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Abstract

Title: Latest Power Electronics Technology to realize the carbon neutral society

The United Arab Emirates (UAE) hosted COP28 from the end of November 2023. There, the UAE, the US, the EU and other countries supported targets for preventing global warming, such as tripling global renewable power generation and doubling energy efficiency improvements by 2030. In addition to these, to realize the Carbon-Neutral Society, it is necessary to make transition to clean energy by promoting electrification and hydrogen application. This presentation intends to remind that Power Electronics technology is inevitable in every solution for achieving carbon neutrality.

TMEIC continues to develop power electronics technology with the concept of “PEiE: Power Electronics in Everything.” This presentation introduces the latest Power Electronics technology to realize Carbon-Neutral Society by showing topics applied in large-scale industries.

The first topic is the high-capacity Power Electronics technology to increase Renewable Energy. In the future, the Renewable Energy will be the main player in the electrical power networks in place of fossil-fueled generators, where Power Electronics technology will provide the grid-forming functions to Renewable Energy. Power Electronics also contributes to power transmission from remote Renewable Energy generations.

The second topic relates to the Green Hydrogen. Some sectors driven by fossil fuels are found difficult to electrify. Such sectors require switching to clean fuels including Green Hydrogen. Mass-production of Green Hydrogen requires high-capacity Power Electronics technology friendly to the future power networks.

The third topic relates to digital networks for information and communication. The digital networks will dynamically manage the energy networks operation in the future. It should be recalled that the digital networks need the electric power. The Power Electronics technology provides such power supply solutions.

The final topics introduces the Power Electronics technologies applied to industries. For achieving Carbon Neutrality, the industries are also required to abate CO2 emission. The large-scale industries cannot apply conventional solutions with limited power range. There, the high-capacity Power Electronics technology provides solutions. It realizes electrification of facilities rated at tens of MW. The high-capacity Power Electronics also improves energy efficiency by optimally managing MW-rated systems..