

**Sunflower Electric Power Corporation**  
**Transmission Planning Engineering Department**  
**ISME Colloquium Presentation**  
Al Tamimi, PhD, PE  
VP, Transmission Planning & Policy

**Title:** Techniques For Decreasing Ice Accumulation Risk on High Voltage Power Lines  
**Date:** Friday – November 9, 2018  
**Time:** 1:00 pm – 2:00 pm  
**Location:** Clinton Hall, 214

**Abstract**

Sunflower Electric Power Corporation is located in western Kansas and is subject to various weather patterns and storms with the potential to cause significant damage to transmission system equipment and create lengthy outages that put the system at risk. One of the more significant issues within the Sunflower system is the accumulation of ice on transmission circuits (100kV+). Sunflower owns and operate over 2,400 miles of high voltage transmission lines in western Kansas. As winter storms travel through the system area, ice builds on conductors and can create several outages in a small area in a timespan of a few hours. The goal of this research is to investigate potential mitigation measures to minimize equipment outages and structural damage due to ice accumulation on conductors during winter storms. A possible approach is to proactively increase loading on critical lines in region that are vulnerable to icing as predicted by weather forecast. It is expected that higher loads on the lines will subsequently increase their temperature, which will lead to a reduction in ice accumulation and result in less damage and outages on the transmission system. Some of the techniques used in this research to provide proactive mitigations to this problem is ramping up or down of existing generation including wind and possible installations of storage devices like batteries, implement forced line outages to trap power flow in the area of interest, transferring system electric loads to different delivery points, and deploying smart wire new power electronics technologies to change line impedance. This research will determine the feasibility of minimizing the accumulation of ice on conductors throughout the Sunflower system by modifying the system conditions to increase the power flowing into an area at risk of a winter storm.

**Speaker Biography**



I am currently the Vice President of Transmission Planning & Policy at Sunflower Electric Power Corporation based in Hays/Wichita, Kansas, where I provide executive leadership on activities of the Planning and Distribution Engineering departments. I work on establishing strategic and tactical plans to meet transmission and distribution planning requirements for Sunflower Electric Power Corporation's and its cooperative members, and support transmission resource planning. I also work on developing and implementing strategies on transmission policy, regulatory affairs, and compliance issues, including facilitating representation of Sunflower Electric Power Corporation before regional transmission organizations and various governmental and regulatory agencies. I have earned a PhD in electrical engineering from Kansas State University in Manhattan, Kansas,

December 2011. During the last few years, I published several IEEE technical papers on maximizing wind penetration in weak power systems in addition to a doctoral dissertation titled "Voltage Stability Limits for Weak Power Systems with High Wind Penetration." where I have successfully developed plans that improved transmission and distribution network planning and operations. I have been employed with Sunflower Electric since 2001. I also hold a Master of Science degree in electrical engineering from Wichita State University and a bachelor's degree in electrical engineering from Jordan University of Science & Technology. I serve on the Southwest Power Pool (SPP) Economic Transmission Study Working Group, and Markets & Operations Policy Committee. I have also chaired The Generation Interconnection Task Force in 2017-Now and Chaired the High Priority Incremental Load Study 2015-2016 at SPP. For the last six years, I have served as an advisory member on the Cooperative Research Network (CRN) Under the Direction of the National Rural Electric Cooperative Association (NRECA) for Transmission & Substation Assets (MAG Group). I am a registered professional engineer in the state of Kansas since 2005, a senior member of IEEE, a member of Phi Kappa Phi, and the Golden Key International Honor Societies.