

Strategies of DC Microgrid System

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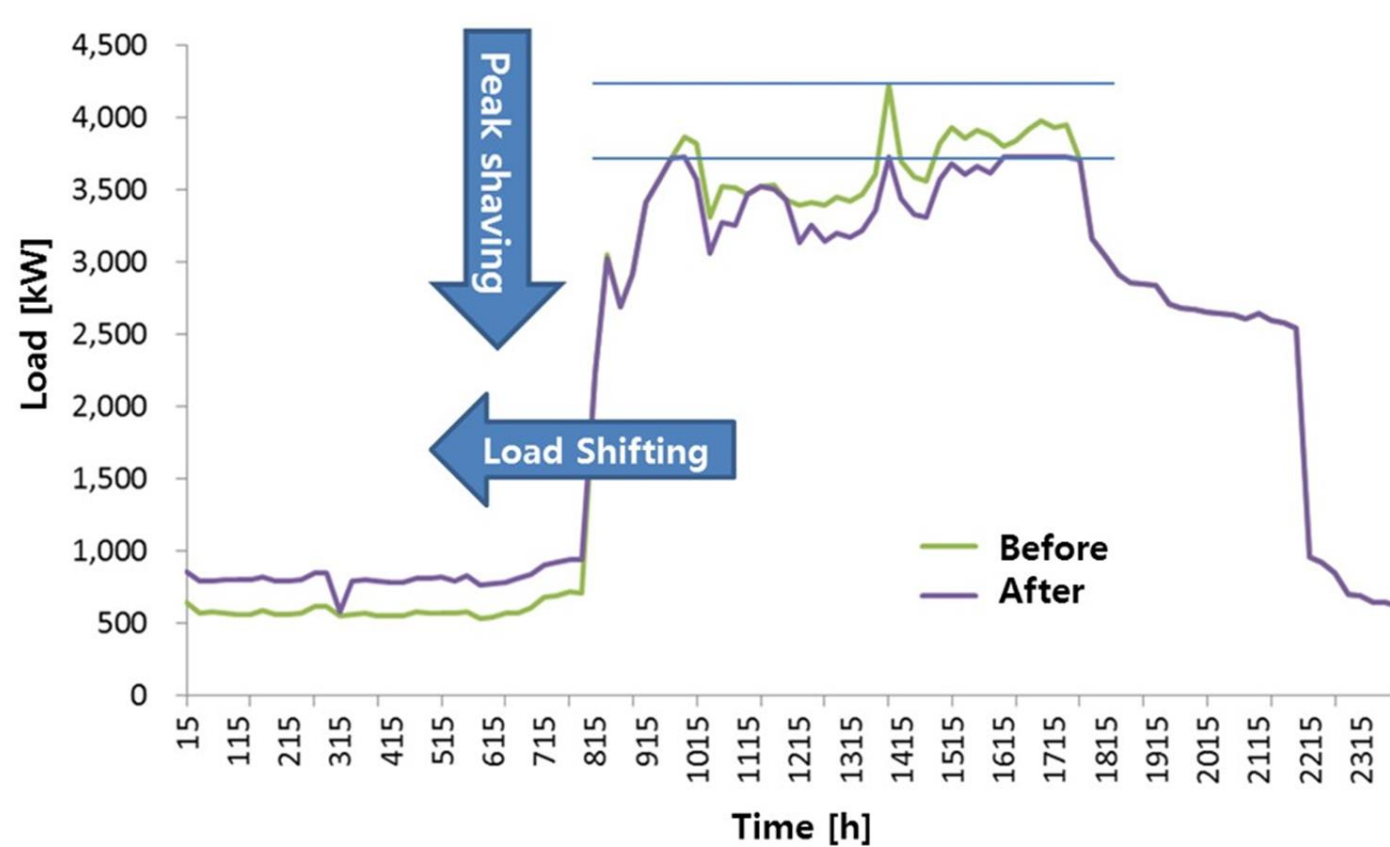
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Abstract

In this poster, a real-time operation test result of load management strategies for the direct current (DC) distribution system is being proposed. The dc microgrids system is considered as a prospective system according to the increase of dc loads and dc output type distribution energy resources (DER) such as photovoltaic (PV) systems and energy storage systems (ESS). Since the dc microgrids system has many advantages such as feasible connection of DERs, reduction of conversion losses between dc output sources and loads, no reactive power issues. Among many functions of an EMS, load management is a main function in grid-connected mode. The developed real-time operation algorithm is implemented in EMS system and its main functions are confirmed in HILS test platform and DC microgrid pilot plant. The EMS system implemented the developed algorithm is operated in the KD Power DC microgrids demonstration site.

TOU(Time-of-Use) based LSM

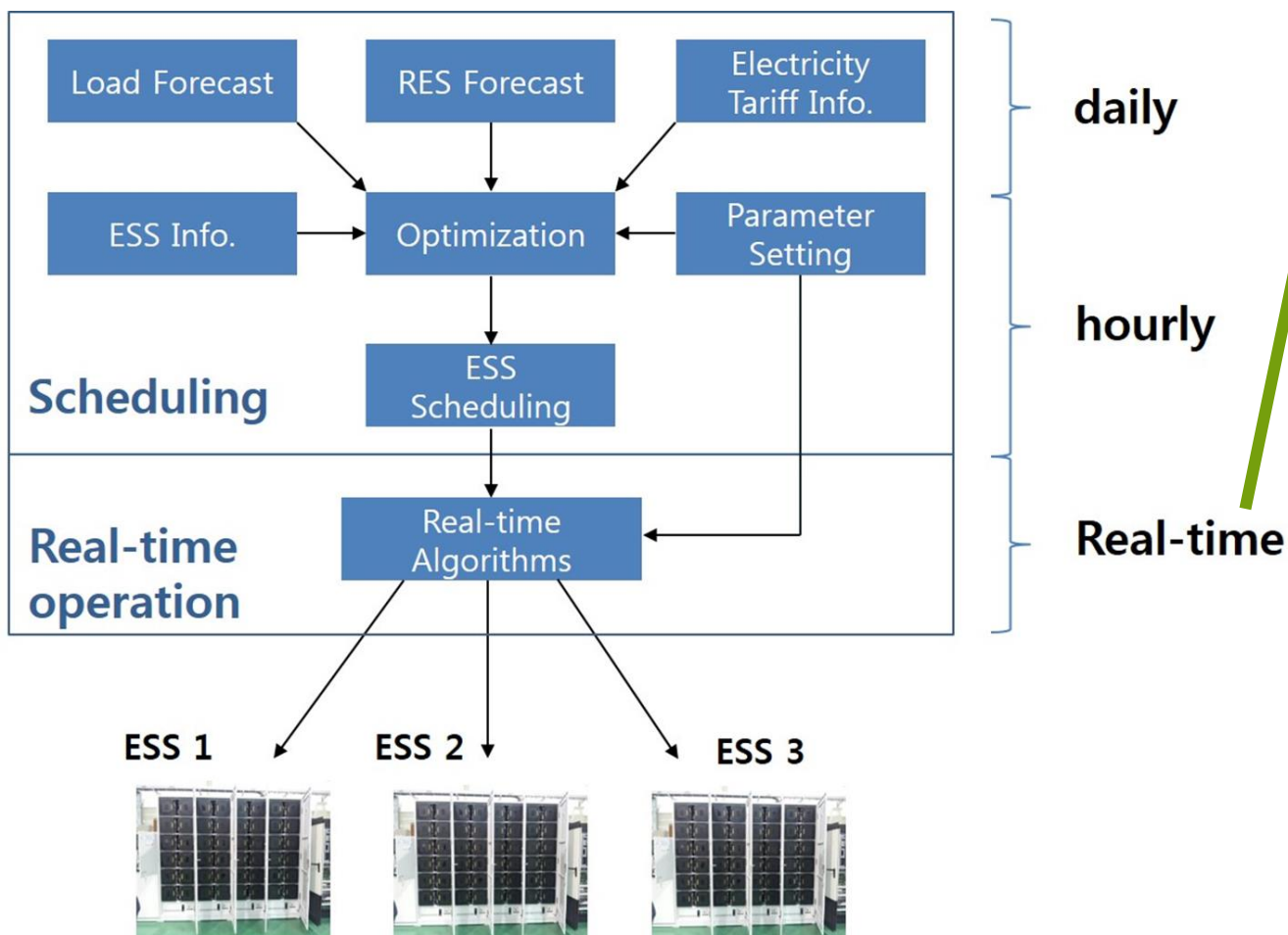
Objective



To minimize daily electricity tariff

- Peak shaving : reduce demand charge
- Load shifting : reduce energy charge

Operation Strategy



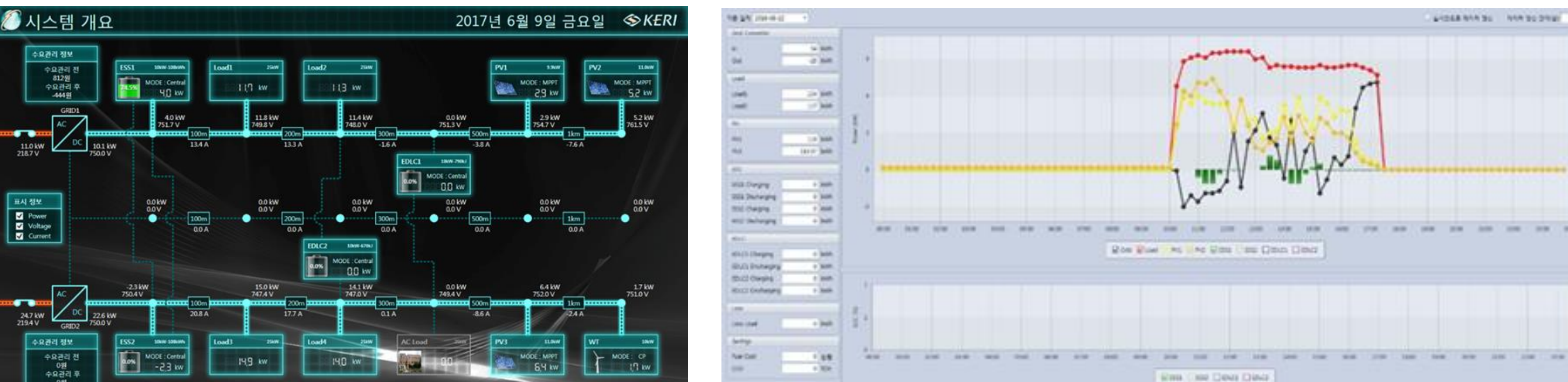
Objective

Real-time operation algorithms compensate the optimal scheduling algorithm to limit the peak load efficiently. In this example case, two real-time operation algorithms are implemented.

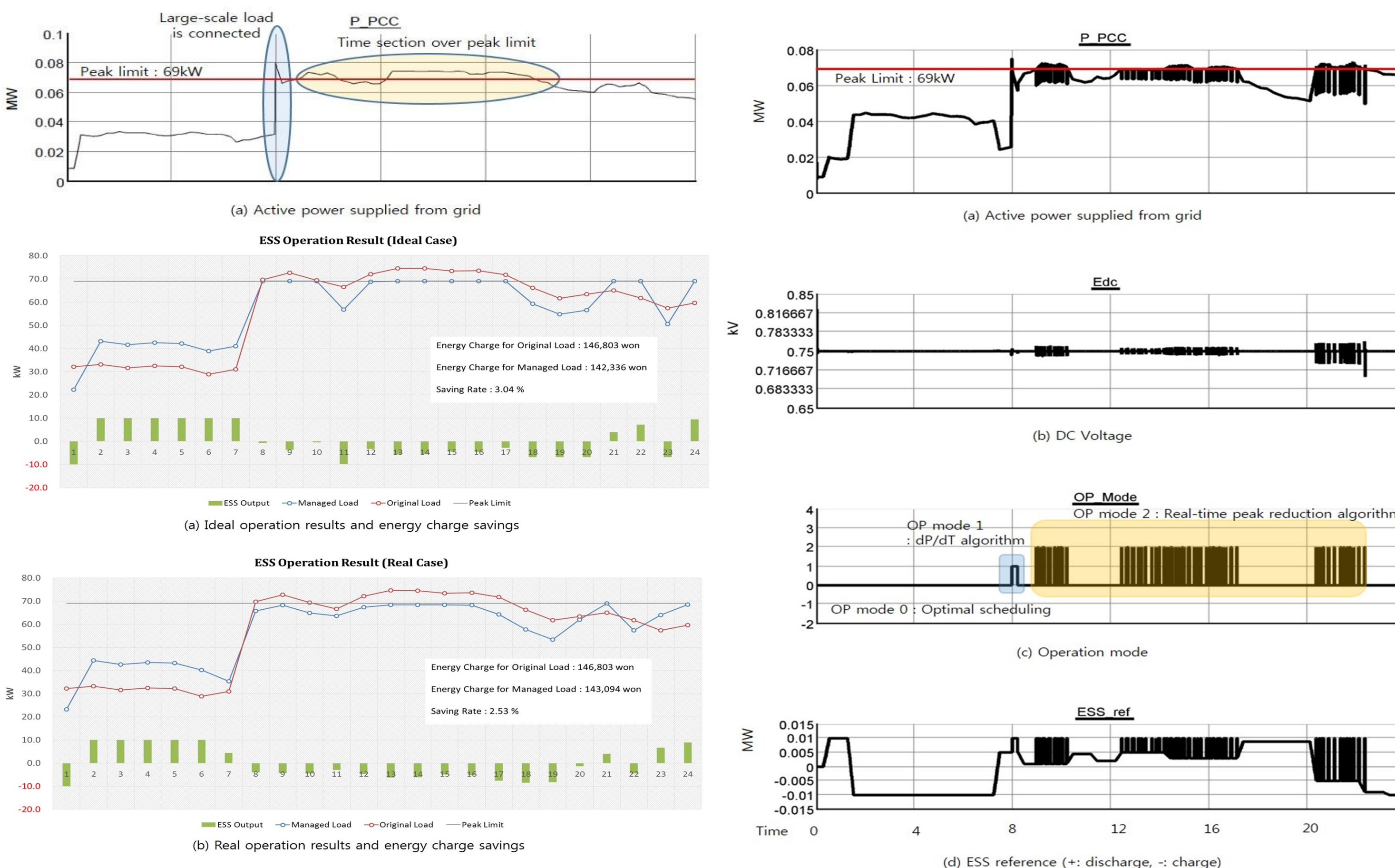
dP/dT algorithm that monitors the rate of load change in real time and is activated when the rate is over the pre-defined limit

Another is the *real-time peak reduction algorithm* that monitor the load pattern in real-time and is activated when the average value in 15 minutes is over the pre-defined margin.

EMS System Overview

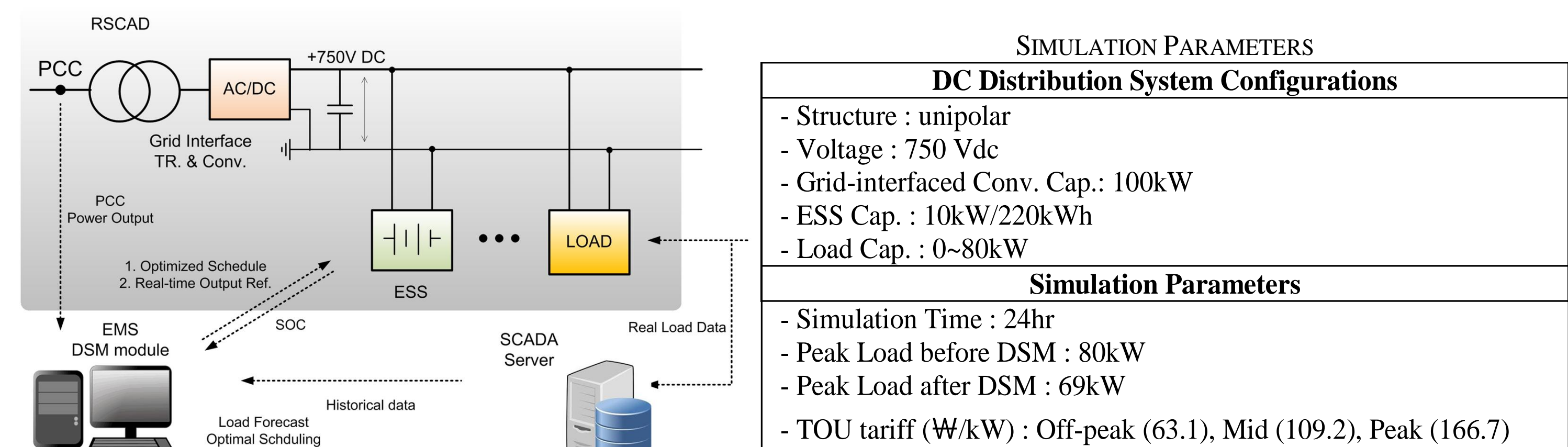


Test Result

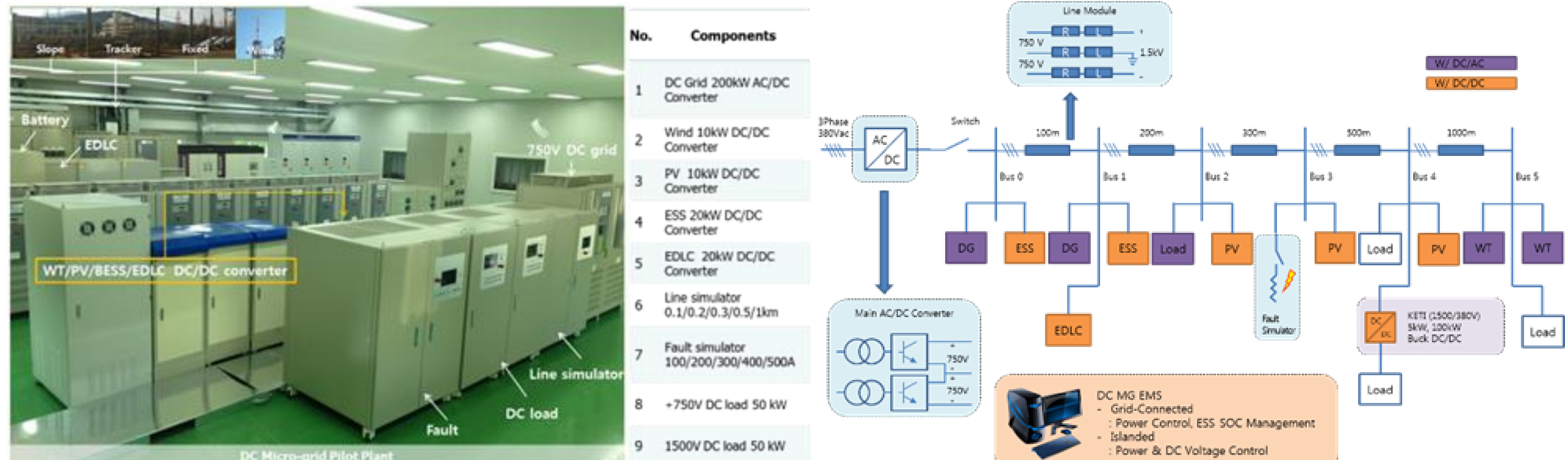


Test Platform

HILS Test Platform

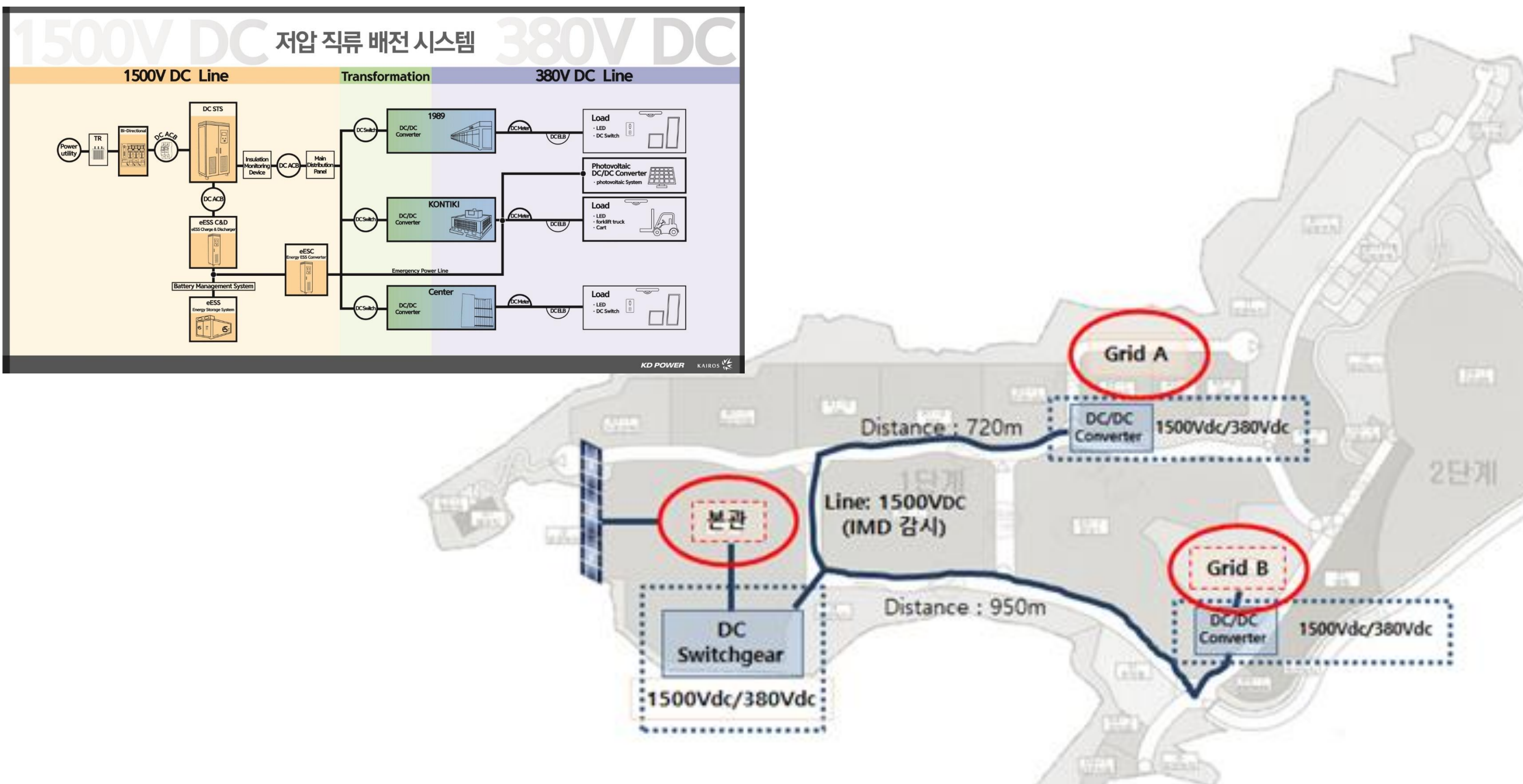


DC Microgrid Pilot Plant



KD Power DC Microgrid

System Structure



Operation Results

