

Outlook

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Who will lead nation out of darkness? Texas can

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IT is vital that the electric grid of the country be modernized if we are to have any hope of preventing future disruptions in the electricity supply like those just experienced in the Northeast. And next time, it could be far worse than Aug. 14.

While the blame game is proceeding on schedule in the rest of the country, it is time for Texas to lead in developing the smart grid of the future. We have already been staking out the leadership for this effort.

The failure detection and remediation system of the national grid has major flaws and weaknesses beyond what we saw last week. The system was designed 50 years ago to automatically shut down at any sign of such a power surge. The blackout lasted several hours because each local utility had to do a hard reboot in computer parlance, or what is called a black start in the energy business. It takes several hours to spin down and bring back up the generator turbines, and much care to re-establish the matching voltages, frequencies and phases of the high-voltage grid before power can be restored (several days with the seven nuclear plants taken off-line).

The country's political and especially economic well-being depends upon the energy infrastructure that we have so long taken for granted. The gallant efforts of unsung heroes at the utilities and independent system operators have reconstituted the power of the Northeast, but who will build the smart grid of the future? How is the country to meet future electricity demand, which is projected to grow by 20 percent by 2020, while maintaining reliability and security, if the current system is stressed to its limits?

Texas has been a leader in electric grid development for 50 years, with its Electric Reliability Council of Texas. ERCOT is already the exemplary independent system

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operator, or ISO, in the country, and Texas is also unique in that its electric grid is largely self-contained, with only limited DC interconnections to Mexico, Oklahoma and Louisiana. Texas also has several of the nation's best-run power companies in Reliant Energy, CenterPoint and Texas GenCo in Houston, and TXU and ONCOR in Dallas, among many more.

But who is to lead? The Texas Energy Center in Sugar Land has been created with assistance from the Texas Legislature to continue the state's energy leadership into the 21st century, as it has been for the 20th century. The Texas Energy Center's mission to lead in energy innovation and the isolated ERCOT grid make Texas the ideal location to develop and test the smart grid of the future, on behalf of Texas and the nation.

And what is to be done? Modern computer sensing, planning and control software could have prevented last week's shutdown in the first place by diverting power from the wave front using what are called smart power controllers. These employ computer control of thyristors, the electric grids equivalent of transistors and giant capacitors to divert power from troubling congestion spots to underutilized grid lines — much as the Internet responds to failures and attacks with instantaneous response.

Widespread use of such software and hardware must be supplemented with far more advanced breakthroughs such as nanotechnologies that could revolutionize the capacity of the transmission wires themselves. New quantum wires must be developed and tested, in addition to superconductors and high-voltage DC lines. Nanotechnologies also offer the possibility for vast new electrical energy storage ca-

capacity that must be tested and connected into the smart grid. Texas then becomes the first to test nano and other advanced technologies related to transmission wires, environmental remediation, new generation technologies and other developments we can't even imagine now related to the smart grid of the future.

The plans for the smart grid must also cope with the added burden of defending against terrorist threats. The Department of Homeland Security knows all too well our vulnerability, but the nation is first dealing with larger strategic concerns by isolating infrastructure attacks and preventing them from spreading throughout the country. This is termed islanding in homeland defense parlance. The islanding was successful Aug. 14, preventing the power wave from propagating all the way to California. But as we saw from the Great Blackout of the Northeast, those inside an island under attack, including all city and state agencies and utilities, are currently on their own for early response.

At the Texas Energy Center, Columbia University and the great Texas universities, we are already working with ERCOT and the state power industry to create a research and development test bed for the smart grid of the future. Our plan is to focus on the tactical level of defense by creating and providing a national test bed in Texas for software and hardware tools for the smart grid that will use simulations and learning to plan for modernization, prevention of cascading failures, and response and remediation in case of attacks from both natural and man-made events.

The utilities and ISOs carry an enormous responsibility to make sure that our energy supply has the capacity to safely deliver the extra energy that the country will increasingly require. Texas can assume a leadership role in the noble task of modernizing this essential electricity grid. In the meantime, the country is hoping to survive the summer of 2003 without further blackouts.

We intend to do more about this problem than just wish ourselves luck and blame others.