

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Geomagnetic Disturbances) Docket. No. AD12-13-000
to the Bulk Power System)

WRITTEN STATEMENT OF
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Thank you for the opportunity to participate in today's technical conference on geomagnetic disturbances to the bulk-power system. I am John Houston, Division Senior Vice President of High Voltage Delivery and Compliance at CenterPoint Energy Houston Electric, LLC. In support of my participation on the panel addressing assessment of risk associated with geomagnetic disturbances to the bulk power system, I am providing these comments.

CenterPoint Energy is an unbundled transmission and distribution utility operating in the ERCOT Region. ERCOT serves approximately 85% of the state of Texas. CenterPoint Energy serves Houston, Galveston, and surrounding areas, which account for approximately 25% of the total ERCOT peak electrical demand. CenterPoint Energy and its predecessor companies have provided electric service to these communities for approximately 130 years.

Operating in the southern portion of the continental United States, CenterPoint Energy has not experienced a documented system failure due to geomagnetic disturbances over the course of its 130 year history. However, CenterPoint Energy engaged a consulting firm to help the Company assess its risks associated with geomagnetic disturbances. The Company has also participated on the NERC geomagnetic disturbances Task Force. In my roles as Chair of the EPRI Power Delivery and Utilization Council and a member of the EPRI Research Advisory Council, I have encouraged EPRI to pursue research into geomagnetic disturbance risks as our knowledge of such risks has increased over time. CenterPoint Energy has also participated in initiatives of the Edison Electric Institute (EEI) and the Department of Homeland Security to

address the threat of severe events that could potentially result in the loss of multiple transformers.

The 2012 Special Reliability Assessment Interim Report, entitled *Effects of Geomagnetic Disturbances on the Bulk Power System*, issued by NERC in February 2012 is the work-product of multiple experts working without a formal or defined governance structure. Naturally, different experts can have differing opinions about the conclusions reflected in such a work product. CenterPoint Energy's understanding is that NERC staff worked with a small group of key experts, identified as Drafting Team Members in Attachment 9 of the report, to write the report, including finalizing conclusions and recommendations.

The report concludes that voltage instability is the far more likely result of a severe geomagnetic disturbances event than the failure of a large number of transformers. The report also indicates that in some cases, the effect of geo-magnetically induced currents in individual transformers can be significant and warrants attention, analysis, and possible mitigation. The report references Section 9.2.3 of IEEE C57.91 – 1995 for a discussion of the currently known information in terms of the vulnerability of transformer winding insulation. The referenced section of the IEEE document indicates that overloading of transformers has some indeterminate level of risk, and a scientific basis for evaluation of the degree of risk is not available at this time. The report then places the referenced section of the IEEE document in the context of overheating caused by half-cycle saturation and concludes that it is only possible to determine that transformers exceeding certain temperatures would result in some above normal yet indeterminate level of risk. The report gives several factors that could influence risk to each individual transformer, and numerical examples of what transformer temperatures would be for postulated scenarios.

It is reasonable, yet debatable, for the writers of the report to make an educated qualitative assessment that the failure of a large number of transformers is a much smaller risk than voltage instability based on the information described in the report. One item on which I believe most experts, including the writers of the February 2012 NERC Report, would agree is that more work is needed to assess geomagnetic disturbance risks. The risk assessment

contained in the February 2012 NERC Report is consistent with CenterPoint Energy's work to assess its own risk to geomagnetic disturbance events.

As I noted earlier in my comments, CenterPoint Energy engaged a consulting firm to help the Company assess its risk to geomagnetic disturbances. As part of this engagement, the consulting firm performed analysis to simulate geo-magnetically induced currents on transformers connected to CenterPoint Energy's system resulting from a severe geomagnetic disturbances event. The consultant also provided to CenterPoint Energy the software used to perform this analysis, so that the Company could refine the analysis and model mitigation measure alternatives if justified by the analysis. CenterPoint Energy continues to refine the analysis; however, after several iterations of corrections and refinements, CenterPoint Energy believes the simulated level of geo-magnetically induced currents, even under extreme geomagnetic disturbances conditions experienced by transformers connected to CenterPoint Energy's transmission facilities, indicate a very low level of risk of transformer failures, particularly failure of a large number of transformers. Among other things, the expected level of maximum geo-magnetically induced currents for each transformer varies and, even if it were the same, each transformer's vulnerability to high geo-magnetically induced currents varies based on the considerations described in the February 2012 NERC Report. It is highly unlikely that the individual risk factors for multiple transformers would coincide to result in failure of a large numbers of transformers. In fact, CenterPoint Energy's analysis thus far has not identified a single transformer that the Company considers to be at a high risk of failure, although as I mentioned earlier the Company is continuing to refine its analysis.

I do not know to what extent CenterPoint Energy's assessment, which is consistent with the general assessment found in the February 2012 NERC Report, would be applicable to other systems. I believe the assessment found in the February 2012 NERC Report would likely be true for other electric systems that are similarly situated to CenterPoint Energy. Although I do not profess to know all the relevant risk factors, I believe that regions, such as ERCOT, that only operate up to 345 kV transmission facilities are at less risk than other regions that operate 500 kV and 765 kV facilities. Furthermore, entities, such as CenterPoint Energy, that have generally installed three-phase transformers are at less risk than entities that have installed single-phase

transformers. I also understand that the geology and geography of some areas of the country may result in higher risk associated with geomagnetic disturbances events.

The extensive amount of information provided in the report is indicative of the effort already made to assess and mitigate geomagnetic disturbance risks accomplished through voluntary industry efforts. Also, EPRI has established a “SUNBURST” network where participants that install geo-magnetically induced current monitors can also share the information indicated by the monitors. CenterPoint Energy is installing a geo-magnetically induced current monitor on its system and plans to participate in the SUNBURST network.

To my knowledge, commercially available software with the normal provision of support services, such as dedicated client support staff, user group meetings, and user manuals, is not yet available, but CenterPoint Energy expects such software to be available over the next several months either from firms that specialize in providing power system modeling software or through EPRI. The Company believes a common modeling platform would be very beneficial and would facilitate regional geomagnetic disturbance modeling groups, particularly in those regions that are most at-risk. The Company is hopeful that actual geo-magnetically induced current information provided through the EPRI SUNBURST network might one day be used to help validate geomagnetic disturbances simulation models.

CenterPoint Energy believes voluntary industry efforts could result in standardized geomagnetically induced currents withstand rating methodologies and reactive power consumption ratings for new power transformers through the long-standing IEEE guideline process or through EPRI research funded by its participants. If advanced assessments ultimately indicate a reasonably quantifiable significant risk of several transformer failures due to a more severe geomagnetic disturbance event, there are various ways that such a threat can be effectively mitigated through voluntary industry efforts. For example, EEI member companies developed the Spare Transformer Equipment Program through which the participating entities, which are not limited to EEI members, agree to binding contractual commitments to provide spare transformers to other participants in the event of a severe event causing the loss of a large number of transformers. If advanced assessments ultimately indicate that provisions should be

made for the possibility of additional transformer failures due to geomagnetic disturbance considerations, it would be logical to build upon an existing successful platform to accomplish this goal rather than invent an untried new process. CenterPoint Energy envisions that if there is a need to increase spare transformers due to geomagnetic disturbance considerations, the need would most likely apply only to certain classes of transformers, such as single-phase 500 kV or 765 kV transformers. The Spare Transformer Equipment Program is already designed to accommodate that consideration, because the program is divided into relevant types of transformers.

Also, earlier this year, CenterPoint Energy, in cooperation with EPRI and the Department of Homeland Security, installed a new type of emergency spare transformer that can be deployed in a matter of days rather than the usual lead time of several weeks or months. CenterPoint Energy believes this advancement achieved by industry and government cooperation is also a useful and effective way to mitigate the potential threat of the loss of several transformers due to a severe, unprecedented event.

In conclusion, the February 2012 NERC Geomagnetic Disturbances Report is a reasonably accurate assessment of the risk associated with severe geomagnetic disturbances events, and is consistent with CenterPoint Energy's assessment of its risk. There is ample evidence of voluntary industry initiatives to assess and mitigate potential risks associated with severe geomagnetic disturbances events.

I appreciate the Commission convening this technical conference and providing me with an opportunity to participate in this important discussion. I look forward to engaging in further dialogue on these topics.