

# Addressing the future of digitalization through demand-side planning

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# Power demand outlook and data center

- **The 11<sup>th</sup> Basic Plan for Electricity Supply and Demand (Korea)**

- The Basic Plan for Electricity is updated every two years, and the 11<sup>th</sup> edition is finalized in 2025.
- The Basic Plan for Electricity provides projections over a 15-year period. (11<sup>th</sup> edition: 2023-2038).
- Electricity demand induced by data centers has been fully incorporated since the 10<sup>th</sup> edition.

- **Data center-related electricity demand**

- Total reference demand = model-projected demand + additional demand
- Electricity consumption projection

(TWh)		2025	2027	2030	2036	2038
Model Demand		556.4	572.1	596.6	642.5	655.5
Additional demand	Data center	2.7	8.4	10.0	13.9	15.5
	Advanced industry	5.8	7.7	10.3	7.6	1.1
	Electrification	1.2	2.8	8.4	43.8	63.0

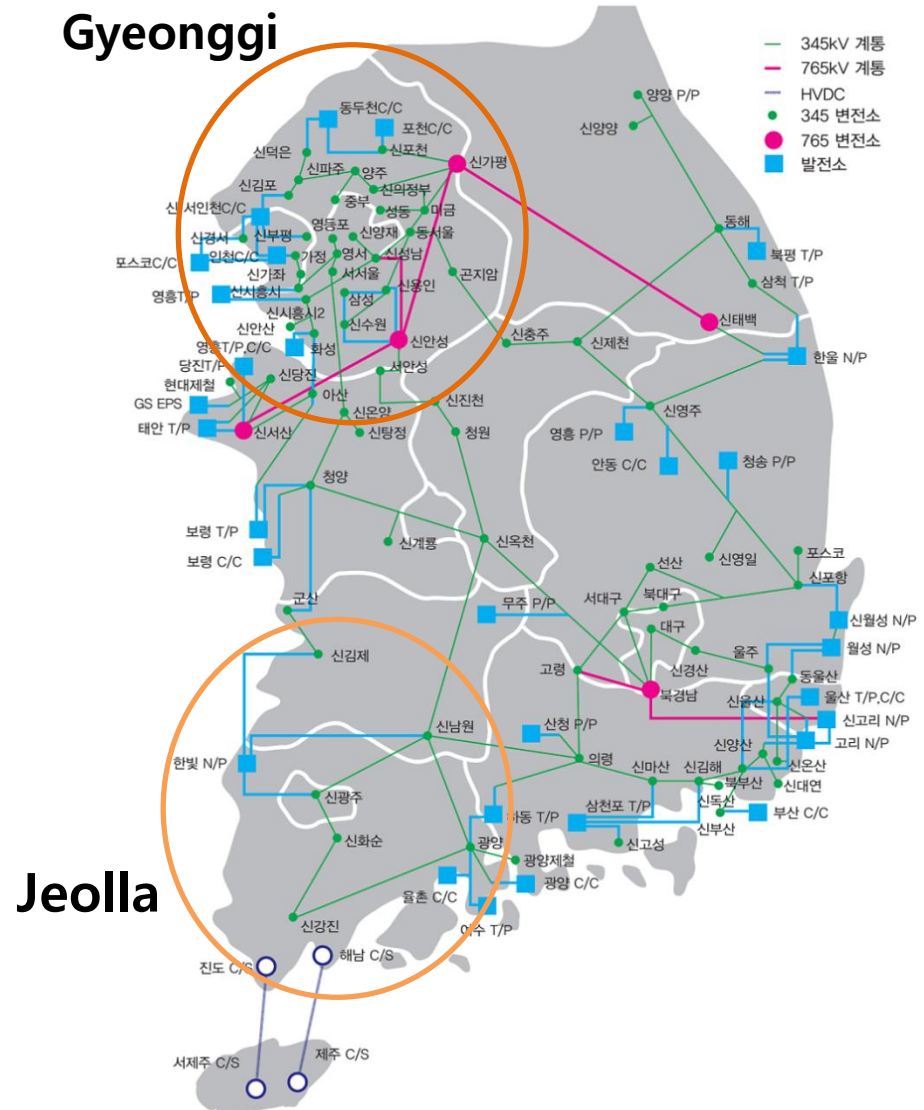
- The 11<sup>th</sup> edition adopted a conservative approach in estimating data center-related demand, and the 12<sup>th</sup> edition is expected to include higher projections.

# Power grid expansion issue

- Power grid structure in Korea**

- Renewable energy generation facilities(wind, solar power) are mainly located in the Jeolla region
- Electricity demand is concentrated in Seoul and the metropolitan area, including factors such as population density, semiconductor production, and data centers.
- A large-scale north-south transmission network is needed to bridge the geographical gap between generation and demand areas.
- Regional distributed energy systems are being discussed as a supplementary measure.

## Seoul & Gyeonggi





# KEEI long-term energy Outlook

- **Incorporating electricity demand growth into the long-term energy outlook**
  - KEEI long-term energy outlook model projects energy demand and supply by sectors, covering the industrial, transport, residential, service, and conversion sectors.
  - The expansion of data centers and AI applications is linked to the ICT industry in the service sector, and the model reflects that energy demand in ICT industry will triple by 2040 compared to the current level.
  - Across all sectors and industries, electricity consumption is expected to increase due to mechanization, electrification, and the expansion of AI applications. These factors are considered to contribute to higher energy demand for equipment and facilities.
  - It is considered that a large number of high-density, large-scale data centers will not be needed in practice in Korea. While the load burden from data centers is expected to increase, the specific figures and scale remain uncertain.



- **Rising electricity dependency**

- Electricity demand is increasing due to
  - 1) changes in lifestyle and production patterns
  - 2) efforts to reduce greenhouse gas emissions.

→ These two drivers should be addressed separately.
- While digitalization enhances productivity and energy efficiency across various sectors, continued expansion of production activities is likely to lead to a gradual increase in electricity demand.

- **The importance of ensuring a stable national electricity supply systems**

- Given its geographical and environmental conditions, Korea has to ensure a self-sufficient electricity supply.
- Expanding electricity supply capacity while meeting greenhouse gas reduction target presents a significant challenge.
- Currently, only two large-scale nuclear power plants are planned, and Korea aims to achieve a stable power supply through the expansion of renewable energy, energy storage systems(ESS), and power grid stabilization measures.
- As electricity demand may surge at certain stages of the greenhouse gas reduction process, it is important to establish and implement medium- to long-term strategies for power supply.