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Power Grid Revamp to Accommodate 100+ GW of Renewable Energy by 2030

- State Council briefed on the “Power Grid Innovation Plan” to accommodate 100 GW+ of renewable energy by 2030
- Grid management substations in the Honam region to be de-designated on October 1; new project applications to resume in January 2027

The Ministry of Climate, Energy and Environment (MCEE, Minister Kim Sungwhan) announced that it presented a “Power Grid Innovation Plan” at a State Council meeting on September 29 to redesign the power grid system with the goal of deploying more than 100 GW of renewable energy by 2030.

The rapid expansion of renewable energy is necessary due to the growth of advanced industries and electrification, but grid constraints in major regions have been a major obstacle to renewable energy expansion. For example, in the Honam region, transmission and distribution grid bottlenecks meant that new projects would not be possible until after 2034.

As such, the government has established a power grid system capable of accommodating more than 100 GW of renewable energy by 2030 through mid- to long-term transmission and distribution grid expansion, alongside short-term reforms to grid systems and operations.

Accordingly, the designation of grid management substations in the Honam region will be lifted as of October 1. Some areas of Chungcheong, where access for new facilities has been restricted, are also expected to become

available for new grid connections. In addition, the government plans to lift the designation of grid management substations in the east coast region in the first half of 2027, when Phase 1 of the East Coast–Singapore high-voltage direct current (HVDC) transmission project is scheduled for completion.

The government and Korea Electric Power Corporation (KEPCO) will implement five key strategies and nine initiatives to ensure these measures are carried out without disruption.

1. Flexible Grid Connection System to Be Fully Implemented

New generators will be prioritized for grid connection based on available grid capacity rather than rated capacity, while non-firm access will be fully implemented, allowing temporary output curtailment when solar power generation temporarily exceeds the grid's capacity.

Through non-firm access, the solar power capacity that can be connected to distribution lines will be increased from the current 14 MW to 16 MW, while the capacity at substations will rise from 50 MW to 60 MW. As a result, solar power capacity in the Honam region, where grid constraints are particularly severe, can be expanded by 2.6 GW without the need for additional grid construction.

In addition, the government plans to launch a “self-managed access system,” under which developers can install renewable energy facilities exceeding the grid connection capacity and use energy storage system (ESS) and other technologies to adjust and manage power output within the permitted capacity limits. Following a pilot project this year, the system will be fully implemented starting next year. This will allow developers to install renewable energy facilities at two to three times the grid's rated capacity.

2. Developing “Non-Wires Alternatives (NWAs)” for the Power Grid Using ESS

The government will fully pursue NWAs by installing ESS within the power grid to maximize the use of existing transmission and distribution networks without constructing new ones.

Grid congestion occurs during the daytime when solar power generation is concentrated. The government plans to install ESS at distribution networks and substations to store surplus solar power generated during the day and feed it into the grid at night, thereby improving grid utilization and transfer capacity. By 2030, the government plans to enable an additional 3 GW of solar power connections in grid-constrained areas through distribution network ESS and an additional 1.6 GW through substation ESS.

In addition, the power grid has traditionally been operated with a portion of transmission capacity left unused as a precaution against potential failures, much like an emergency shoulder lane on a highway, to prevent an individual incident from escalating into a widespread blackout. By installing ESS for contingency response, the government plans to utilize the transmission capacity previously kept in reserve for actual power transmission.

3. Systematic Management of Fictitious and Delayed Projects

Through inspections of fictitious projects, approximately 9 GW of grid connection capacity has been reclaimed. Going forward, the government plans to proactively adjust connection capacity not only for fictitious projects but also for long-delayed projects, deferring their grid connection rights until the actual time of use. By adjusting the connection schedules of offshore wind and other projects that have been delayed, more than 10 GW of grid connection capacity is expected to be reclaimed in the Honam region alone by 2030.

In addition, under the existing approach of allocating grid capacity on the assumption that renewable energy projects would be completed on schedule at a 100% implementation rate, additional grid connection capacity will be

allocated for projects scheduled to come online from 2031 onward, taking into account the actual renewable energy project implementation rate of 67.2% and various factors such as realistic permitting delays and changes in project conditions.

4. Overhaul of the Renewable Energy Grid Connection System

Until now, when reviewing new renewable energy grid connections, it was assumed that new renewable energy would be dispatched after existing fossil fuel generation. Going forward, the connection criteria will be revised to reflect actual grid operations, giving renewable energy priority over fossil fuel generation. This is expected to enable the nationwide grid to accommodate an additional 20 GW of renewable energy by 2030, including in the Yeongnam and Gangwon regions, where coal and liquefied natural gas (LNG) power plants are concentrated.

The system for allocating power grid connection rights will also undergo a fundamental overhaul to ensure the efficient allocation of limited public resources. Until now, grid connection rights have been granted exclusively on a first-come, first-served basis at the early stages of power generation projects, often resulting in developers securing connection rights even when their projects were ultimately canceled or significantly delayed. From January 2027, in conjunction with reforms to the Renewable Portfolio Standard (RPS), under which renewable energy projects will in principle enter the market through competitive bidding, grid connection rights will also be granted to projects selected through these competitive bids.

5. Improving the Renewable Energy Grid Connection Cost-Sharing System

Until now, when reinforcement of the shared distribution network was required for new renewable energy connections, the initial developer whose connection caused the need for the upgrades was charged the full cost, while subsequent developers were able to use the upgraded network free of charge.

Going forward, KEPCO plans to first invest in distribution network reinforcement, with power generation developers who subsequently use the upgraded facilities sharing the costs based on their installed capacity.

This plan will establish a power grid system capable of reliably accommodating the target of more than 100 GW of renewable energy by 2030. In terms of grid capacity, renewable energy accommodation capacity in 2030 will increase by 52 GW, from 119 GW to 171 GW at the transmission level, and by 26 GW, from 84 GW to 110 GW at the distribution level.

In particular, in the Honam region, where new connections have been difficult due to grid congestion, transmission capacity is expected to increase substantially from 37 GW to 64 GW by 2030, while distribution capacity will rise from 18 GW to 30 GW, helping to simultaneously ease transmission and distribution bottlenecks.

The additional grid capacity secured under this plan will be allocated first to existing projects awaiting connection. Starting October 1, these projects will be able to apply for early connection and receive support, while new projects will be supported under the revised grid connection system beginning in January 2027. Details on available capacity by substation and year, grid reinforcement plans, and application procedures can be found on KEPCO website (online.kepco.kr).

Minister Kim Sungwhan said, “This plan is about making the most efficient use of the power grid we have now, rather than waiting for new grid infrastructure to be built.” He added, “Within just one year of the launch of the MCEE, we have lifted the grid constraints on renewable energy that had been in place since September 2024 and resumed new renewable energy connections in the Honam region.”