UTILITIES

Grid researchers focus on fast-evolving U.S. energy system

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The pace of technological change and innovation in the power sector has led the power grid's leading research organization to change its focus. Photo by Ian Muttoo, courtesy of Flickr.

The power industry's leading research organization is shifting its focus to understanding the interdependence of energy resources, including power, pipelines and water.

The Electric Power Research Institute is planning to look more broadly at the connections among electricity, gas, water, transport and natural resources such as clean air, according to EPRI officials meeting with state regulators at a meeting of the National Association of Regulatory Utility Commissioners (NARUC).

Michael Howard, president of EPRI, announced the organization's new approach yesterday in Washington. "Systems for managing energy and natural resources are increasingly interconnected. Yet these systems remain largely separate and fragmented with respect to strategy, management, and operations," he wrote in a forward to a new EPRI report, "The Integrated Energy Network."

Michael Howard. Photo courtesy of the Electric Power Research Institute.

The pace of technological change "suggests the need for a fundamental rethinking of an energy system that has evolved gradually for most of the past century." The transformation could rival the electricity revolution set loose by Thomas Edison in the late 19th and early 20th centuries when the nation's electrical networks were born, EPRI said.

"Separate regulation, planning, and operation of electricity, natural gas and water systems make these systems less reliable and efficient, and they make it harder to realize the productivity and environmental gains of deeper integration," the organization said.

"This will require a tremendous amount of collaboration among all of you," Howard told regulators in the audience. "We are asking you to join us in this effort."

Advances in grid technologies, including digital sensors and high-powered computer analytics, create both the opportunity for a more unified management of a spectrum of energy sources and a growing need to do so, he said.

Howard's message could be taken as a sermon to the state regulators in his audience to approve investments in new grid systems required to achieve the new EPRI vision. Such investment "is going to be much more significant than what we've seen in the past, and it is going to be essential," he said. "We can increase productivity, reduce emissions and improve the use of precious resources like water," Howard told the NARUC conference audience.

The mission shift by the Palo Alto, Calif.-based nonprofit institute sounded in tune with an expanding consensus on the need to plan for convergence of critical infrastructure sectors that include telecommunications, finance and transportation, in addition to electric power, water and natural gas.

While these links create the potential for new consumer services and more reliable and efficient energy delivery, the future also includes greater cyber risks as internet-facing equipment proliferates, and not just in the electricity sector, experts agree. Gerry Cauley, chief executive of the North American Electric Reliability Corp., told a House subcommittee this month. "I don't expect there is going to be an attack that's only on the grid," he said.

The Electricity Subsector Coordinating Council, a group of 31 electric power industry chief executives that regularly meets with senior federal government officials on grid cybersecurity defenses, is expanding its concerns to other critical sectors.

"While electricity is often described as the most critical of the critical, if we don't have water, we can't generate steam or cool our systems. We don't have transportation or pipelines, we can't move fuel or our equipment. If we don't have communications, we can't operate," Scott Aaronson, executive director of security and business continuity at the Edison Electric Institute and the ESCC secretary, said at the same congressional hearing.

EPRI's new research agenda will also focus on the need for new ways of determining the value of electricity, Howard said in an interview. The value will vary depending on whether power is coming from a traditional power plant, a customer's solar unit or an electric vehicle's battery that is plugged into the grid, for example.

"Getting the markets right — the whole regulatory issue around how you price these different values — is a huge discussion," Howard said. "I think we have a lot more work to do there."

Ernest Moniz, former secretary of Energy, called the "value" challenge one of the greatest for the transforming energy sector. In an interview with E&E News, Moniz said he is looking to researchers at the department's national laboratories to create a foundation for answers. "They can provide a technical base for the critical discussions that I think are still in their infancy in terms of how does one value different grid services in a system that looks so different from the traditional one."

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