The Preliminary Concept of China-DPRK-ROK Power Interconnection

CHINA ELECTRICITY COUNCIL
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1. Background

Under the various initiatives:
“Asia Super Grid”,
“Northeast Asia Super Grid”,
“Global Energy Interconnection”,
“Gobitec Initiative”, etc.

3 NEA-RPIC Forums
Northeast Regional Power Interconnection and Cooperation Forum

5 the NEA Energy Security Forums

2 workshops in Russia, 2014 and 2015

Conference on NEA Energy Connectivity in Ulaanbaatar, 2015

3 workshops, 2 in China and 1 in Russia from 2001 ~ 2003:
Power Grids Interconnection in Northeast Asian

......, etc.
1. Background

Some multilateral or bilateral planning studies underway in parallel or in preparing.
1. Background

Good beginning, constructive talks, uncertainties, barriers to be overcomed, tensions alleviated possibly

March.25, 2018

April.27, 2018

Jun.12, 2018
2. Current Status

Northeast China Power System

Generating Capacity
2017 Total: 139.09GW

- Coal (92.51)
- Nuclear (4.48)
- Hydro (8.12)
- Wind (27.62)
- Solar (6.35)

Annual Generation
2017 Total: 463.606 TWh

- Coal (366.37)
- Nuclear (23.6)
- Hydro (15.13)
- Wind (53.4)
- Solar (5.11)
2. Current Status

ROK
Generating capacity
2015 Total: 103.019GW
Source: UN

DPRK
Generating capacity
2015 Total: 9.5GW
Source: UN

ROK
Annual Generation
2017 Total: 571.7TWh
Source: BP

DPRK
Annual Generation
2015 Total: 13.737TWh
Source: UN

ROK Generating capacity
2015 Total: 103.019GW
Source: UN
- Thermal(70.108)
- Nuclear(21.716)
- Hydro(6.471)
- RES(4.277)
- Other(0.447)

DPRK Generating capacity
2015 Total: 9.5GW
Source: UN
- Thermal(4.5)
- Hydro(5)

ROK Annual Generation
2017 Total: 571.7TWh
Source: BP
- Thermal(397.6)
- Nuclear(148.4)
- Hydro(3)
- RES(16)
- Other(6.7)

DPRK Annual Generation
2015 Total: 13.737TWh
Source: UN
- Thermal(3.737)
- Hydro(10)
2. Current Status

China-DPRK Hydro Power Company

- Yunfeng HPP, 630MW 3.3TWh/Y
- Shuifeng HPP, 400MW 1.3TWh/Y
- Taipingwan HPP, 190MW 0.6TWh/Y
- Weiyuan HPP, 390MW 0.9TWh/Y

4 HPPs on the border river between China and DPRK
3. Suggested Interconnection Scheme

Power System Adequacy for Northeast China power system

Basic assumptions
- Reserve: 15~18% of installed capacity including spinning, emergency and maintenance
- Export to North China: 3000MW
- Import from Russia: 720MW
- Wind capacity: 5% of installed wind capacity

Adequacy projection in 2020
Surplus generation capability: 3000~4000MW

High power flow in summer and winter peak
3. Suggested Interconnection Scheme

Site selection: the sending end

The HVDC station site
Generating resources concentrated area

High power flow in summer and winter peak

3 terminal HVDC Scheme

DPRK transmission system
3. Suggested Interconnection Scheme

3 terminal ± 500KV HVDC Scheme

Terminal 1:
Sending end in Changchun
Rectifier 3000MW

Terminal 2:
Receiving end in Pyongyang
Inverter 1000MW

Terminal 3:
Receiving end in Seoul
Inverter 2000MW

Straight line distance:
Changchun-Pyongyang 533 km
Pyongyang-Seoul: 182 km

Estimated engineering distance:
Changchun-Pyongyang 640 km
Pyongyang-Seoul: 218 km
3. Suggested Interconnection Scheme

The ongoing study

- ±800KV
- ±500KV
- ±500KV
3. Suggested Interconnection Scheme

![DPRK annual generation chart]

Source: UN
3. Suggested Interconnection Scheme

2017 Cost Standards for Transmission Projects

HVDC converter station: **501.13RMB/kW**

Terminal Changchun: 3000MW
Terminal Pyongyang: 1000MW
Terminal Seoul: 2000MW

Transmission line: 858km (engineering distance)

The project cost of the 3 HVDC terminals and line

**1 billion US$ estimated**
Thank You!

Welcome you to contact me:

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