

# Power to the people

## Sociologists helping safeguard smart grid

As our nation's electric power and communications systems have grown increasingly intertwined, the risk of catastrophic system failure also has grown.

An extreme weather event—a large snowstorm or hurricane, for example—or coordinated attacks on the primary electric systems could collapse enough of the network to plunge the country into darkness and chaos.

*But on the brighter side...* WSU researchers in disciplines as unlike as sociology and electrical engineering have teamed up to make the deeply connected systems more robust. Supported by a \$1.2 million, three-year grant from the National Science Foundation, **Christine Horne**, professor of sociology, is working with colleagues in engineering, economics, and sociology at WSU and three other universities to analyze and design more resilient power and communication networks.



Christine Horne

They aim to develop a new paradigm for understanding the complex networks' interdependence to better predict what could happen in extreme events and to strengthen critical elements against cascading failures.

"We don't usually think about these systems because they're so woven into our lives that we take them for granted, but we couldn't get through a day without noticing the lack of electricity or internet," Horne said. "Our goal is to increase resilience of the critical electricity and communication systems that society relies upon to function."

Communication networks transport data for the power system, while at the same time require power to operate successfully. A power failure can cause failures in communications network that can worsen the original power failure.



The sociologists will focus on identifying social factors that can



impair or improve the systems. By rigorously analyzing governn and organization documents, and interviewing a broad range of electricity and telecom stakeholders, they will zero in on proces: behaviors, and features that can contribute to the systems'

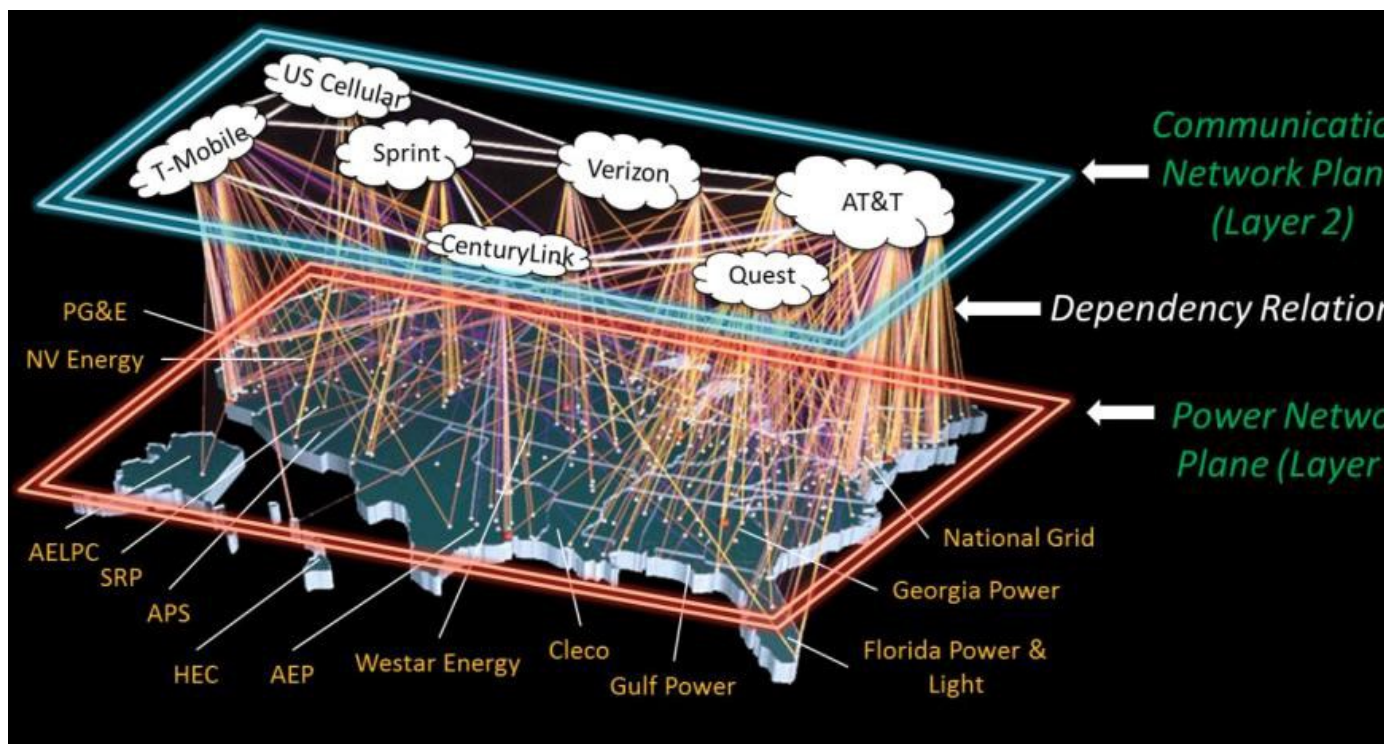
vulnerability or strength.

In particular, Horne and her colleagues will assess the ways perceived risk is reflected in curr operations, policies, and plans for the future. The economists will analyze the investments th might best ensure the power grid's resilience and robustness.

Together with computer scientists and electrical engineers, the team of researchers—at WSU Texas A&M University, SUNY Buffalo, and the University of Arizona—will work to identify the systems' most vulnerable nodes, simulate failures, and design models for failure prevention . recovery.

## Critically interdependent structures

The highly interdependent power and communication networks are two of our nation's most critical infrastructure systems, said Anjan Bose, Regents Professor in the WSU School of Elect Engineering and Computer Science.



Interdependent U.S. power and communication infrastructure system

The need for an interdisciplinary approach to communication and electric power grid issues l been widely recognized in the United States and abroad. As noted in the European Unions' 21 *FOCUS* report on the interdependence of infrastructures, "Interdependency modeling is not a

easy task...multidisciplinary agents' participation is needed."

Researchers in computer science and WSU's top-ranked power engineering program began working together to devise better communications tools for the power grid more than a decade ago. At that time the communications system was part of the electric power grid.

"Now, the smart grid means that communications systems are ubiquitous—right up to the home meter and inside the home," Bose said. "It is critical infrastructure...we do worry."

*The findings of this research will be incorporated into graduate and undergraduate curricula at WSU and the collaborating institutions. By leveraging existing STEM programs, the researchers work to recruit and mentor female and minority students, especially students of the social sciences and economics who may not otherwise be exposed to the energy and communications domain. Other outreach efforts will include workshops, webinars, and technical sessions for students in high schools, community colleges, and historically minority schools.*

—By J. Adrian Aumen, College of Arts and Sciences  
and Tina Hilding, Voiland College of Engineering and Architecture