New Studies Present Models and Strategies for Creating a More Resilient Power System

MCLEAN, Va. (Nov. 9, 2017) - Our society relies heavily on infrastructure to function and advance. Ensuring the robustness and resilience of our aging power infrastructure is of utmost importance, as our reliance creates risk in the face of extreme events that threaten our infrastructure. Due to the complex interdependencies that exist between the electricity sector and all other critical infrastructures, disruption in the electric power sector can adversely affect our national security, public health and the environment, and have adverse socio-economic impacts on our society.

Without the ability to mitigate extreme weather, we must address these threats and their effects head on. These risks will be examined during several presentations at the 2017 Society for Risk Analysis (SRA) Annual Meeting.

As hurricanes and other catastrophic weather events increase in severity and frequency, our country’s power system becomes increasingly vulnerable. "The ability to withstand and recover from adverse events, such as hurricanes, thunderstorms and winter snow and ice storms will result in fewer service disruptions and lower costs over the long run," said Andrea Staid, a researcher from Sandia National Labs.

Using historical outage data, Staid and her team developed scenarios that can be used for planning to increase resilience. Their study, Quantifying Power System Resilience to Support Decisions in The Face of Adverse Weather Events, assesses the range of potential consequences of various weather threats. The researchers generated scenarios to represent outcomes that could result from different adverse events. These scenarios are used to evaluate potential actions that can be taken to minimize losses.

Another study led by Roshanak Nateghi, Electric Power System Inadequacy Risk in The Residential Sector, used a place-based, data-driven approach to identify and assess risk factors in the residential electricity sector. Nateghi proposes a decision-making tool that utility companies, energy professionals, policymakers and regulators can use to design effective strategies to minimize supply inadequacy risks. During severe weather, not having power could cause serious public health impacts.

Much research has been done about replacing fossil fuels with renewable energy such as solar, hydro and biofuel. However, the production of renewables is highly uncertain and extremely vulnerable to external events, such as extreme weather, which would result in a less resilient power system. In their study, Assessing the Resilience Power Systems Under Renewable Sources Supply Risk, researchers from Vanderbilt University analyzed these renewables in search of a way to build a future power system that is renewable and resilient to disruptive events. This is especially important as the supply of fossil fuels
continues to diminish. They used optimization tools to identify the most effective way to distribute power in the U.S. using both renewable sources and fossil fuels to maximize recovery in the event of a disaster.

Power outages caused by hurricanes are becoming more frequent, affecting a large portion of the U.S. population for prolonged periods of time. However, predicting the extent of a hurricane-induced outage using statistical models remains a challenge and requires decision-making by electric power utilities as well as water systems and emergency response agencies. Researchers from the University of Michigan have developed a new model to help make these decisions and have collected promising results when using the model on central Gulf Coast data.

“Our model estimates the number of crews needed to restore power,” said Seth Guikema, a professor at the University of Michigan. “This helps power companies restore power more efficiently and more quickly after severe weather.”

These studies will be presented during two sessions at the 2017 SRA Annual Meeting at the Crystal Gateway Marriott in Arlington, Virginia.

- Tuesday, Dec. 12, 2017, 3:30-5:10 p.m.: Power Systems Resilience
- Wednesday, Dec. 13, 2017, 3:30-5:10 p.m.: Infrastructure: Climate Change and Extreme Events

*Seth Guikema and Sara Shashaani, Ph.D., from University of Michigan, Andrea Staid, Ph.D., from Sandia National Laboratories, Cameron MacKenzie from Iowa State University, Hiba Baroud, Ph.D., and Pamela Hoover, P.E., from Vanderbilt University and Roshanak Nateghi, Ph.D., and Benjamin Rachunok from Purdue University will be available for media interviews at the 2017 SRA Annual Meeting. Please contact Melanie Preve at melanie@bigvoicecomm.com for all interview requests.

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About SRA
The Society for Risk Analysis is a multidisciplinary, interdisciplinary, scholarly, international society that provides an open forum for all those interested in risk analysis. SRA was established in 1980 and has published *Risk Analysis: An International Journal*, the leading scholarly journal in the field, continuously since 1981. For more information, visit [www.sra.org](http://www.sra.org).