

Integrated Solutions for MicroGrid

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Abstract

With the urgent requirement of environmental protection and the supply of conventional energy becoming increasingly tense, development and utilization of renewable energy sources has drawn more and more attention, with the implementation of smart grid development strategy, the proportion of renewable energy in China's energy structure will further increase in the future, thus providing microgrid a huge opportunity for development.

Under this circumstance, we have developed a hierarchical coordinated control strategy for optimized operation of different-size and different-type microgrids. To be specific, in microgrid scheduling control level, it is mainly responsible for scheduling control and economic coordination of microgrid and distribution network to improve the economy of microgrid operation. In microgrid integration control level, monitoring and coordinated control of DGs are accomplished to reduce the impact of the integration of new energy on the grid and improve electricity quality of the system. In microgrid operation control level, it mainly realizes the grid-connected control and protection of DGs, thus decreasing the electricity fluctuations and improving the stability and reliability of the microgrid.

Based on the proposed control strategy, we have also developed a series of equipment. In the microgrid scheduling control level, we have the microgrid regulation system which implements operation monitoring, coordination control for DGs and new energy economy operation control etc. In the microgrid integration level, energy storage inverter is developed, which adapts to a variety of energy storage unit, receives control instructions and provides reactive power, thus improving the quality and economic benefits of the system. In the microgrid operation control level, a set of microgrid connected equipment is also designed. This device can achieve protection, grid connected control, power quality monitoring for connection point of microgrid.

What's more, in aspect of application, based on the great testing and production environment built by NARI, the control devices based on the proposed control strategy have been applied in many actual projects all over the country and gained a lot of social and economic benefits, such as Grid-connected demonstration project of new energy power plants in West Deer Island, Wind-solar-battery-new energy hybrid power plant project in Yudaokou, and so on.

In summary, series equipment of microgrid supplies the integrated solution for different size, different types of microgrid, which meets the diversity of requirement for microgrid project construction and operation. It can also supply the feasible solution for that the power is hard to supply in the island, village and mountainous area and the energy shortage in the city.