Keynote speaker

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Title

Power Electronics Technology to Realize the Carbon Neutral Society

Abstract

At the end of April, the International Energy Agency (IEA) reported on a High-Level Energy Transition Dialogue for COP31 held in Paris. The dialogue addressed the expansion of renewable energy and the improvement of energy efficiency as some of the measures to address current energy challenges arising from geopolitical tensions, as well as the practical implementation of the transition to carbon neutrality. Considering such a global trend, this presentation focuses on power electronics technology, highlighting its essential role in solutions for achieving carbon neutrality.

TMEIC continues to develop power electronics technology under the concept of "PEiE: Power Electronics in Everything." This presentation introduces the latest development activities aimed at realizing a Carbon Neutral Society, showing topics applied to large-scale industries.

The first topic is high-capacity Power Electronics technology for expanding Renewable Energy. Renewable Energy is going to become a primary source of electric power generation, replacing fossil-fueled generation. Energy storage systems will also play important roles in the future energy networks. Power Electronics technology provides grid-forming functions for renewable energy and energy storage systems. Power Electronics also contributes to power transmission from remote Renewable Energy.

The second topic addresses Green Hydrogen. In fossil-fuel-dependent and hard-to-electrify sectors, switching to clean fuels, including Green Hydrogen, is essential. The mass production of Green Hydrogen requires high-capacity Power Electronics technology compatible with future power networks. This presentation introduces recent applications of Power Electronics in development projects in Japan.

The third topic addresses digital networks for information and communication. The digital networks will play a key role in dynamically managing and operating the future energy networks. Today, another major trend is the rapid growth of AI, which requires large data centers and high and variable power consumption. This presentation notes that these digital networks require large scale secure electric power supply and power variation leveling. Power Electronics technology provides the necessary power supply solutions.

The final topic introduces the Power Electronics technologies applied to industrial sectors. For achieving Carbon Neutral Society, conventional electrification solutions are often inadequate for large-scale industries. High-capacity Power Electronics technology enables electrification of facilities rated at tens of MW. The high-capacity Power Electronics also improves energy efficiency by optimally managing MW-rated systems.