

Space Weather and Power Grid Workshop

The high-voltage power grid is vulnerable to the effects of severe space weather through the induction of GICs that can damage or destroy equipment and lead to grid collapse due to cascading effects. While there is some awareness and knowledge among power-grid operators and regulators of the space-weather hazard, levels of awareness, as well as vulnerabilities, differ from country to country and regionally within the USA. In order to launch a dialogue on the topic the European Commission's Joint Research Centre (JRC), the Swedish Civil Contingencies Agency, and NOAA's Space Weather Prediction Centre jointly organized a 2-day technical workshop on 29-30 October 2013.

Promote and support dialogue

information exchange and coordination among the stakeholders to foster a holistic approach towards disaster risk reduction associated with extreme space weather storms.

Share experiences

understand current developments, and study lessons learned from recent efforts to protect assets critical to the reliability of the bulk electric system in Europe and North America.

Strengthen the research

and scientific capacity to develop and apply methodologies, studies, and models to assess vulnerabilities to and mitigate impacts of geomagnetic storms at a regional scale.

The workshop was structured into six sessions, the speakers of which represented the various stakeholder groups in Europe, the USA and Canada, who commented on the topic from diverse technical, operational and organisational perspectives.

Session 1: Awareness, policy action, and international cooperation

High-level speakers from Europe and the USA discussed strategic and policy issues related to severe space weather and its potential impact on infrastructures. During the discussions a priority need for validated risk and impact assessment was highlighted.

Session 2: Space weather and GICs

This session provided an introduction to the solar phenomena that can give rise to GICs on Earth, in particular CMEs, and provided an analysis of GIC occurrences in the UK, Ireland and South Africa. In addition, the EURISGIC initiative for providing a real-time forecasting service for GICs in Europe was presented.

Session 3: Canadian experience, including a severe event

Following the space-weather impact on parts of the Canadian power grid in 1989 significant steps were taken to render the grid less vulnerable, such as new developments in modeling, as well as the deployment of a GIC simulator service to automate GIC modeling. Next steps include combining geomagnetic activity forecasts with the GIC simulator, and determining what constitutes a 100-yr geomagnetic storm.

Session 4: USA experience - NOAA's facilities and their use

In a video link with NOAA's Space-Weather Prediction Center, NOAA's monitoring and prediction facilities were presented. In addition, the process from CME detection to customer notification of potential impacts was elucidated. A North American electricity operator discussed operational strategies in case of an alert including potential mitigation strategies.

Session 5: Risk assessment and management

Discussing more generally the disaster risk management cycle, prevention, preparedness and response aspects were addressed, including the need for benchmark event scenarios for severe space-weather impact. The idea to launch a dedicated exercise to provide a stress test of response capabilities both nationally and internationally was proposed to the workshop participants.

Session 6: Looking forward: operator requirements and regulation

The workshop concluded with a discussion of operator and regulatory requirements, as well as with the feasibility of creating a European space-weather forecasting capability. It was also indicated that there is preparedness in industry in some European countries against moderate space weather, but the vulnerability of the power grid with respect to Carrington-type events is unclear and needs to be evaluated. In addition, interdependencies between national grids and other critical infrastructures in case of space-weather impact are not routinely assessed.

The outcome document of the workshop will be released in January 2014.