

Managing High Levels of Variable Generation in Distribution Circuits



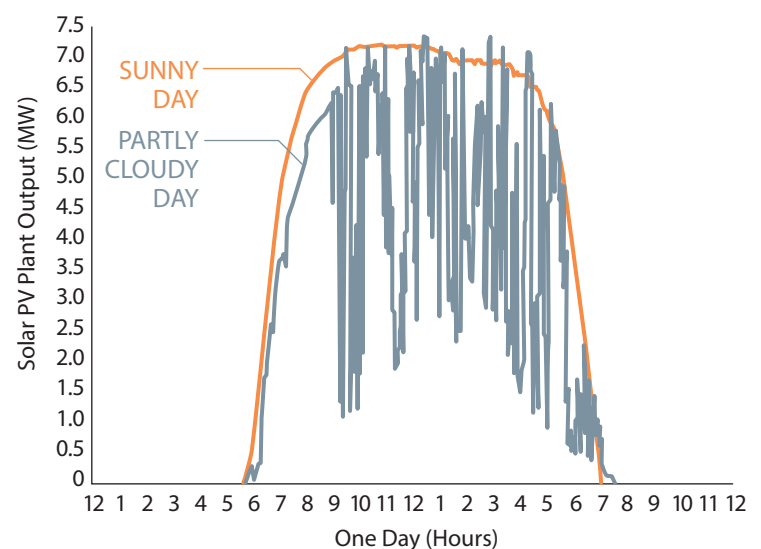
Why are distribution solar plants a problem for voltage regulation?

The rapidly varying nature of solar and wind can cause upwards of fifty large power fluctuations in a single day. This variability outpaces existing utility distribution volt/var control systems, resulting in substantial voltage issues.

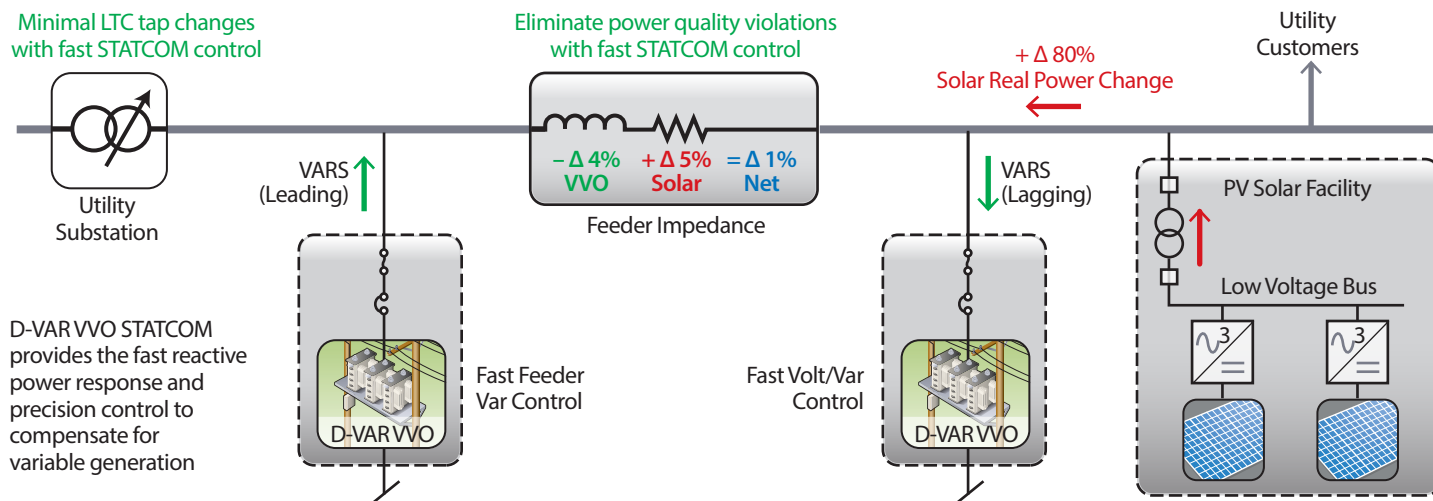
Problems:

- Required construction of dedicated feeders
- Long interconnect times
- Premature wear of load tap changers
- Persistent power quality problems
- Mis-operation of line regs & cap banks

Variations in Solar PV Plant Output
Actual Field Measurements – PV Solar Generation (MW)



Principle of Operation with Distribution STATCOMs Managing Voltage



D-VAR VVO® STATCOM Solution

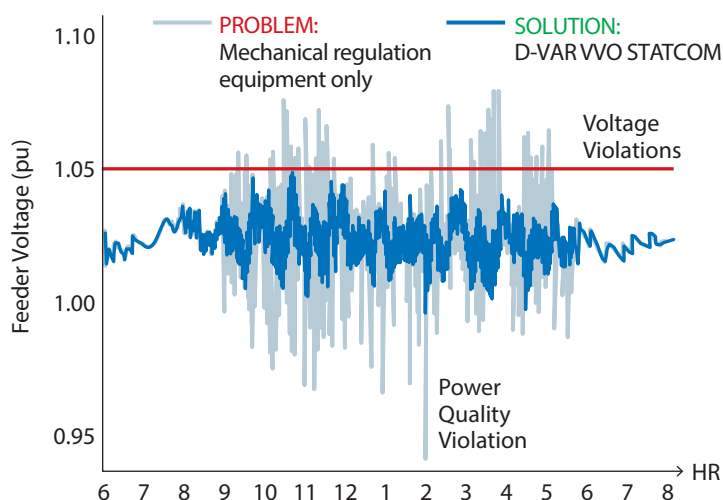
Increase Circuit DG Capacity by 3-4 MW per device

- Sub-cycle response and continuous control
- Overhead and pad-mounted options
- Shunt medium voltage electrical connection
- High speed waveform capture for validation
- Fully sealed, ingress proof enclosure
- Extremely low parasitic losses (<1% of output)
- No moving parts, no pumps, no fans.

D-VAR VVO® Advantages:

- **Fast, Feeder-level control:** VVO's directly control utility medium voltage feeders with no added voltage drops and no communication delays
- **Right-sizing made simple:** Add parallel STATCOMs to achieve larger sizes, parallel stages are completely redundant from each other
- **No real estate procurement:** Compact, distribution class equipment fits within existing easements
- **Right location:** Can be installed in the utility feeder or at the generating plant to best fit project needs
- **No routine nor scheduled maintenance:** Unique solid state design with no moving parts

A feeder with Variable Solar Generation



Fuse

Vacuum Switch

AMSC Power Electronic Units

AMSC Control Unit