Geomagnetic disturbances, also referred to as solar magnetic disturbances, have the potential to affect the high-voltage transmission system and are of concern to the electricity industry and government. PJM Interconnection has developed specific operating procedures for when solar activity is high and could threaten the reliability of the transmission system.

Sunspots and other solar phenomena can produce large clouds of plasma that can induce electric currents in the ground and on high-voltage transmission lines. These currents can flow up from the ground or down into the earth through grounded grid equipment, mainly power transformers.

High levels of these ground-induced currents can cause conditions in power transformers that can result in stressed system operating conditions and potentially lead to blackouts.

The last major geomagnetic disturbance (GMD) occurred on March 13, 1989. It struck Quebec's power grid, causing a blackout that lasted for nine hours. In that same event, a transformer in the PJM footprint, at the Salem Nuclear Plant in New Jersey, was severely damaged.

At a Glance

- Solar phenomena can interfere with the Earth's magnetic field and disrupt the bulk electric system in what is called a geomagnetic disturbance (GMD).
- PJM's members have installed special equipment to detect and measure ground-induced currents that are caused by GMDs.
- If sustained ground currents at a certain level are observed, PJM operates the system in a more conservative mode until the space weather event has ended.

Preparing for Space Weather Events

The National Oceanic and Atmospheric Administration's Space Weather Prediction Center monitors both solar activity and the Earth's magnetic field and issues alerts and warnings to grid operators, so they can prepare for the impacts of space weather events.

To help anticipate problems, PJM's members have installed special equipment to detect and measure ground-induced currents that are caused by GMDs.

When a solar disturbance is forecast, PJM monitors these detectors. If sustained ground currents at a certain level are observed, PJM operates the system in a more conservative mode until the space weather event has ended.

NERC Reliability Standards

The North American Electric Reliability Corporation (NERC) developed and enforces reliability standards to address GMDs. Since 2014, owners and operators of the grid are required to implement operating procedures to mitigate GMD effects.

In 2016, FERC approved an additional NERC reliability standard that identified a "benchmark GMD event" against which asset owners and grid planners are required to assess their equipment and develop and implement mitigation plans. FERC later modified the reliability standard in 2018 to also include a "supplemental GMD event" against which asset owners and grid planners are required to assess their equipment and develop and implement mitigation plans.

In 2021, as requested by FERC, NERC also completed a GMD research work plan to further understand the risk of severe GMDs to the bulk power system. That work affirmed the adequacy of the standards in place in assessing and reducing the risk of GMDs to the electric grid.

June 18, 2026

(866) 400-8980 | (610) 666-8980

PJM © 2026

Visit **learn.pjm.com**
for simple lessons on PJM and the grid.