Power Development and Planning in China

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August 29, 2017
Outline

1. Introduction of power industry in China
2. Power planning and cooperation of China
3. ESCAP Energy Connectivity expert working group
1. Introduction of power industry in China
China’s Primary Energy Consumption in 2010-2016

Primary Energy Consumption Structure in 2016

Non-fossil energy increases to 13.5%
Coal drops by 1.7%

China’s Primary Energy Production in 2010-2016

Primary Energy Production Structure in 2016

Non-fossil energy increases to 16.7%
Coal drops by 2.5%
Power Consumption and Generation

**National Power Consumption in 2010-2016**

- **Consumption (TWh-hours)**
  - 2010: 14.8%
  - 2011: 12.0%
  - 2012: 5.6%
  - 2013: 7.6%
  - 2014: 5.6%
  - 2015: 1.0%
  - 2016: 5.0%

- **YOY growth**

**Structure of Installed Power Generation Capacity**

- Gas: 4%
- Hydro (Conv.): 19%
- Pump Storage: 2%
- Wind: 9%
- Solar: 5%
- Nuclear: 2%
- Others: 2%
- Coal: 57%

- **National Power Consumption in 2010-2016**

**Growth Rate of Electricity Consumption by Sector in 2016**

- Primary Industry
- Secondary Industry
- Tertiary Industry
- Households

**Structure of Power Generation**

- Gas: 3%
- Hydro (Conv.): 19%
- Pump Storage: 1%
- Wind: 4%
- Solar: 1%
- Nuclear: 4%
- Others: 3%
- Coal: 65%

**Consumption (GW)**

- 2010: 1650
- 2016: 5920

**Growth Rate**

- Primary Industry: 5%
- Secondary Industry: 15%
- Tertiary Industry: 10%
- Households: 25%
Non-Fossil Fuel Power Generation

Wind Power Output and Growth Rate in 2011-2016

Solar Power Output and Growth Rate in 2011-2016

Hydro Power Output and Growth Rate in 2010-2016

Nuclear Power Output and Growth Rate in 2010-2016

Share in primary energy production:

- Wind: 50%  39%  34%  16%  16%  30%
- Solar: 400%  500%  133%  180%  68%  68%
- Hydro: 18%  29%  4%  19%  5%  5%
- Nuclear: 7%  17%  13%  13%  19%  29%  24%

- Wind in 2016: 241 TWh
- Solar in 2016: 66.2 TWh
- Hydro in 2016: 213 TWh
- Nuclear in 2016: 1650 TWh

Output (Tera-watt-hours)

Growth rate

2.1%
0.6%
10%
1.8%
In 2016, the distance of power lines (≥220 kV) is 642,000 km, with 614,000 km AC lines and 28,000 km DC lines. The total substation capacity (≥220 kV) is 3420 GVA.
Energy investment decreases by 9%

Fixed Asset Investment in 2010-2016 (Billion Yuan)
Power Interconnection with NEA countries

China - Russia
500/220/110KV
Import: 3.29 Twh

China - Mongolia
220/10/35KV
Export: 1.11 Twh

China-Russia
500/220/110KV
Import: 3.29 Twh
2. Power planning and cooperation of China
Basic industry, highly correlated with others

Huge investment, long construction period

Systematic engineering

- Scientific planning can assure economical efficiency of the power system. And it can meet the needs of economic and social development.
Power Planning of China

Power Industry Planning System of China

National Development Planning

Energy Industry Development Planning

Power Industry Development Planning
Process of Power Industry Planning

Achievement review  Developing trend analysis  Objective setting  Task assignment  Guarantee measures

Power management system in China

National level  Provincial level  Enterprise level
In 2013, China raised the initiative **the Belt and Road**, which runs through the continents of Asia, Europe and Africa.

The main aspects of the Belt and Road are policy communication, facilities interconnection, trade flow, financial integration, and connection between people. As energy and power industry is the fundamental sector to support economic development, **energy and power cooperation is the key point of the Belt and Road.**

- Improve infrastructure connectivity
- Increase cooperation on production capacity and equipment manufacturing
- Participate global energy governance
International Cooperation with NEA countries

• China-Russia Power Cooperation Planning
• China-Mongolia Energy Cooperation Planning
Opportunities

- As a major electricity consumer in NEA, China’s electricity demand still has a certain growth. Under proper economic and technical conditions, China can consider importing electricity from Mongolia and Russia.

- Korea and Japan are relatively short of energy resources. Under proper economic and technical conditions, China-Korea-Japan power grid interconnection can be promoted to transfer electricity from China to Korea and Japan.

- UHV AC/DC technology has become mature and is widely applied in China, which provides possibility for long-distance and large-scale power grid interconnection.
Challenges

- In the short term, the growth of China’s or even the world’s electricity demand will slow down. Before 2020, China's installed generation capacity will be more than necessary.

- The China-Korea-Japan power grid interconnection requires cross-sea transmission projects, which result in high costs and high technical difficulties. A better transmission scheme is needed.

- With consideration of laws and policies of relevant countries, study on mechanism and institution for construction and operation of interconnection projects is needed.
Power Interconnection Planning with NEA Countries

- China-Russia
- China-Mongolia
- China-Korea-Japan
3. ESCAP Energy Connectivity expert working group
During the 73rd Session of ESCAP, the establishment of Energy Connectivity expert working group is proposed by China.

To launch related work, the first Energy Connectivity expert working group meeting is planned to be organized at the end of 2017 in Beijing.

Entrusted by National Energy Administration of China, Electric Power Planning & Engineering Institute (EPPEI) will join the Energy Connectivity expert working group and undertake the secretariat work of this working group from China side.
Electric Power Planning & Engineering Institute (EPPEI)

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Thank you very much for your attention!