

AVOIDING POWER OUTAGES BY FOCUSING ON THE MARGIN WITH MICRO GRIDS

By Guy Warner

During August's brutal heat wave, record power use crashed the electric distribution system in downtown Stamford, Connecticut. The life-sustaining services of an elder care facility were among the operations that went dark for more than nine hours. Financial and pharmaceutical companies, who lose millions per hour without electricity, also had no power.

On average, the central power systems delivering electricity to Stamford and other U.S. cities achieve a remarkable level of performance, often reaching a reliability rate exceeding 99 percent. As shown during the heat wave in Stamford - and other cities including New York City, Chicago, St. Louis and Los Angeles - central power failures at very particular times and places can threaten lives and wreak enormous financial damage.

Central power systems generate electricity with large

plants that cannot be easily fired up on short notice. They convey that power to cities over lines which can be easily knocked down by Mother Nature or human mischief and often take many years to upgrade. Moreover, regulation does not encourage deregulated utility companies to invest in improving local distribution systems at their weakest points.

While it vies to build new coal-fired generating plants and billions of dollars of transmission lines, Stamford's utility, Connecticut Light and Power ("CL&P"), is investing only \$150 to \$250 per year in local distribution property and much of that to add new customers as opposed to upgrading the quality of the system.

CL&P estimates that upgrading distribution systems will take another five years to accomplish. As Stamford residents and businesses anxiously await heat waves next summer, there



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seems little hope that there will be a solution coming from the central power system any time soon.

Many experts now agree that solving marginal power problems at particular times and places will be better met by a new type of decentralized micro-grid system. In his brilliant new book, "From Edison to Enron," Richard Munson has described the promise of micro-grids: "... a growing number of engineers argue that the August 2003 power cascade should provoke a dramatically new approach to delivering electricity.

"They draw a comparison to computers and their evolution from centralized mainframes of the 1960s to today's decentralized web of networked laptops. These engineers foresee a radical new power network - one that's adaptive, self-healing and compatible with distributed on-site energy sources. It would have sophisticated sensors to anticipate crises, electronic circuits to redirect wayward currents and a computerized 'brain' to power down non-critical electricity loads when the system is nearing its capacity. One innovation, the micro-grid, already links small generators and sophisticated software based on neural networks can increase power quality and reduce the risks of overloads," Munson writes.

As outlined in figure A on page 34, the micro-grid approach recognizes there are clear benefits to taking the same spatial "foot print" where costly area- and time-specific failures occur and installing a source of environmentally benign, high quality micro-generation at or near its point of use.

Unlike a conventional plant, micro-grids have an economic and environmental benefit in being able take advantage of the excess thermal energy from power generation to heat and cool buildings. From about 30 percent energy efficiency at a conventional power plant (some 70 percent of the energy goes up a smoke stack and adds to global warming or is lost during the electricity's journey from the central plant to where it is used), micro-generation can achieve up to 85 percent efficiency.

The decentralized micro-grid also creates an optimal situation to introduce a variety of renewable energy and alternative energy technologies, particularly solar, solar thermal and solar photovoltaic power. Small, on-site fuel cell power plants can also provide additional peaking and crucial back-up power for uninterrupted energy service.

As opposed to the distant and detached state and federal organization of the central power system, new, more agile community groups are emerging to plan and finance micro-grids.

Taking a cue from the model by which self-taxing business improvement districts solved crime and sanitation problems in the 1980s, for instance, pending legislation in

Connecticut would enable municipalities and their businesses to take local control of electric power in an innovative organization called the Energy Improvement District (EID). Under

the legislation, EIDs would be able to use municipal bonds to plan, finance and install micro-grids.

As opposed to the slow, cumbersome, and environmentally negative central power approach, a micro-grid planned and financed by an EID could deliver more reliable and cleaner power in less than one year. Experience with

micro-grid systems on U.S. military bases and other residential communities in the United Kingdom has demonstrated that micro-grids can be developed much faster and more economically than central power upgrades.

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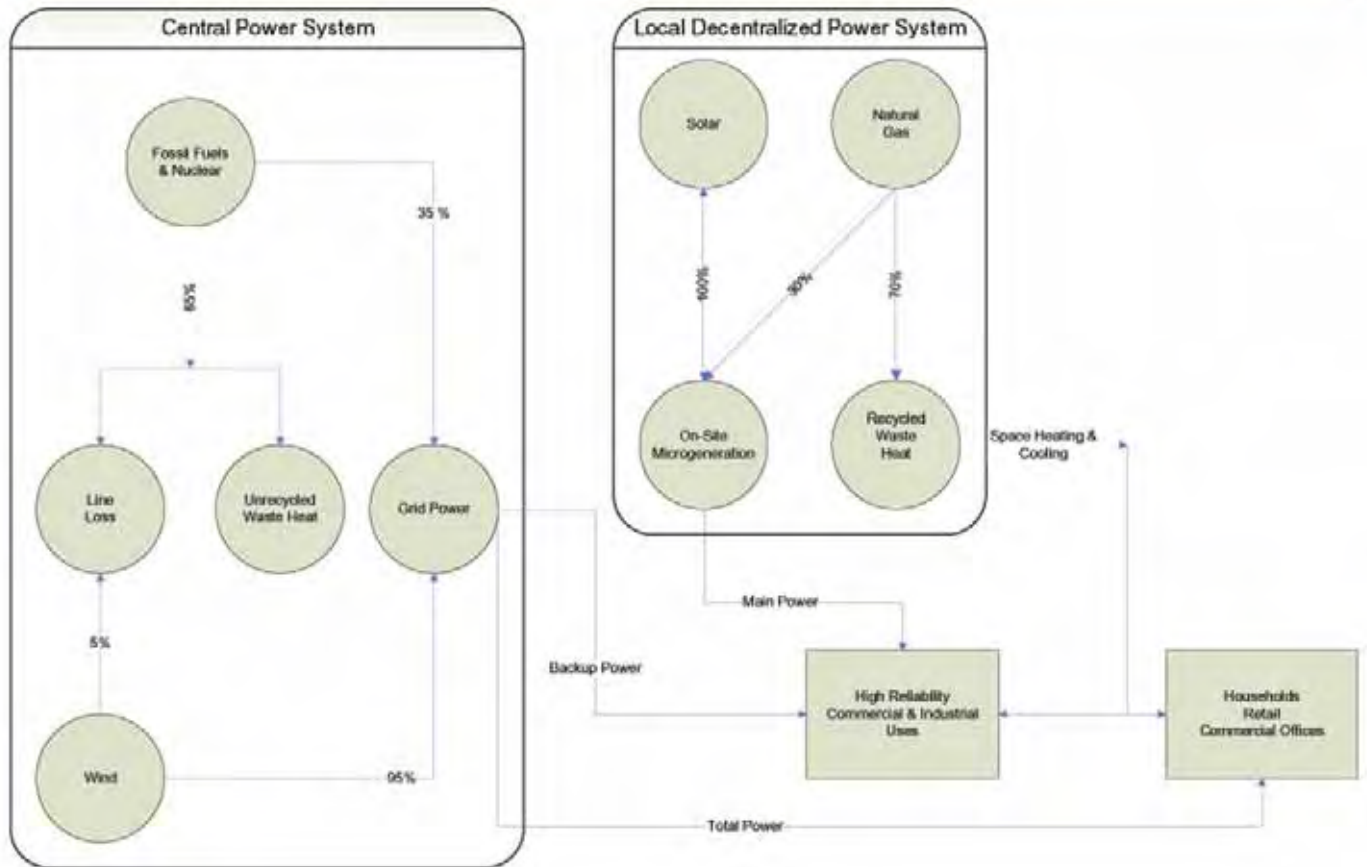


Figure A

Micro Grids continued from Page 29

The Economist magazine likens the emergence of micro power to previous trends towards smaller, more customized ser-

vices in telecommunications and predicts that the U.S. market for micro generation may exceed \$60 billion.

Taking local control of key electric system upgrades, putting 70 percent of waste heat to work in space heating and cooling, eliminating line loss and poor power quality due to wires, and installing electric power generators compatible with

the environmental and economic tenor of the community are all common sense objectives which can be achieved much better with a decentralized micro-grid approach. Benefits will reverberate from local communities to entire states and geographic regions as robust economic development and electric power grid stabilization result.

Guy Warner is the CEO of Pareto Energy, www.paretoenergy.com; and has worked with cities, small countries and several multinational utilities on new energy efficiencies, renewable energy and on-site power project strategic planning.



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