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Demand response scheduling based on system operator: A dynamic programming approach for load shifting

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The demand response (DR) is the key component of smart grid which reduces peak loads and makes flexibility of demand possible according to its fluctuation. However, since most of the DRs that are currently used requires load shifting after their uses, the current state requires the system operators (SO) to manage the suitably of DR. Also, the tendency of the market change tries to use the DR in ancillary service market. Especially, it is discussed and applied actively in capacity market. It shows that the importance of the role of SOs have increased since SOs are required to manage the distribution of DR. Therefore, the paper will handle research about optimal scheduling of distributing DR resources in SO's perspective. The research will use optimal amount of DR calculated based on SMP data and demand data of the day which are estimated before D-1. Also, the load pattern of past load data of the same period have been analyzed to be applied in comparison. The DR resources are assumed as the ones that are traded in electricity wholesale market. To increase the credibility of system operation, optimal amount of DR per period has been calculated separately from each composition of DR resource (i.e., Generator type, ESS, etc.) by applying DE-rating factor. The amount of DR distribution is calculated using dynamic programming. It will also be applied to optimal scheduling per day by load shifting the amount of DR calculated based on the system stability and load per period after the use of DR. As a result of simulation, calculated amount of DR and optimal scheduling will be computed to be compared with the amount of the load used per day before the scheduling. Comparison will be centered on developmental costs considering social benefits. Lastly, through this research; SO can help to manage system operations with more stability and efficiently. Also, efficient management of DR is expected.

Biography

Jong-Pil Yang is currently in the Master's course at Konkuk University's Graduate School. Currently, he is studying in Energy System Laboratory of Konkuk University. His major is Energy Systems Engineering and he had issued two papers as his research results.

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