

# Three-level conversion wind power generation system

What are the components of a wind generation system?

In wind generation systems, the wind turbine, the electrical generator and the grid-interfaced converters are three key components that have been developed in the past 30 years [32,33]. The turbine converts wind energy into mechanical energy.

Do power electronics converters work on wind turbines?

As power electronics develop, power electronics converters are increasingly being equipped on wind generation systems [35,36]; for example, back-to-back converters are equipped on both type 3 and type 4 wind turbine generators.

What are the different types of wind turbine generation systems?

Two typical configurations of power electronic converter-based wind turbine generation systems have been widely adopted in modern wind power applications: type 3 wind generation systems with doubly fed induction generators (DFIGs) (Fig. 2a); and type 4 wind generation systems with permanent magnet synchronous generators (PMSGs) (Fig. 2b).

How do wind generators contribute to grid stability?

Hence, wind generators are required to contribute to grid stability through active power and frequency control to help to maintain the power balance in power systems [52]. Grid codes specify the permitted range of voltage and frequency variations that wind generators must adhere to during grid connection.

Why do wind power converters need a parallel connection?

As the power rating of wind energy conversion system increases, high-voltage or large-current is required for the power converters. Considering the limited power rating of power switch devices, the parallel or series connection of several converters would be the solutions.

What are the requirements for a wind generation system?

These requirements are twofold: first, wind generation systems must operate effectively under diverse grid conditions and disturbances arising from interactions between wind generation systems and the grid; and second, wind generation systems are mandated to provide various auxiliary services to ensure the optimal operation of the power systems.

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