

**COGENERATION
OF
GRID-CONNECTED
WIND-PHOTOVOLTAIC
SYSTEM
USING BACK-TO-BACK VOLTAGE
SOURCE CONVERTERS**

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ABSTRACT

This book introduces a new topology, yet simple and efficient, for a grid-connected wind-photovoltaic (PV) cogeneration system. A permanent magnet synchronous generator-based full scale wind turbine is interfaced to the utility-grid via back-to-back (BtB) voltage-source converters (VSCs). A PV solar generator is directly connected to the dc-link capacitor of the BtB VSCs. No dc/dc conversion stages are required, and hence the system efficiency is maximized. The proposed topology features an independent maximum power point tracking for both the wind and the PV generators to maximize the extraction of the renewable energy. The regulation of the VSCs is achieved via the vector control scheme in the rotating reference frame. The detailed small signal models for the system components are developed to investigate the overall stability. The influence of the utility-grid faults on the performance of the proposed system is also evaluated. Nonlinear time-domain simulation results under different operating conditions are presented to validate the effectiveness of the proposed topology.

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