

# Ensuring grid code compliance and maximizing plant productivity ABB's power converter solutions for the wind industry



**Wind energy production is growing rapidly with thousands of turbines, both large-scale wind farms and smaller projects, in operation worldwide. This global expansion of installed wind power is forcing transmission system operators to tighten their wind generator interconnection rules – grid codes – in order to maintain network quality and stability. Consequently, in some countries, commonly used turbine designs have difficulties in achieving grid code compliance. To address the global challenge for improved grid quality, ABB offers supplementary compensation equipment, such as VArPro™ STATCOM (static compensator) and EssPro™ energy storage power conversion system (PCS).**

## Background

According to the GWEC (Global Wind Energy Council) over the past decade, global wind power capacity has continued to grow at an average rate of over 30 percent. This phenomenal increase of installed wind power has led to a change of the grid code requirements.

These new rules demand that power plants of any kind support the electricity network throughout their operation. In addition, as a significant number of wind farm projects are set up at sparsely inhabited, remote locations, where the electricity grid

is relatively weak, the need for add-on equipment, such as ABB's VArPro STATCOM, becomes critical. Furthermore, due to linear and gusting wind speed changes, grid power quality is dramatically affected. New energy storage devices make it possible to store energy from the electricity grid and return it when required. However, such equipment is heavily reliant on a converter to interface with the grid. ABB's EssPro PCS is specifically designed to allow a range of energy storage devices to be coupled to the grid, offering advanced features and configuration options.

## Solutions required

### Proactive solutions for reactive needs

One of the solutions offered by ABB is VArPro STATCOM, a line-up of proven technology, which ensures grid code compliance while maximizing plant productivity. As a pure static device, with no switched passive elements, the system provides outstanding performance for steady-state and dynamic operation. In particular, the fast dynamic voltage control and the behavior during balanced, as well as unbalanced, grid faults (fault ride-through) enable the stringent grid code requirements to be met. VArPro STATCOM is available from 100 kilovolt ampere reactive (kVAr) up to 100 MVar and is characterized by its flexible design.

ABB has a strong global track record of successful STATCOM installations used to integrate wind parks into grids with demanding connection rules.

### The power to control energy

As a full scope supplier, ABB offers EssPro PCS; a power converter platform that enables energy storage devices, such as batteries, flywheel systems and new generation super capacitors to be connected to the grid. The platform strengthens and enhances the performance, quality and reliability of the network thanks to advanced operational modes, such as frequency regulation, peak shaving, load shifting, capacity firming, spinning reserve and microgrids.

ABB's EssPro PCS looks to the power system like a traditional synchronous machine. This is achieved through fast acting digital signal processors (DPSs) incorporated into the product design, which allow real and reactive power to be controlled at near instantaneous speeds. If the grid supply is lost, EssPro can detect this, disconnect itself from the grid and shut down.

The EssPro's ability to store energy is highly scalable with power ratings from 100 kilowatt (kW) up to 50 megawatt (MW).

### ABB's power converter solutions

ABB's power converter solutions provide a new dimension in developing smart grids, allowing a significant increase in renewable energy generation. They constitute cost-effective, environmentally attractive and high quality services for existing networks. Both VArPro STATCOM and EssPro PCS provide high efficiency (from 97 to 98.5 percent) and reliability. Modular construction makes the design of both systems highly configurable and versatile in terms of installation time and space, thereby enabling indoor and outdoor use. Furthermore, the high efficiency and low maintenance (MTTR <30min) lead to low operational costs. Owing to maximum flexibility, the solutions cover a wide range of applications, including wind farms, utilities with weak grids or fluctuating reactive loads and industrial applications.



A wind farm in Naguabo, Puerto Rico installed a 12 MVar ABB STATCOM system to ensure grid code compliance.

### Features of power converter solutions

Modular design

Fast response in case of instability

Voltage control - reactive power compensation

System power factor control

Built-in redundancy and protection system

Flicker mitigation, unsymmetrical load balancing

Low voltage ride-through (LVRT) capability

Active harmonics cancellation

### Benefits of power converter solutions

High availability maximizes plant revenue and ensures lowest cost of ownership

Secure electrical grid providing a clean energy supply

Proven technology ensures high reliability and lower maintenance

Grid expertise supports precise system control for grid code compliance

Worldwide service and support throughout the entire power converter lifecycle

For more information please contact:

[www.abb.com/converters-inverters](http://www.abb.com/converters-inverters)

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