WORLD BANK GROUP | KOREA GREEN GROWTH TRUST FUND | Ministry of Economy and Finance

KGID 2025 Green Growth: The Path to Sustainable Jobs

AI-Based **Smart Grid Optimization**

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Contents

A Smart
Energy Creator

Future power system " Microgrid " for energy security and carbon neutrality

Traditional energy systems

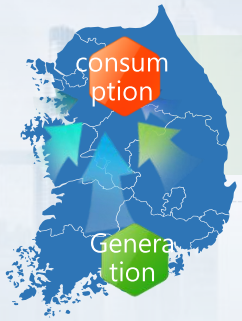
Basic Direction

- Large-scale fossil fuel-based centralized power generation
- Remote coastal power generation → Consumption within the metropolitan area

a power grid

- One-way power system
- Power generation business → Transmission and distribution business → Consumer

" Production and consumption at different places "



Increasing regional Imbalance in supply and consumption

Fossil fuel based Centralized system

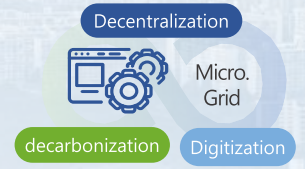
Future Microgrid Systems

- Distributed power generation centered on small-scale renewable energy
- energy self-sufficiency within the region

- Prosumer* based two-way system

  * An individual who directly consumes, produces and sells electricity

" Production and consumption at the same place "

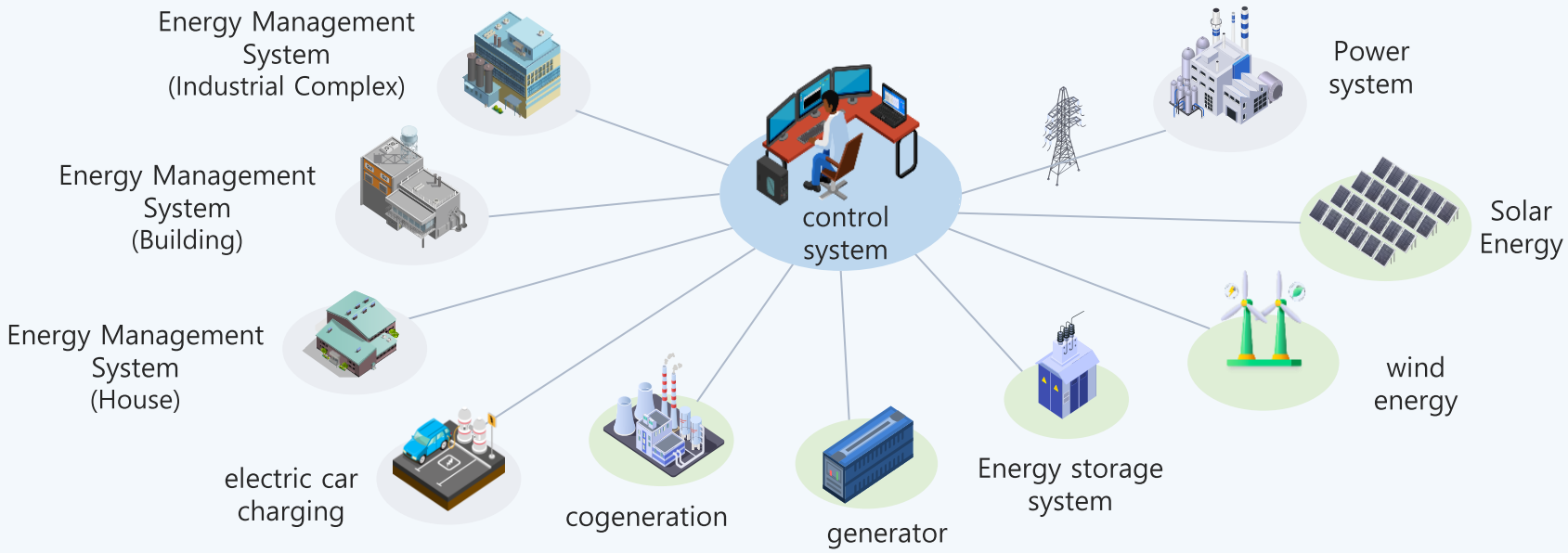


Conversion to a local self-sufficient decentralized system

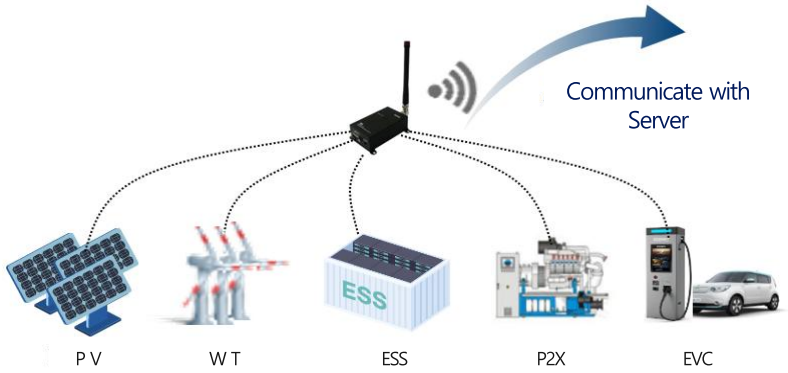
Microgrid Concepts

Small-scale intelligent power grid that optimizes energy efficiency by combining information and communication technology with the existing power grid and sharing between power suppliers and consumers real-time power information in both directions.

* Utilization of renewable energy, AI-based energy efficiency, and establishment of its own power supply facilities



1 Energy Data Terminal Device



2 Energy Data Terminal Device

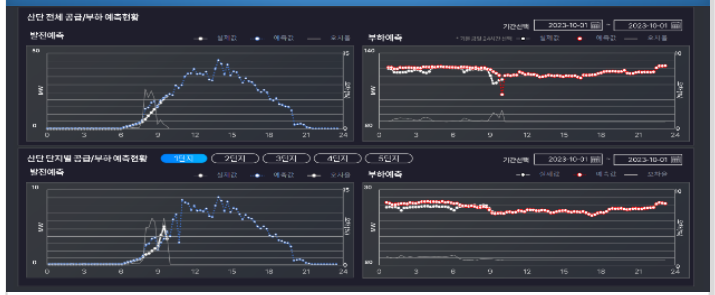
MG Energy Management

3 MG Operating System

Integrated management of distributed resources

- ✓ Renewable, ESS, EVC, P2X*
- ✓ Resource Monitoring and Control

Integrated management of distributed resources



- ✓ Real-time power quality monitoring
- ✓ ADMS-linked overvoltage/overload response

Uninterrupted supply

- ✓ Power outage monitoring and uninterrupted supply using renewable energy and ESS

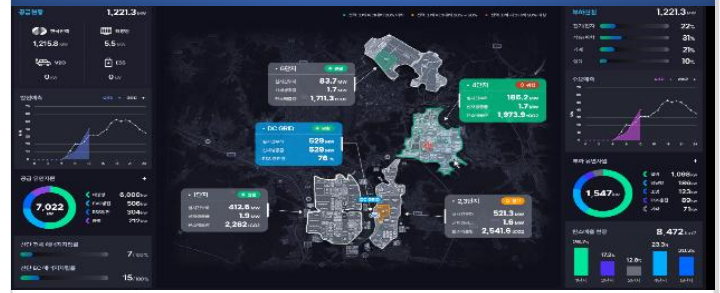
Power Peak Management

- ✓ Power usage pattern analysis, load forecasting
- ✓ Peak Monitoring and Load Control

Power-to-thermal energy circulation

- ✓ Monitoring of surplus energy generation
- ✓ Energy storage and conversion control

Monitoring Power Supply and Demand



- ✓ Monitoring the supply and demand of industrial complex energy
- ✓ Monitoring carbon emissions

* P2X, the process of converting renewable energy-based electricity(P) into various forms of other electricity(X)

Network investment

Minimize investment in renewable network and contribute to resolving system congestion by building MG for large-scale demand areas

- Gumi Industrial Complex reduced connection costs by approximately 60 billion KRW based on PV 200MW construction standards

Network operation

Reduce the burden of network operation on distribution companies by managing MG unit distributed resource management

- Securing visibility of distributed resources using MG platforms and optimal balancing of supply and demand

New business

Contrubute to increasing sales by securing new business opportunities using MG

- Commercialization of network convergence services(VPP, NWAs, etc.) and MG solutiuons

Thank you

KEPCO New Energy Business Project