From Possibilities to Reality: Discussion of interconnectors in Korea

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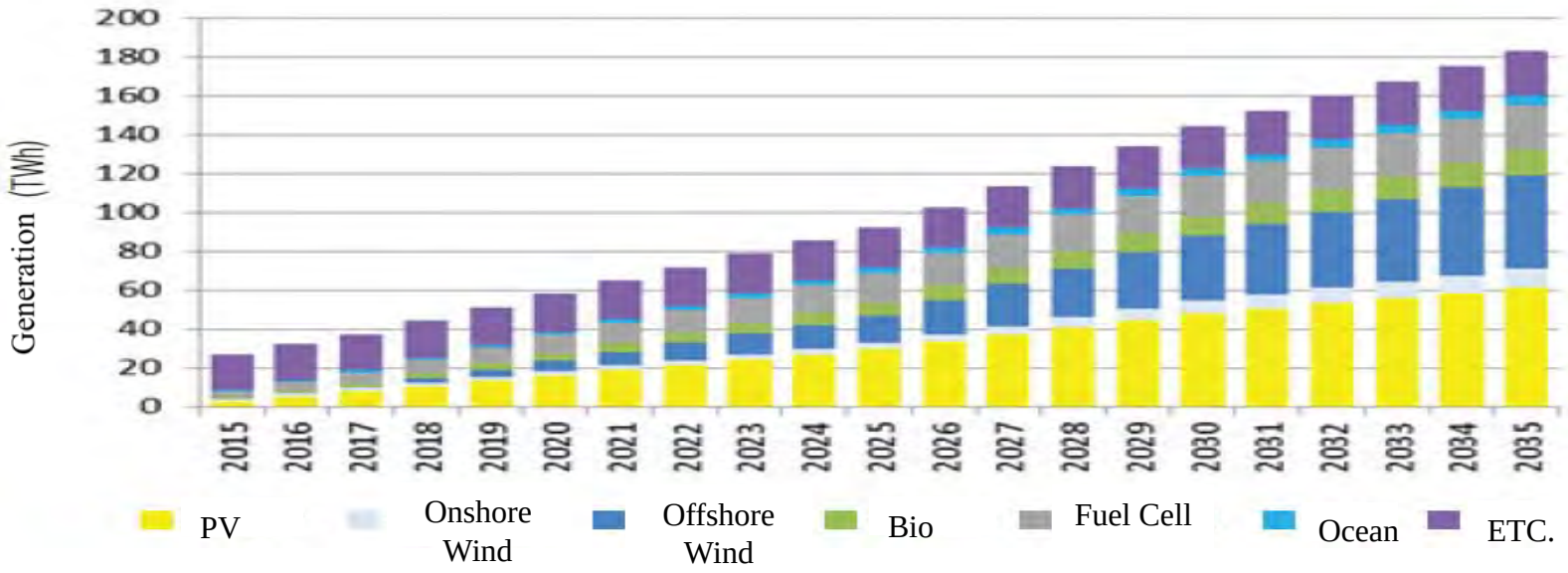
Energy Transition in Korea

- **Expansion of renewable energy supplies: 20% of the gross electricity consumption by 2030**

<Estimated Renewable Resources Capacity (in 2030)>

	PV	WIND	Others	Total
Installed Capacity (GW)	33	15.7	13.9	62.6
Share (%)	52.7	25	22.3	100



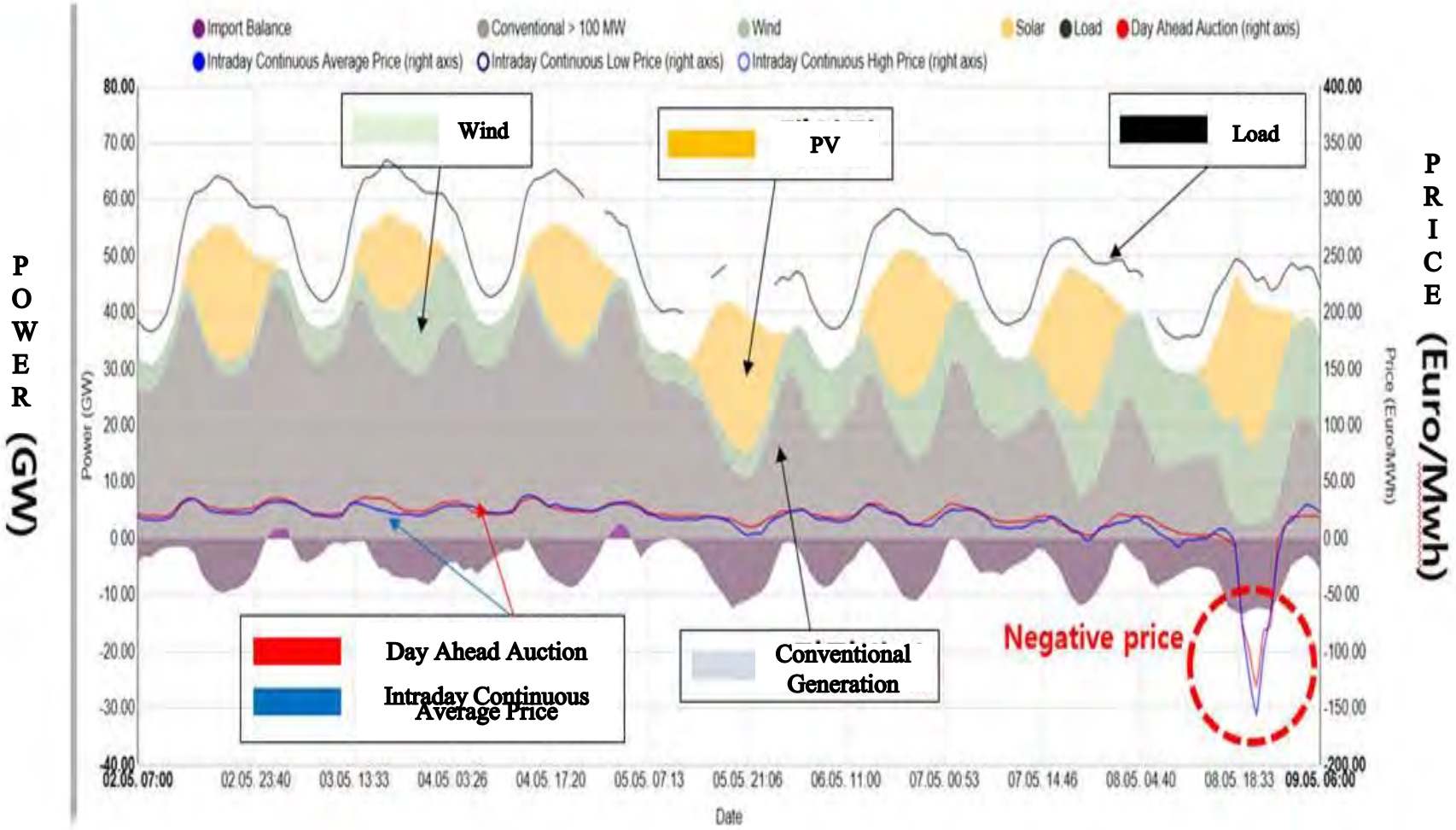
Energy Transition in Korea

- **How to operate an isolated power system with 50 GW variable sources and 100.5 GW loads**
  - ✓Large balancing power is needed

- **Possible balancing power**
  - ✓Fast power reserve (power system flexibility)
  - ✓Energy storage
  - ✓Demand response
  - ✓Renewable energy curtailment
  - ✓Power system interconnection

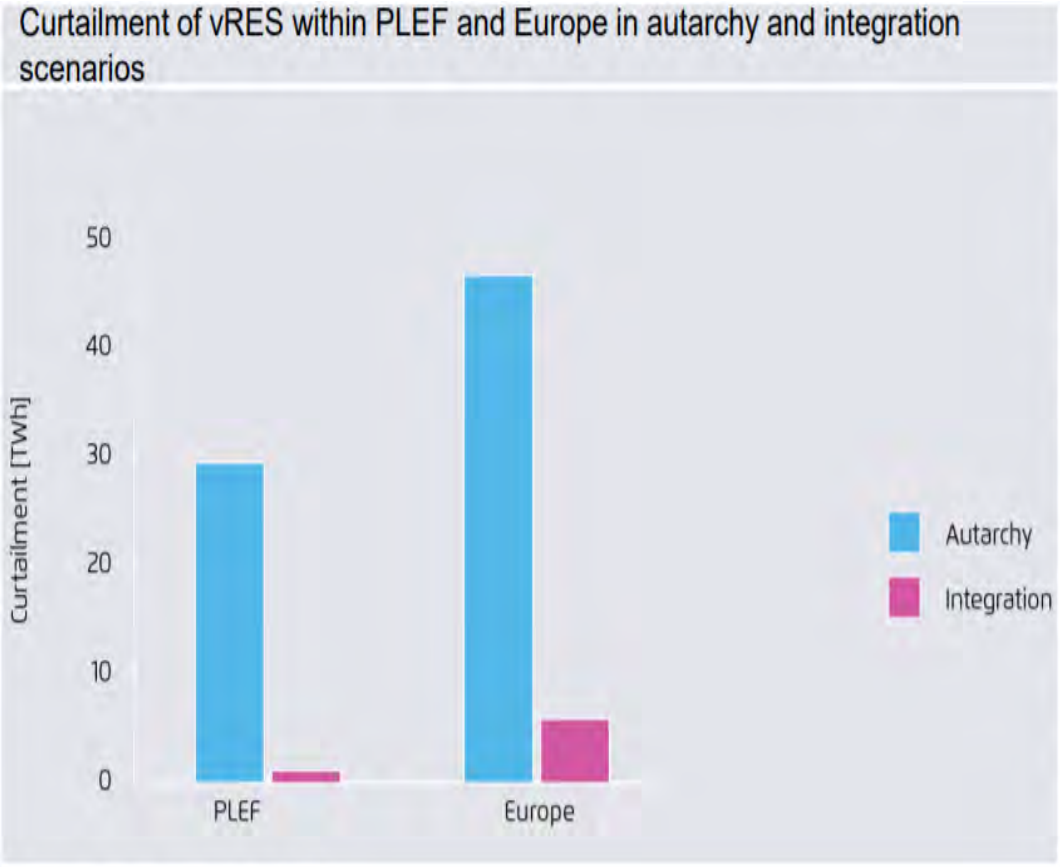
Case with high RES penetration

Electricity production and spot prices in Germany in week 18 2016



Renewable Energy Curtailment Decrease

- **Effective surplus power distribution with interconnection**
  - ✓Wind & PV curtailment decreases over 10 times



Curtailment is greatly reduced by market integration

Curtailment in autarchy case is ten times higher due to lack of exchange options with other regions

Not only cross-border grids are important, but also enough transfer capacities within countries must be available

Still, avoiding curtailment altogether would be difficult to achieve just by increasing transfer capacities, as highly correlated feed-in situations can occur

*The European Power System in 2030

North-East Asia SuperGrid

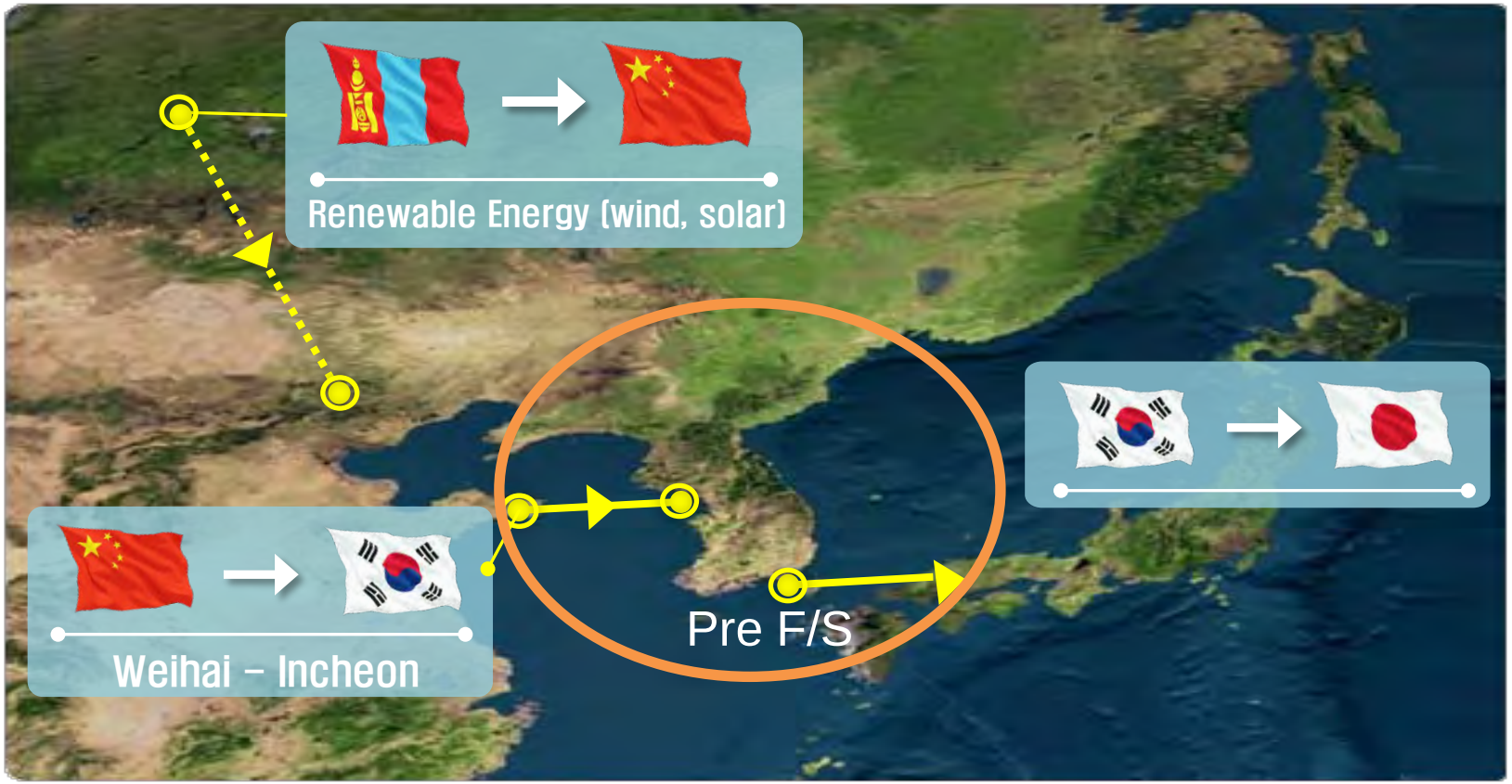
Benefits of NEA SuperGrid

- Rich resources (Mongolia, China, Russia)
- High energy demand (China, Korea, Japan)
- Different power peak demand period
- Importance of sustainability

Economy	Effective use of natural resources
Environment	Utilization of eco-friendly resources
Reliability	Large-scale interconnected power system
International Cooperation	Extending to economic community

Preliminary Feasibility Study of C-K-J

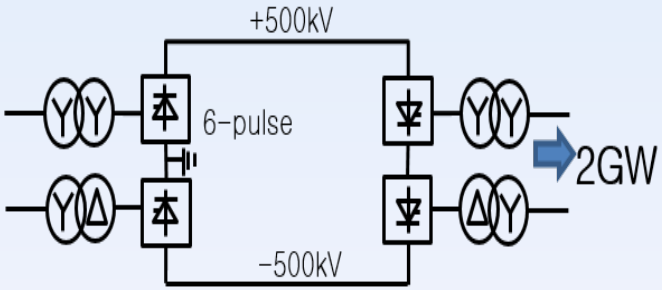
- HVDC Transmission (2 GW)
- Sea depth (72m, 200m)
- Connection length (366km, 460km)



Preliminary Feasibility Study of C-K-J

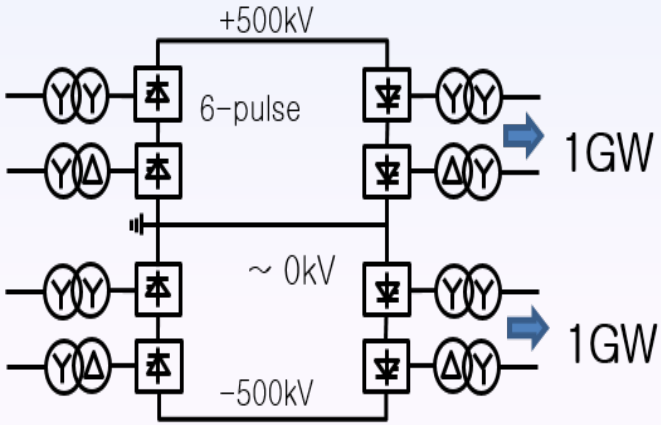
C-K-J Interconnection plans (865km)

Economic Plan: Nano Composite XLPE & VSC



- **Developing technology**
  - Cable: 400kV (’19~ Track record)
  - Converter: To be developed

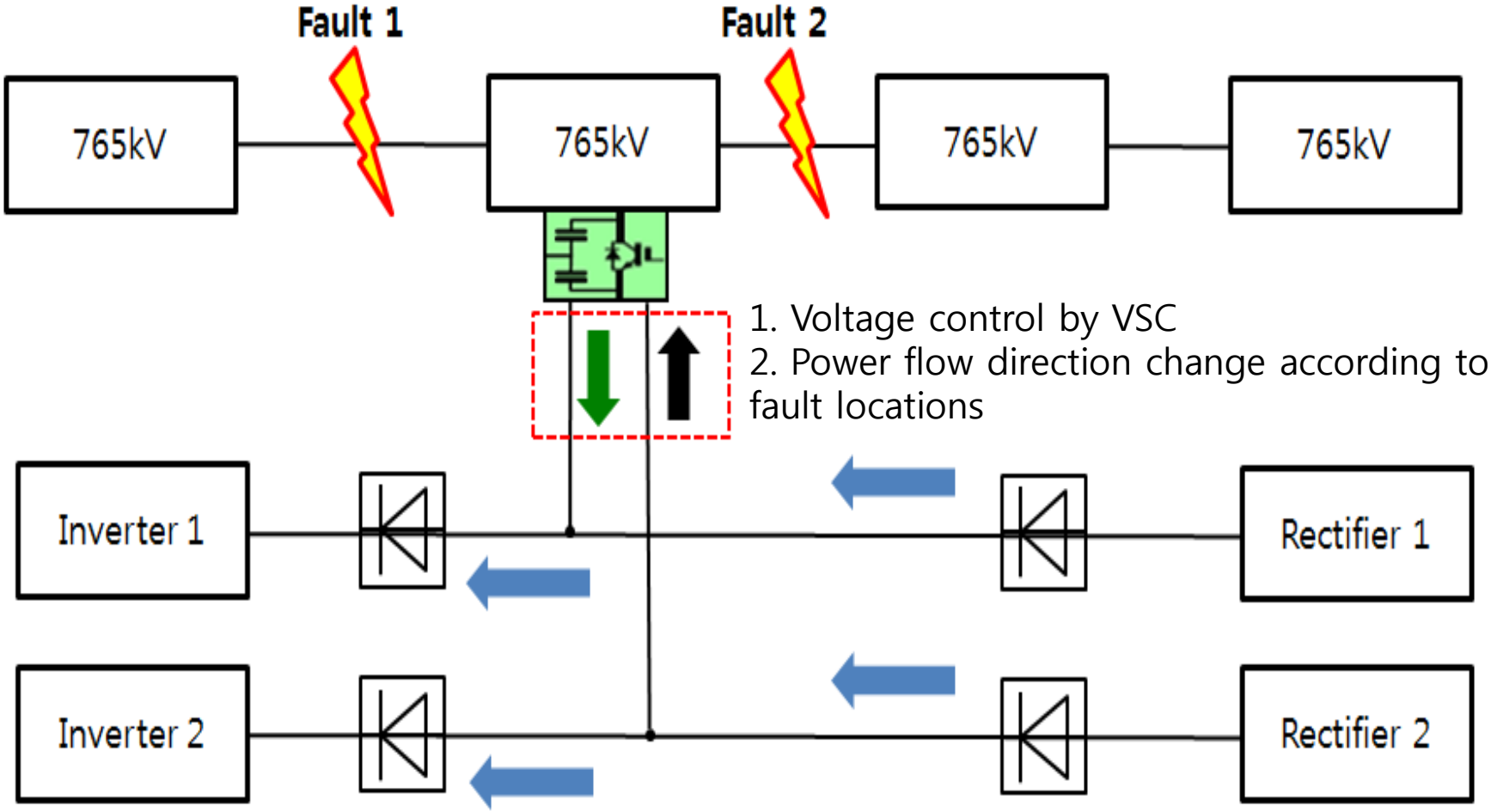
Reliable Plan: MI PPLP & LCC & Bi-pole



- **Available Technology (Track record)**
- **Reliable operation with one pole outage**

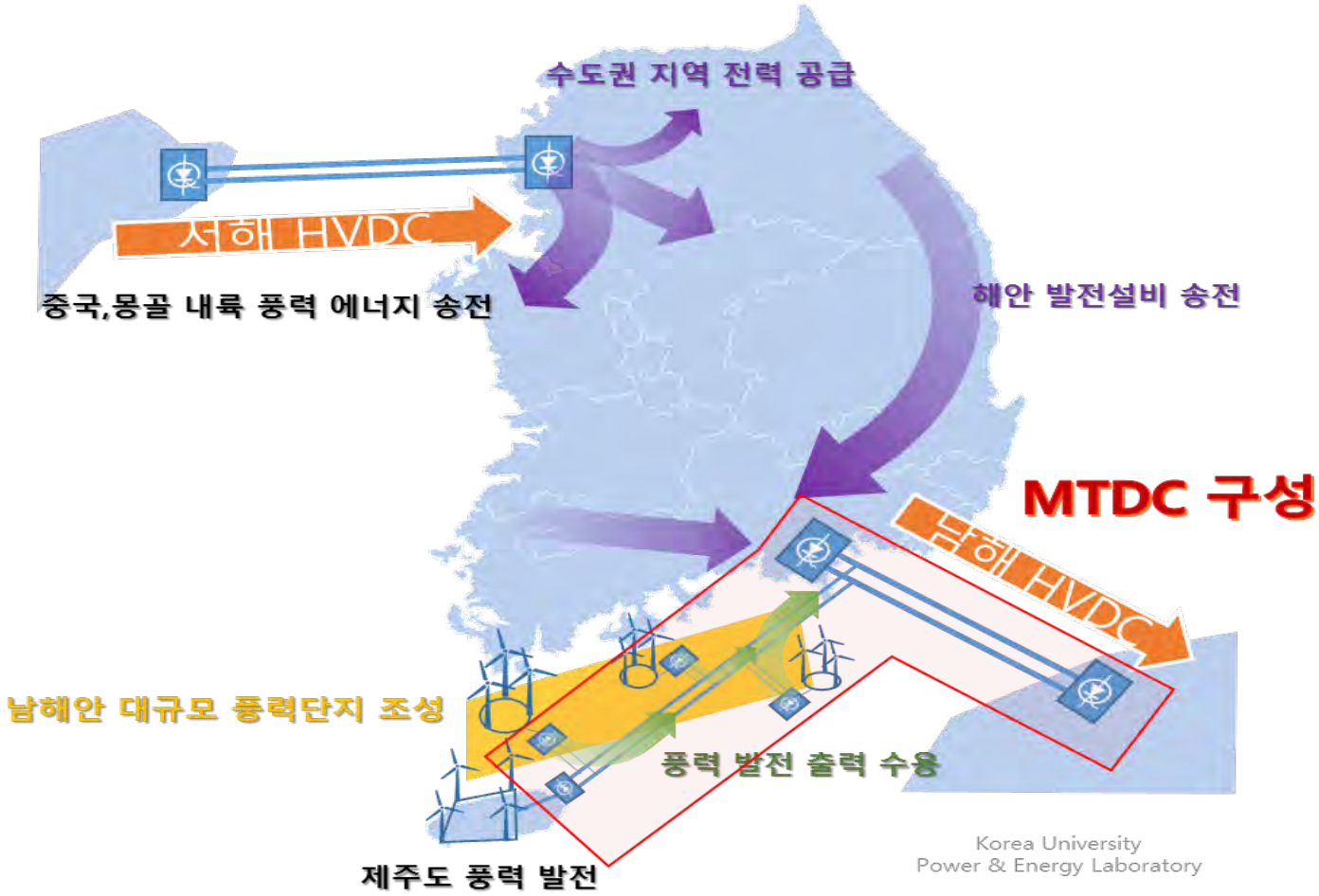
Hybrid Muti-terminal HVDC Topology

- **Addition of a VSC type terminal to LCC HVDCs**



NEA SuperGrid Configuration Suggestion

- **NEA SuperGrid configuration with MTDC topology**
  - To improve system efficiency and increase the acceptability of renewable energy resources in Jeju island and southern sea



Technical Barriers to NEA SuperGrid

- VSC HVDC technology for 2GW or more
- 500kV cable development & deep sea installation technology
- Coordination of power system operation, market operation, communication and grid code

=> can be solved!!

Questions & Answers

Thank you!