Construction and Practices of Strong & Smart Grid

State Grid Corporation of China
5 - 6 April 2011, Hongyu LIN, France
1. PROFILE OF SGCC

- **Service Area**
  - 26 provinces of Mainland China
  - covering 88% of China’s territory

- **Length of Transmission Line**
  - Over 618 thousand kilometers
    - (110 (66) kV and above)

- **Substation Capacity**
  - 2.13 billion KVA
    - (110 (66) kV and above)

- **Customers & Annual Sales**
  - Serves over 1 billion population
  - 258 million customers
  - 2.7 trillion KWH annually

---

State Grid Corporation Of China. All rights reserved. @2011
1. PROFILE OF SGCC

- The largest utility around the world.
- Ranking 8th in the world’s Top 500 Corporations in 2010 “Fortune”.

SGCC is

---

State Grid Corporation Of China. All rights reserved. ©2011
CONCEPTS

PROFILE OF SGCC

PLANNING

PRACTICES
2. CONCEPTS

Strong & Smart Grid is a modern power grid that is based on a strong information and communication platform, with UHV grid as backbone and subordinate grids coordinated at all levels, featured as being IT-based, automatic and interactive.
2. CONCEPTS

Five Major Connotations of Strong & Smart Grid
2. CONCEPTS

Transmission

Transformation

Dispatching

Communication & information support

Generation

Hydroelectric power plant

Nuclear power plant

Thermal power plant

Transformer substation

Power plant

Office buildings

Homes

Buildings equipped with solar power, gas cogeneration, storage cells

Commercial facilities

EV charging station

Solar power panel

Storage cells

Grid control

Controller

Smart meters

Storage cells

Communication & information support

Electricity flow

Information flow

Distribution grid

Electric vehicle

Solar power plant

Homes equipped with solar power and storage cells

Controller

Smart meters

Storage cells

Electric vehicle

Solar power plant

Homes equipped with solar power and storage cells
3. PLANNING

Power Grid Smart Plan

Sub-plans

- for Regional & Provincial Power Companies
- R&D Plan for key equipments of Smart Grid
- R&D Plan for technical standards of Smart Grid

plan for special subjects
Three phases of the development progress of Smart Grid

Phase 1: 2009~2010
Planning & pilot phase

Phase 2: 2011~2015
Overall Construction Phase

Phase 3: 2016~2020
Enhancing Phase
CONTENTS

PROFILE OF SGCC

CONCEPTS

PLANNING

PRACTICES
4. PRACTICES
(1) MAP OF PILOT PROJECTS

Scope: 3 groups 261 items pilot projects, cover 26 provinces, could be the largest practice in the world
4. PILOT PROJECTS  
(2) THE FIRST GROUP

1. Generation

A. Coordination of Conventional Generation and Power Grid
   • 5 regional and provincial companies
   • Completed in June, 2010

B. Wind/PV/Storage/Transmission Joint Demonstration Project
   • ZhangBei district To be completed by the end of 2011

2. Transmission

A. Status Monitoring System for Transmission and Transformation Equipment
   • 8 regional and provincial companies
   • completed by the end of 2010
3. Transformation

B. Smart Substation

- 8 smart substations completed by the end of 2010

4. Distribution

Distribution Automation

- 4 projects completed in Hangzhou, Xiamen, Beijing, Yinchuan
- completed by the end of 2010

5. Consumption

A. AMI

- 24 million smart meters have been applied, cover 26.4% customers
- by the end of 2010
4. PILOT PROJECTS
(2) THE FIRST GROUP

6. Dispatching

Supporting System for Dispatching
- State Dispatching Center, 3 regional companies
- 2 provincial companies, 3 district companies
- completed by the end of 2010

7. Comprehensive projects

Shanghai EXPO Smart Grid Demonstration Project
- 9 demonstration projects and smart grid exhibition in SGCC pavilion
- Completed in Apr. 2010

B. E-vehicle Charging Facilities
- 87 public charging stations and 7031 AC charging spots in 26 provinces and municipalities
- completed by the end of 2010
4. PILOT PROJECTS  
(3) THE SECOND GROUP

1. Generation

A. Large-scale Wind Power Forecast, Operation & Control
- 3 regional companies, 3 provincial companies
- To be completed by the end of 2011

2. Transmission

A. Helicopter/UAV Patrol
- 1 regional company, 3 provincial companies
- To be completed by the end of 2011

B. VSC-HVDC
- Shanghai municipal company
- To be completed by the end of 2011
3. Distribution

A. Distributed PV Generation Integration and Micro-grid Operation & Control

- 1 regional company and 4 provincial companies
- To be completed by the end of 2011

4. Consumption

A. Smart Communities and Buildings

- 6 smart communities in Beijing, Chongqing, Langfang; 1 smart building in Shanghai.
- completed by the end of 2010

B. 95598 Call Center and Website

- Jiangsu and Shanxi provincial companies
- completed by the end of 2010
5. Communication & Information

**A. Fiber to the Home by Optical Fiber Composite Low-Voltage Cable**

- 14 regional and provincial power companies
- 23,000 households completed by the end of 2010

**B. Information Platform and Security**

- 17 regional and provincial companies
- To be completed by the end of 2011

6. Comprehensive projects

**A. Sino-Singapore Tianjin Eco-city Smart Grid Demonstration Project**

- 12 demonstration projects
- To be completed by the end of 2011
4. PILOT PROJECTS (4) R&D CENTER

1. National Energy Research (Experiment) Center for Solar Power (Nanjing) (finished)

2. National Energy Research (Experiment) Center for Grid Connection of Bulk Wind Power (Beijing) (finished)

3. National Energy Smart Grid R&D (Experiment) Center (Beijing & Nanjing) (under construction)
4. PILOT PROJECTS
(5) MOVING FROM FIRST PHASE TO SECOND PHASE

A. 2010 Pilot Projects Evaluation
   - Evaluate the pilot projects finished in 2010

B. New Pilot Projects In 2011
   1. Large-scale PV generation integration
   2. Centralized monitoring for grid operation
   3. Operation & distribution & dispatching for rural power grid
   4. Interactive business hall
   5. Smart industry park
   6. Supporting system for information application
   7. Comprehensive Demonstration for urban areas
117 and 88 topics in 10 categories were selected in 2009 and 2010 respectively for in-depth research.

<table>
<thead>
<tr>
<th>Generation</th>
<th>Transmission</th>
<th>Substation</th>
<th>Distribution</th>
<th>Power Consumption</th>
<th>Dispatching</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Wind power and photovoltaic power generation key technology research</td>
<td>2. UHV DC key technology and related equipment</td>
<td>3. Smart substation key technology and related equipments research</td>
<td>5. Micro-grid technology framework and access technology and distributed energy storage</td>
<td>6. Two-way interactive marketing technology research and demonstration projects</td>
<td>8. Supporting system research of Smart grid dispatching technology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Superconduction magnetic energy storage key technology research</td>
<td></td>
<td>7. AMI</td>
<td></td>
</tr>
<tr>
<td>Communication &amp; information support</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management research</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Smart grid related communication and information technology research</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Smart grid management pattern research</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. PRACTICES
(7) KEY EQUIPMENTS RESEARCH

Scope

- 7 domains
- 28 technical issues
- 137 key facilities

Achievements

- Smart Distribution
- EV charging facilities
- Advanced control center

Releases

- R&D Plan for Key Equipments of Smart Grid, released on June, 29, 2010
4. PRACTIC
(8) STANDARDIZATION SYSTEM RESEARCH

**Scope**
- 8 domains
- 26 technical fields
- 92 standards series

**Achievements**
- 186 smart grid technical standards by the end of 2010

**Releases**
- R&D Plan for Key Technical Standards of Smart grid, released on June 29, 2010
Thank you!