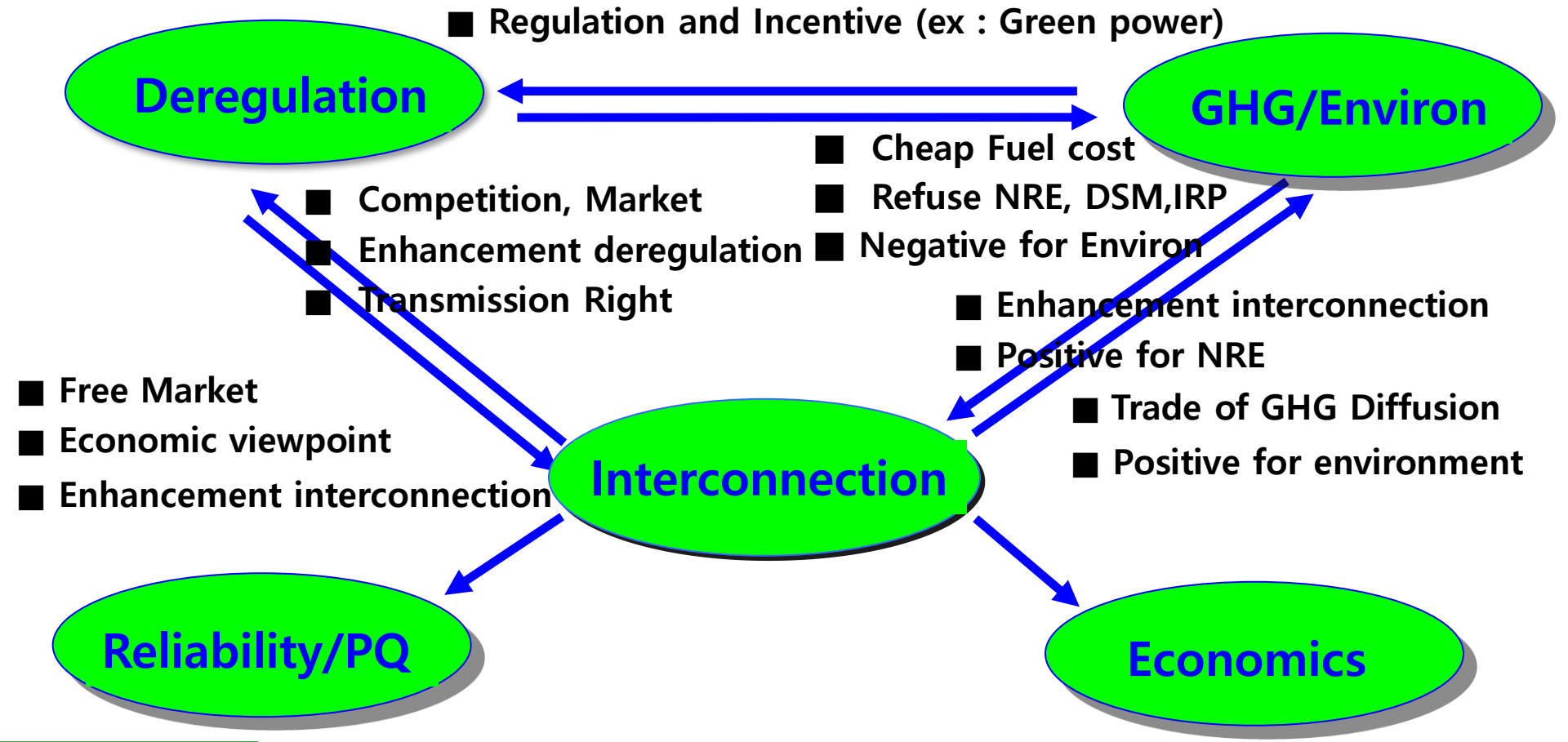
Overview on Policies and Plans for Renewable Energy in Korea

(ESCAP-GTI Seminar)

July 07. 2021.

Jae Young YOON

<PSI/CBT & Relation Factors>



<Benefits of Power Market Integration>



Diversity of Generation Plants
Harmonize & Optimization of Generation Mix



Promotion of RES Development
CO_2 Emission Reduction



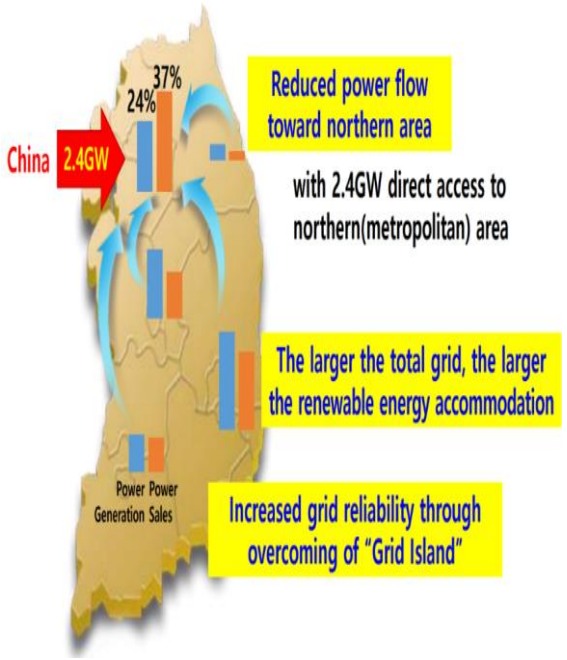
Interconnector Development, Bulk Energy Trading
CDM Project Extension



Stimulate of New Energy Resources
Decrease of Middle-East Energy Dependency

<Background of PSI in Korea's Perspective>

- **Governmental Policy**
  - **3020 & 4030 Policy for Renewable Energy Supply Increasing**
    This means the target of Renewable Energy Supply will be 20% and 30% or more in 2030 and 2040
  - **2050 Carbon Neutrality Policy :**
    Net Carbon Emission "Zero" Policy in 2050
- **National CO_2 Reduction Plan**
  - Transition Sector, especially for Generation part
  - Power Interconnection using Renewables …
- **Regional Intra-Trading Congestion**
  - Load Center, SEOUL,
  - Generation site : east and southern part
- **Overcome the Electricity Island**
  - Two options of PSI with DPRK & Others …



<Power Supply Plan in Korea>

- **[Korea] Renewables will be rapidly increased for Carbon zero ….**
  - **[9th National Plan on Power Supply]**
    - **[Demand] Expected Peak Load 89.1GW(2020) → 102.5GW(2034)**
      It's only annual increase rate of 1.0%, Demand will be saturated …
    - **[Supply] Increasing Renewables/LNG, Decreasing Nuclear/Coal**
      Based on Reserves 22%

	2020	2034	Remarks
Nuclear	23.3GW	19.4GW	26Gens(24)→17Gens(34)
Renewable	20.1GW	77.8GW	Green New Deal Policy Target
Coal	35.8GW	29.0GW	Abolition 30 Coal Gens.
LNG	41.3GW	59.1GW	Convert 24 Coal Gens to LNGs

<CO_2 Reduction Plan>

- Power generation sector accounts for 34% of total CO2 emission
  - Average emission quantity per kWh is around 0.459 tCO2/MWh
- CO_2 emission target of 536Mtons including the additional reduction potential of transition sector in 2030.
  → 37% reduction target for the existing scenario and 22.3% lower than 2015

Subject	CO2 Target	Remarks
Total(2030)	574.3Mtons (608.4-34.1)	Including 34.1Mtons for additional reduction potential of transition sector
Subtotal	536.0Mtons (574.3-38.3)	38.3Mtons reduction by importing or forest resources absorption
Transition sector target	192.7Mtons (333.2-140.5)	Prospective amounts 333.2Mtons, Reduction quantity 140.5Mtons(42.2%)

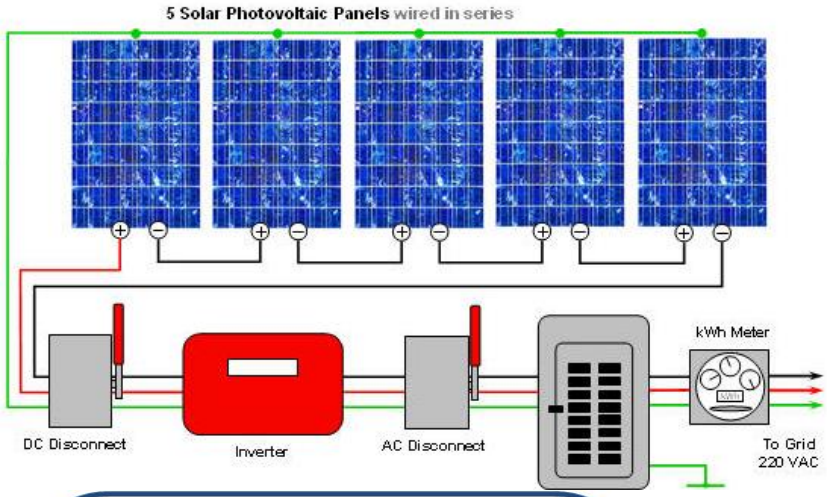
<Volatility Compensation Plan for Renewables>

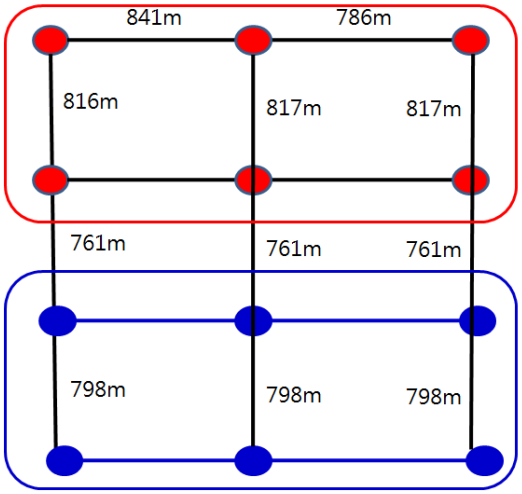
- **Backup Generation Facilities**
  - Pumped Storage(1.8GW Add)+ESS(1.0GW) +LNG(18GW) ….
- **Demand Response**
  - Promotion of New Business Maker
  - Cost Recovery
- **Market Regulations & Cost Compensations**
  - Ancillary Service Expansions
  - Frequency Response and Operating Reserves
- **Renovation of System Operation Technology**
  - Application of New REMS(Renewable Energy Management System)
  - Technology Development of Renewable Output Expectation(Volatility)
- **Interconnection with Neighbouring Countries**
  - Renewable Energy Trading …
  - International Business & Market Institutional Changing …

<Export/Import Potential>

- **High Renewable Potential of NEA**
  - GOBITEC : Solar & Wind
  - Russia : Hydro & Tidal and so on
- **Importing Capability of Korea**
  - Max 5GW, 3GW for 1-country/point because of Energy Security
    (5% of Peak Load(100.5GW), Demand 589.5TWh in 2030, KOREA)
  - CO_2 reduction target by 37%(25.7% by domestic activity, 4.5% by international trading)
  - Average Generation Price : 7.28[cents/kWh]
    → Expected Future RES Price in 2030, KOREA
- **No Limit for Power Trading in NEA including China**
  - China, Largest Power Trading Potential in the World
  - Already Processing on PSI with neighboring countries (RU/KR/CH …)

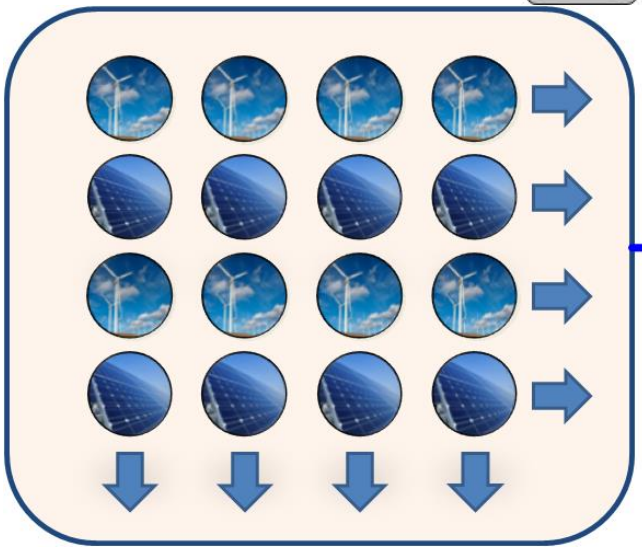
<Wind & Solar Farms & Interconnector>





REPOWER 5M Model
6 Units 30MW

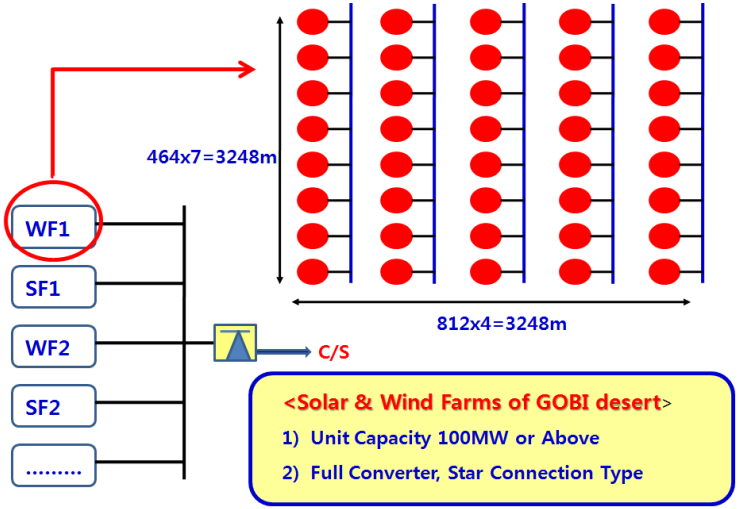
AREVA M5000 Model
6 Units 30MW



WF
SF

WIND FARM 0.1GW or
SOLAR FARM 0.1GW

<EX) 5MWx8x5 = 200MW Wind Farm Generation>



<Solar & Wind Farms of GOBI desert>
1) Unit Capacity 100MW or Above
2) Full Converter, Star Connection Type

<CBT Projects & Scenarios in NEA>

- **Many Studies performed on NEA-CBT since 2000 (Multilateral PSI)**
  - NEAREST (KERI, ESI 2003)
  - Asian Super Grid (JREF 2011)
  - GOBITEC (ECS 2014)
  - Northeast Asia Supergrid (KEPCO, KEEI with Skoltech, 2014)
  - GRENATEC (HRENATEC 2010)
  - Asia Pacific Power Grid (Japan Policy Council 2011) …
- **Bilateral PSI Scenarios**
  - KO-CH, KO-JP, KO-RU in terms of KOREA
  - CH-RU, RU-JP …
- **Eco-friendly Energy Import to Korea**
  - Korea wants to Eco-friendly and Energy Security guaranteed Import
  - This is a very hot issue in both positive and negative viewpoints

<Recommends>

- 3020 & 4030 Policy for Renewable Expansion
- Carbon Neutrality Policy in 2050 for Net CO_2 Emission "Zero"
- Renew. Volatility Countermeasure : Supply/Demand/Policy Side
- Interconnector can be a Alternative for Renewable Volatility
- Renew./Deregulation/Interconnector/Economics complex issues
- So many Issues to be solved for Renew./Carbon Neutrality
- Carbon Neutrality should overcome so many barriers ...