



America's Power System in Crisis

By Guy Warner

Nov. 4, 2010

This past summer's heat wave and deadly thunderstorms triggered an unusually high number of power outages across the U.S., including sustained weather-related outages in major cities such as New York, Detroit and Washington D.C.

While Americans are increasingly aware of the impact of extreme weather on the electrical transmission system, many are less aware of the number of outages that are not related to weather – those caused by overload on an aging electrical infrastructure.

Concerns are rising about a system in crisis. The nation's electricity transmission and distribution grid was built for the 20th century and has remained virtually unchanged since that time. Years of decline and deferred maintenance have resulted in a system that is outdated and in disrepair.

During the past two decades, non-weather related blackouts have increased 124 percent, with demand up in the past decade alone by 60 percent. In fact, analysts estimate that in an average year, power outages and disruptions cost the American economy an estimated \$104 to \$164 billion.

In addition to the economic toll, there is also growing fear of national security risks related to the system's vulnerability to terrorist attacks. In April 2009, American security forces reported evidence of hackers from Russia and China penetrating U.S. electrical systems and leaving potentially damaging programs embedded. While no specific outages were reported as a result of the attack, the incident elevated concerns of a potential cyber-assault on America's electric infrastructure.

In response to these threats, there is growing interest in the development of "microgrids," peer-to-peer power networks that feature locally produced and locally managed power systems that operate in parallel to the utility grid. They can utilize natural gas or renewable energy sources, such as solar, geothermal or biomass power and are ideal for high-use building clusters, such as hospitals, universities, office complexes and data centers. The buildings remain connected to the utility grid, but by generating their own power they reduce reliance on the grid and can even send surplus power back into the grid. In a power outage or disturbance, a microgrid can separate from the utility grid and continue to provide secure, reliable power. Members of the microgrid retain power availability, avoiding blackouts and lost productivity.

Microgrids offer a range of benefits from enhanced efficiency to reduced carbon footprints. Central plants are at best 35 percent efficient because of line losses and smoke stack waste heat. Microgrids have no line losses and



can capture surplus heat and use it to warm and cool buildings, making them up to 85 percent efficient. Through the use of renewable sources and recaptured heat, microgrids generate an estimated 48 to 50 percent reduction in GHGs and can save an estimated 10 to 12 percent in energy costs.

Microgrids feature the latest in smart-grid technologies, decentralized energy distribution systems, communications infrastructure and power generation all within a single location. These energy assets can stimulate local economies through significant job creation – for every utility worker displaced, an estimated two local green jobs are created for microgrid design, construction and maintenance.

The average microgrid takes only 12-24 months to legally enable, which can result in rapid job creation and energy savings for communities. Major microgrid projects are already designed and are raising financing for construction – in Stamford, Connecticut's financial district; in Washington D.C. on the campus of Howard University; at Santa Clara University; and the University of Illinois.

Howard University's planned microgrid project is expected to create 15 new local jobs at a salary ranging from \$60,000 to \$150,000 per year during the construction phase. Furthermore, a small number of permanent green collar jobs will be created indefinitely for the ongoing operations and maintenance of the system.

Consider these scenarios: a single microgrid in New Orleans could provide secure and reliable power for multiple critical hospitals, medical institutions and bio-medical research facilities, even during traumatic weather events, such as Hurricane Katrina. A Wall Street microgrid could keep trading floors operating during New York power outages, saving our economy millions of dollars.

U.S. regulatory and financial support for the development of microgrids currently lags significantly behind Europe. Enabling legislation passed by the European Union in 2000 launched the development of microgrids across Europe with pilot projects now operational in eleven European countries.

Washington D.C. could similarly jumpstart the U.S. microgrid market with an infusion of stimulus money to help fund design and development. To date, an estimated \$11 billion in stimulus funding has been allocated to modernize the nation's electricity grid. However, the majority of those funds have gone to smart grid technology designed to integrate energy demand. Zero dollars have been allocated to proposed microgrid projects, a number of which are already shovel-ready.

Microgrids are, in fact, the ultimate "smart grid" that have the potential to reduce the power load on our national grid, stimulate the economy and create local green jobs, eliminate national security risks and provide clean energy resources that are more reliable and cost less. With a system already in crisis, the time to act is now.

Guy Warner is a leading economist and the founder and CEO of Pareto Energy a company that provides counsel in the design, development, funding and maintenance of microgrids. To contact Warner, e-mail him at gwarner@paretoenergy.com.