

# **KEPCO's Progress & Future of NEA Supergrid**

2018. 3. 8.

# CONTENTS



**1** Power System in Korea

**2** Background & Purpose

**3** Current Status & Progress

**4** Challenges & Future plan

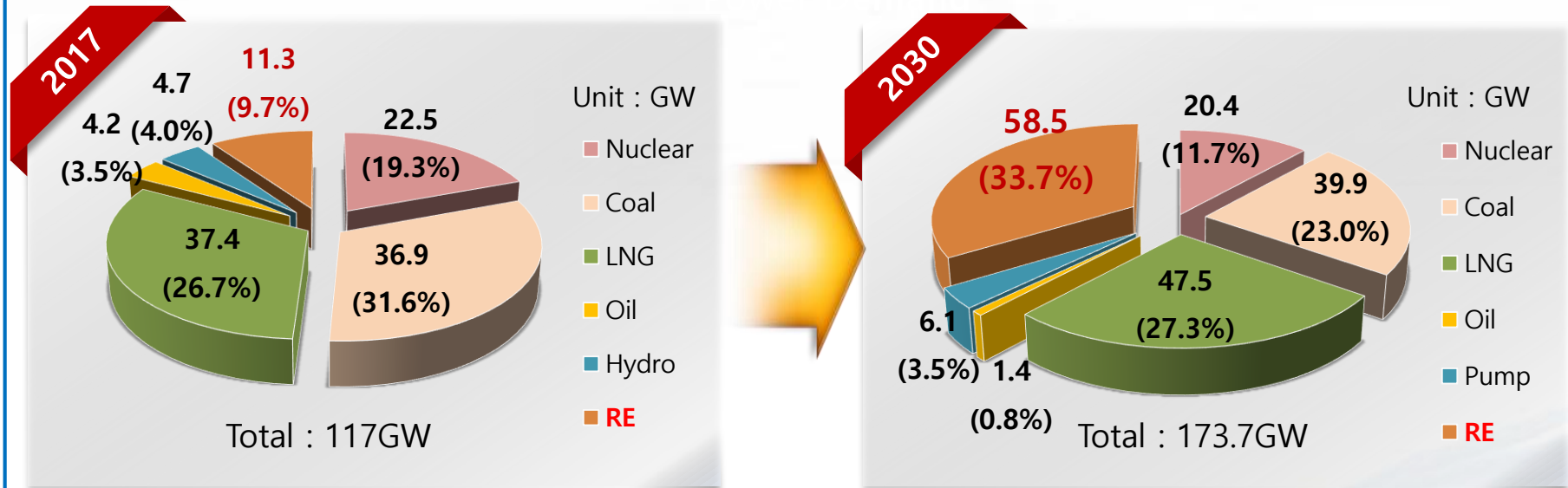




# 1-2 Energy Policy in Korea

## Government Policy on Nuclear & Coal

### Outlook of Power Source Mix(Installed capacity)



### Phasing out of nuclear power plants

> Cancellation of 6 planned units (8.5GW), Service life expansion not allowed

### Early shut-down of the aged coal-fired power plants

> Early shut-down of 10 Units (3.3GW), 6 existing units will be converted to LNG



# 1-3 Challenge for Renewable Energy

## Renewable Energy Vision 3020



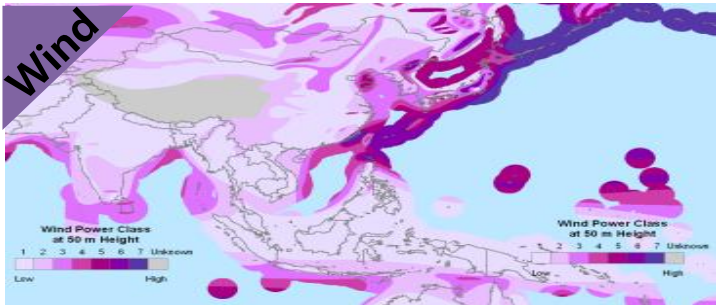
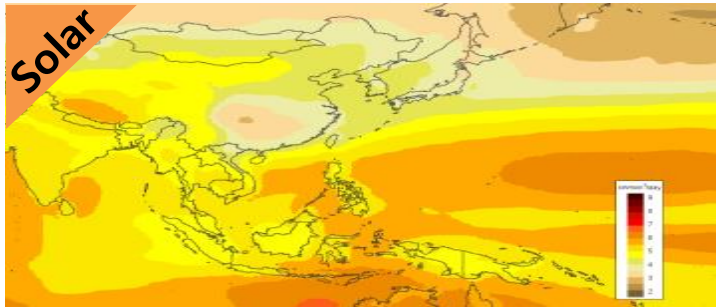
### Renewable Energy Expansion

- > 20% of power generated by Renewable Energy
- > Waste, Bio-mass centered ⇒ Solar, Wind centered



# 2-1 Paradox: Renewable Energy Resources

## Renewable Energy Resources vs Demand



- **Unevenly distributed renewable energy resources**

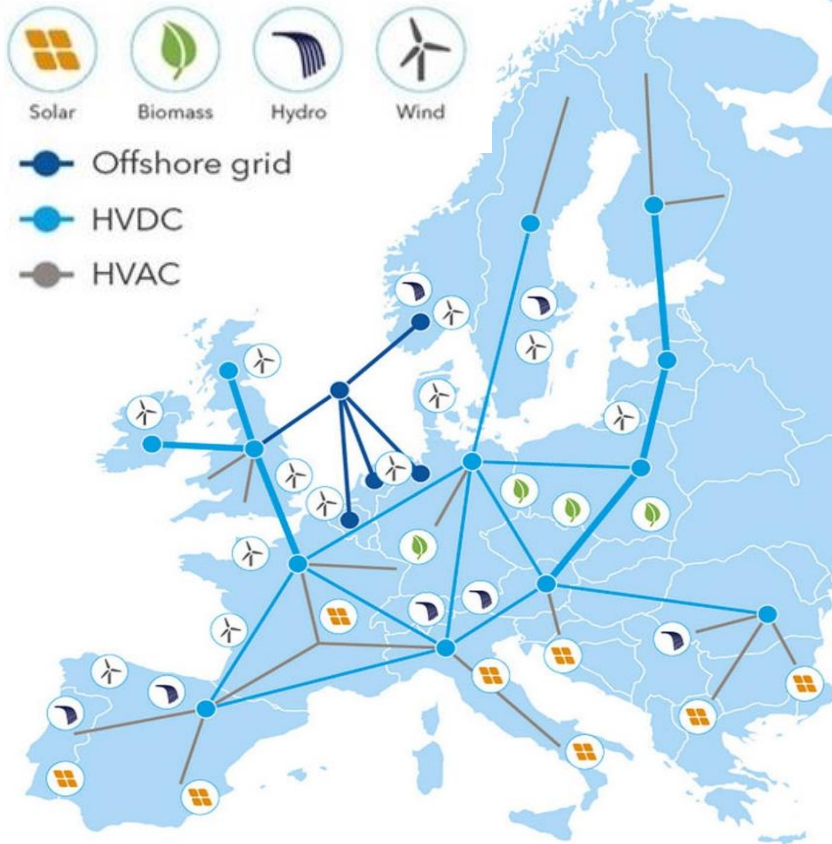
- > The area rich in renewable energy resources is remote from demand areas

***“MORE renewable energy resources, LESS demand”***

# 2-2 Paradigm Shift on Supergrid

## New paradigm

Conceptual European supergrid structure connecting renewable power sources



## Past

- To overcome power shortage
- To enhance the stability of power system securing power reserve

## Present

- To integrate diverse energy sources
- To make effective use of electric power through power trading



# 3-1 KEPCO's Vision of NEA Supergrid

## Vision

- Joint development and utilization of renewable energy in NEA  
⇒ Joint strategy for global climate change & environmental pollution

## KEPCO's NEA Supergrid Concept





# 3-2 KEPCO's Progress (1)

## Major Progress / China-Korea-Japan

'16.03

**MOU on Joint Promotion of Power Grid Interconnection between SGCC(China)-KEPCO-SoftBank(Japan)-Rosseti(Russia)**

'16.06

**Joint Pre-F/S on Mongolia-China-Korea-Japan Power Grid**

~  
'17.03

**Interconnection between SGCC-KEPCO-SoftBank**



# 3-2 KEPCO's Progress (2)

## Major Progress / Russia-Korea

'12.10 ~ 14.09 **Feasibility Study for Korea-Russia Power Grid Interconnection**  
▶ KEPCO, KEEI, Korea University, Yulchon LLC

'17.09 **President of Korea proposed NEA Supergrid Establishment**  
▶ Eastern Economic Forum in Vladivostok, Russia



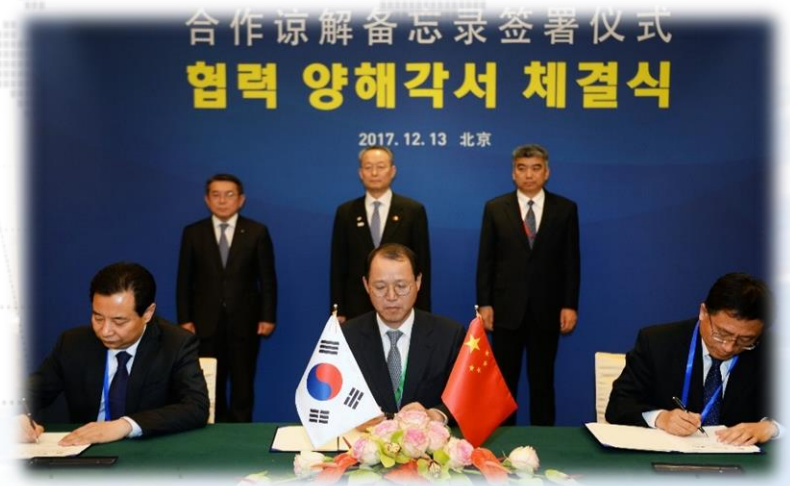
# 3-3 C-K Power Grid Interconnection (1)

## Joint Project Development MOA

- KEPCO – SGCC – GEIDCO / '17. 12. 13. 14:00
- To develop China-Kore Power Grid Interconnection Project within the framework of the M-C-K-J Power Grid Interconnection Project

## Major contents

- Establishment of Steering Committee & Joint Working Group
- Joint conduct of a further study;
  - Technical & economical feasibility
  - Power market, regular policy, etc.
- Development of addition agreements including JDA





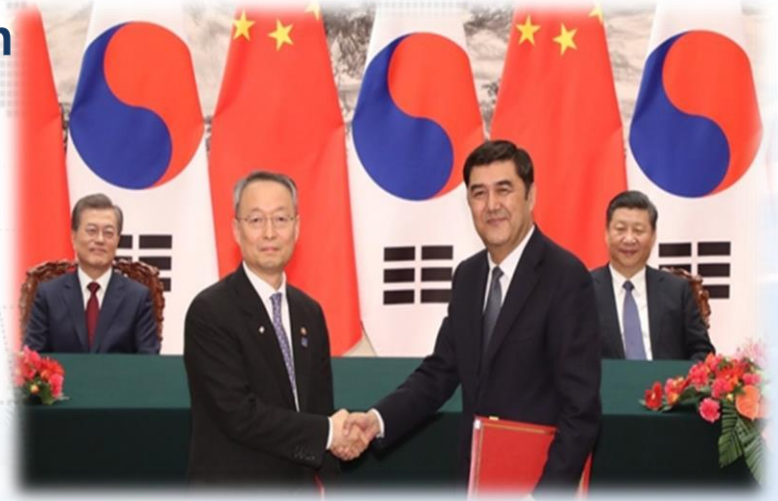
# 3-3 C-K Power Grid Interconnection (2)

## Inter-Governmental Cooperation MOU

- Korea MOTIE – China NEA / '17. 12. 14. 16:00
- To establish a cooperation channel in the energy sector including;
  - Energy policy exchange, High-level conference, etc.

## Major contents

- Study on power grid interconnection
- New energy industry, Renewable energy, Energy efficiency related to climate change and Greenhouse Gas
- Natural gas trade, etc.



# 3-4 Formulation Policy on NEA Supergrid

## 8th Basic Plan for Long-term Electricity Supply and Demand

산업통상자원부 공고 제2017-611호  
(2017. 12. 29)

### 제8차 전력수급기본계획 (2017~2031)

2017. 12. 29

 산업통상자원부

#### ④ 「동북아 슈퍼그리드」 구축을 통한 독립계통 한계 극복

- 한-중-일, 한-러 송전망 구축을 통해 극동 시베리아 및 몽골 고비사막의 청정에너지(천연가스·풍력)를 동북아 국가가 공동사용
- 주변국과의 예비력 공유로 '계통섬'이라는 지리적 한계를 극복함으로써 전력수급 우려 해소, 동북아 역내 긴장 완화

< 동북아 슈퍼그리드 연계도 >



- '22년까지 ① 일부 구간 착공, ② 한-러간 공동연구 완료를 목표로 관련 절차를 최대한 신속하게 추진
- 각국 정부·민간기관간 확고한 협력채널 조성, 동북아 슈퍼그리드 구축을 위한 공감대를 형성하고 실무검토\* 진행 (~'19년)
- \* (기술성) 기술적 가능성, 장애요인 분석, (경제성) 사업모델, 수익·비용 검증 등
- 특수목적법인(SPC) 설립을 통해 추진동력을 확보하고, 공동해양조사, 자금조달 등 후속작업도 병행 추진 ('20.上)

### ■ Government Policy : Implementation of NEA Supergrid

> Jointly utilize clean energy sources in NEA

# 4-1 Potential Risks in Supergrid Project

## Risk Factors

Source : Dr. McKinstry, the European Supergrid – Messiah or Pariah, 2013

| Factors                            | Rank     | Risk Index(%) |
|------------------------------------|----------|---------------|
| ▪ <b>Policy</b>                    | <b>1</b> | <b>87.8</b>   |
| ▪ <b>Financial</b>                 | <b>2</b> | <b>85.6</b>   |
| ▪ <b>Planning &amp; Consenting</b> | <b>3</b> | <b>83.1</b>   |
| ▪ <b>Political</b>                 | <b>4</b> | <b>76.3</b>   |
| ▪ Infrastructure                   | 5        | 66.0          |
| ▪ Operational                      | 6        | 64.3          |
| ▪ Technical                        | 7        | 50.0          |

⇒ **Policy, Financial, Planning & Consenting, Political Risks**  
**are much bigger than Technical and Operational Issues**



# 4-2 Key Success Factor in Europe

## Key Factors

- European Commission forms regulatory frameworks for supergrid
- Cross-border transmission operator(ENTSO-E) has been introduced

### EC: Policy making

- Trans-European Energy Network
  - Framework for cross-border development on interconnection, Inter-operability, etc.
- The Third Energy Package 2009
  - Common Rules and Regulations for cross-border grid interconnection

⇒ *Inter-governmental  
Cooperation required*

### ENTSO-E: Coordination of TSOs

- Established in Dec 2008
- 42 TSOs from 34 countries in EU
- Major roles of ENTSO-E
  - Integration of renewable energy sources(RES)
  - Technical cooperation between TSOs, etc.

⇒ *Cooperation between the  
Parties(or TSOs) required*

# 4-3 Governance Establishment

## Public: Inter-Governmental Agreement(IGA)

- Joint declaration of NEA Supergrid Promotion
  - Mitigate Policy/Political Risks
  - Less uncertainty & More comfort to the shareholders
- Principles & Foundation for mutual cooperation



*Interaction*



## Private: Joint Development Agreement(JDA)

- How to develop and implement NEA Supergrid
  - Mitigate Financial/Planning & Consenting Risks
- Define: Business model, Roles of each Party, Project development schedule, Financing plan, etc.



*Addressing  
Inter-  
Governmental  
Agenda*

# 4-4 Challenges in the Future

## Cooperation Field





# 4-5 Towards One Asia



A city skyline is visible in the background, rising from a sea of white, fluffy clouds. The sky is a vibrant blue, featuring a bright sun in the upper right corner with several large, overlapping lens flare circles. The text "Thank you" is centered in the middle of the image.

Thank you