

VArPro™ STATCOM case study

Solar PV Cluster in Massachusetts

Voltage regulation through reactive power support

Multiple solar installations in Massachusetts required reactive power support to manage a growing population of PV sites in the region. ABB provided a STATCOM solution to meet all interconnection requirements.

With some of the highest electricity rates in the United States, and large demand placed on traditional generation plants, Massachusetts has become a leader in solar power generation. The state has steadily increased its solar capacity to several hundred of megawatts in recent years.

With limited geographical space to install large utility scale systems, many of the solar installations are located on the distribution network near the communities and homes that the solar plant is energizing.

One developer installed a cluster of small solar PV plants on the distribution network next to a subdivision to power the local neighborhood. However, the system impact study indicated the need for reactive power support at the point of interconnection to mitigate grid instability due to fluctuation caused by the variability in solar PV irradiance.

To help mitigate voltage variations caused by the intermittency of the cluster of solar PV installations, ABB's VArPro STATCOM was installed to ensure feeder and station voltages were within acceptable limits. Due to the modular design, a solution was provided tailored to the unique needs at various points in the distribution network within the solar PV cluster. This included smaller system sizes in the 1 to 2 MVar range that were strategically placed throughout the area.



Key project data

Scope of supply	1.3 MVar STATCOM, outdoor enclosure
	1.0 MVar STATCOM, outdoor enclosure
	1.5 MVar STATCOM, outdoor enclosure
	300 kVar STATCOM, outdoor enclosure
	Supported by separate padmount transformers, with installation and commissioning Services
Power demand	Multiple sites totaling more than 13 MW solar PV connected to 115kV grid
Requirements	Meet distributed generation requirements for interconnection

Solar PV plant operation benefits

Interconnection requirements met
External dynamic reactive support for voltage ride-through compliance.
Maximize profitability, including protection against faults, voltage drops, and other issues that can stress equipment, lower power output and revenue
Improve network reliability, securing the electrical grid and enabling renewable power implementation



Solar PV sites in Southeastern Massachusetts; solar now provides several hundreds of megawatts of renewable power generation to residents and businesses across the state.

What is a STATCOM?

A STATCOM (or Static Synchronous Compensator) is a voltage regulating device. It is based on a power electronics voltage-source converter and can act as either a source or sink of reactive AC power. It is a member of the Flexible AC transmission system (FACTS) family which detects and instantly compensates for voltage fluctuations or flicker, as well as controls power factor. As a fully controllable power electronic device, the STATCOM is capable of providing both capacitive and inductive VARs.

STATCOM benefits

- Power factor control
- Voltage regulation
- Independent phase control
- Flicker reduction
- Active harmonic filtering (application specific)
- Multiple system parallel control
- High and low voltage ride through
- Modular inverter blocks for simple long term maintenance
- Flexible transformer integration for optimal footprint and low installation costs
- Optional overload capacity up to 300 percent



An example of ABB's compact outdoor STATCOM solution, rated at 3 MVar.

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