

Lightning Surge Suppression in Commercial Systems

Overview

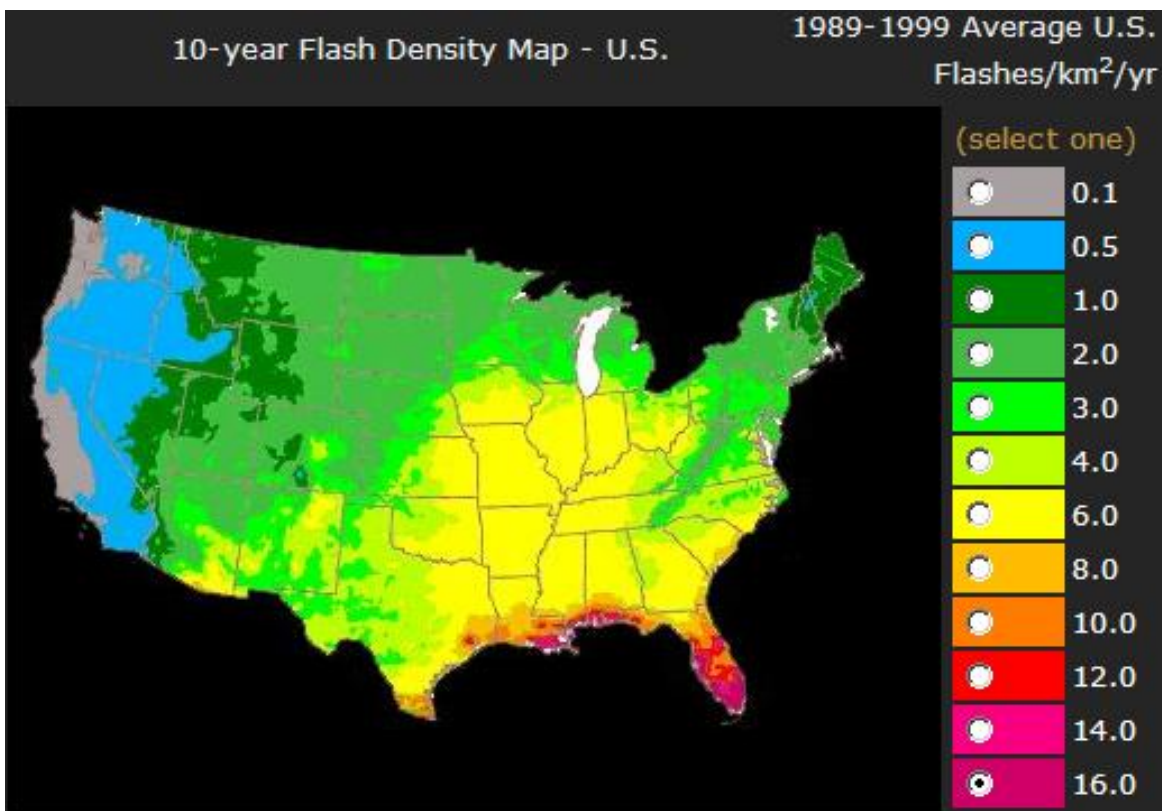
In certain parts of North America, the statistical frequency of lightning strikes near a photovoltaic (PV) installation can be high enough such that it is recommended that a lightning protection device be installed as part of the system. This technical brief points out geographic areas where the frequency of lightning strikes is high and provides an example of an applicable off-the-shelf product. Enphase does not warrant or guarantee the performance of any of these products.

Discussion

A lightning strike does not actually need to strike the equipment or building where a PV system is installed in order to cause damage. Indeed, a strike that is near enough will often induce voltage spikes in the electrical grid that can damage equipment. Enphase Microinverters have integral surge protection that is more robust than most string inverters. However, if the surge has sufficient energy, the protection built into the microinverter can be exceeded, and the equipment may be damaged.

The Enphase Limited Warranty does not cover "acts of God" such as lightning strikes. These lightning strikes can occur anywhere. However, there are some geographic areas where the statistical probability of a damaging lightning strike is very high. For instance, in some parts of Florida the average frequency is 16 flashes per square kilometer per year, while in nearly all of California, Oregon and Washington the average number of flashes per square kilometer per year is a mere 0.5 or less.

The following diagram shows the frequency that lightning strikes occur relative to the location in the United States. (Lightning Density Map provided by Global Atmospheric, Inc. Tucson Arizona).



Recommendation

In areas with lightning flash incidence greater than 3.0 per square kilometer per year, the following lightning protection device is recommended for use with Enphase Energy Microinverters:

- **Vendor:** Citel
- **Part Number:** SP-120
- **Application:** Branch Panel Protection
 - 120kA transient amps protection (8/20 μ s)
 - 5kA transient amps protection (10/350 μ s)
 - Heavy-duty busbar, modular construction
 - Multi-redundant protection circuit per phase
 - Full on-board diagnostics
 - Dual stage fault indicators and remote alarm.
 - 60A, 200kAIC fused disconnect switch (option)
 - 10-Year warranty
 - (See the vendor datasheet for this model at http://www.citel.us/data_sheets/ac/SP120-DataSheet.pdf)

This protection device is sufficient to protect one load center, and one is needed for each load center. The protection device is usually wired to the load center but mounted adjacent to it in a separate box. Install per manufacturer instructions.

One example of an enclosed surge protection system:



Conclusion

Although not common, lightning strikes are an eventuality that must be addressed, especially in certain parts of the world. Following the guidelines in this document will help minimize any lightning related issues with your commercial installation.