

How ComEd Used Distributed Generation To Handle Its Peak Summer Load

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Commonwealth Edison Company (ComEd-A Unicom Company) serves more than 3.4 million customers across Northern Illinois, or 70 percent of the state's population. The summer of 2000 marks the third consecutive year that ComEd used diesel generation for peak shaving, distributed generation, in the Chicago area.

It began back in 1997, when the effects of El Niño forecast increased temperatures throughout the nation. Research began to determine what alternatives existed to provide extra power capacity on a temporary basis. After reviewing data from portable diesel generator suppliers, it was determined that it was feasible to supply generation on an as needed basis.

With that, a plan was put into place to provide temporary, regional distributed generation to critical areas in the territory. ComEd contracted to rent 90 megawatt's of portable diesel generation during the months of June through August. Although the running hours were limited, the project was viewed as a success. This success shed light as to the possibilities of providing a quick and cost effective means of local, peak shaving generation.

In 1998, ComEd researched the market for temporary power alternatives. Areas that were covered included, power barges, 3-5MW diesels on railcars, and small jet turbines. Once again the diesels won out and were contracted for the project. Only this time, the scope was raised to 210MWs.

As in the prior year, the performance of the portable units were put to the test on days where ambient temperatures exceeded 100°F and heat

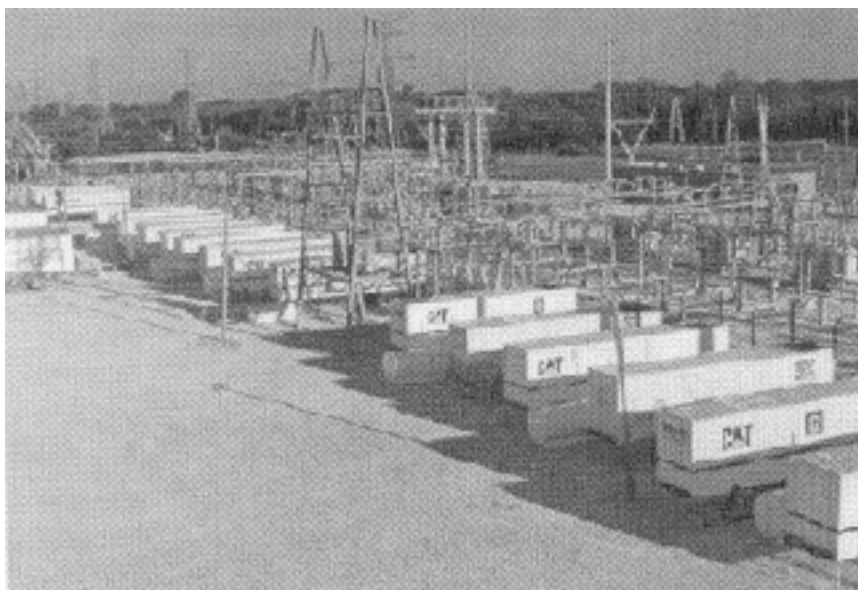
indexes above 150. The units provided substantive power to the tune of 21,420 MWhs during the summer months. These needed MWhs were especially appreciated when spot market pricing reached levels in excess of \$7000 per MWh.

Where does this put ComEd for the new millennium? This year's scope was ramped up to provide 300MWs of peak shaving, distributed generation. Performance-based contracts have been awarded to the two suppliers from previous years. Patten Power Systems and Aggreko will be challenged once again for the project. These two suppliers have proven themselves over the last two years and will be called upon to deliver the MWs.

Patten Power Systems, the local Caterpillar dealer, will be providing the lion's share with 160 power modules, producing 240 MWs at 8 locations. Aggreko's portion will be supported by 60 power modules generating 60 MWs at 2 locations.

The Patten Power Systems' sites typically consist of 20, Caterpillar 1750 kW, utility-grade power modules, each one tied to a single 2500 kVA transformer, then paralleled together into a substation. The typical installation shown below depicts the arrangement of equipment at one of ComEd's transmission substations.

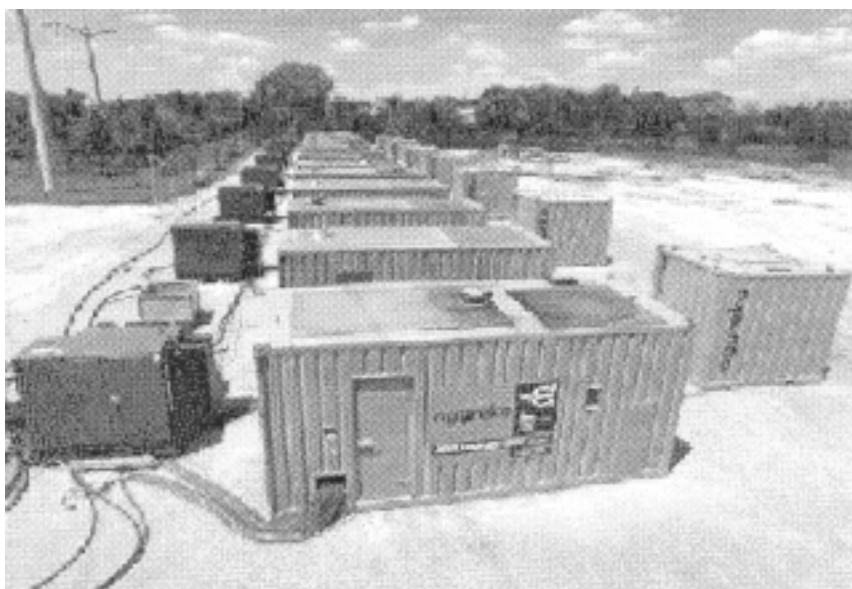
After extensive planning and coordinating, it took about a month



to set and place the generators, fuel tanks and cabling at all 8 sites. Mechanically, the equipment was installed by dedicated crews utilizing cranes, lift trucks, and tractors. There are over 21 miles of power leads alone. Electrically, the power from each module is delivered through 4,535 MCM leads per phase. For system protection, each generator is wired with specific safety trips that can be activated both from the substation and the control cabinet within the power module. Examples of those safety measures include reverse power, over speed, over/under voltage, over/under frequency, and ground/electrical fault.

Similarly, the Aggreko sites include 30, 1250 kW, utility-grade power modules paired to a single 2500 kVA transformer, then paralleled into a substation. Due in part to the unique containerized design of the Aggreko components, they are able to set up a typical site within a week's time.

As with last year, fuel capacity and consumption is a major factor. During a critical operation, fuel was being burned at a rate of 18,000 gallons per hour for more than 15 hours a day. Each site's generators are paired to a single, external, fuel storage tank. The fuel tanks vary in capacity from 2300 to 2500 gallons, and are certified, double steel wall construction to prevent spillage and leaks. Total site storage capacity was 285,000 gallons. As one might expect, keeping the individual fuel stor-



age tanks filled in the heat of a Chicago summer day, is a monumental task.

ComEd's contracted fuel supplier Bell Fuels, managed to keep the trucks running. Their efforts were challenged once more to keep the units filled. With the increase in scope of the project, the fuel deliveries reached 70 truckloads a day to keep the generators running. The on-site storage this year was increased to 430,000 gallons to accommodate the additional gensets and anticipated consumption.

Additional lessons learned from the previous years have included the derating of the gensets. Given the extreme operating conditions that the generators were running, each generator had been derated 250 kW. This gave a comfortable operating margin for Aggreko at 25% and Caterpillar with 17%. These margins yielded 1000 kW and 1500 kW for Aggreko and Caterpillar respectively. At the same time, both Patten Power Systems and Aggreko have incentives built into their contracts to produce additional power at the direction of ComEd.

Where does it go from here? ComEd's distributed generation project this year is the largest of its kind. With the increased demand for power and physical limitations of existing transmission and distribution systems, distributed generation has the ability to get the power where it's needed most.

The marketplace is emerging, providing many alternatives for localized power production. As deregulation occurs throughout the nation and the call for competitive solutions continues, OEMs and utilities will be pushed to provide answers. The large diesel engine manufacturers have been forthcoming by developing diesel engines with lower sound and exhaust emissions. Combine that with their relative small size per kW and the ease of installation, the diesel generators have carved their way as the clear, low-cost provider for peak shaving, distributed generation for ComEd.

ABOUT THE AUTHOR

Joseph Fiorito was a senior purchasing specialist for ComEd and initiated the idea of using distributed generation in 1997. Incorporated in 1994 and based in Chicago, Unicom Corporation (NYSE: UCM) is a public company dedicated to meeting the energy needs of residential, commercial, industrial and wholesale customers. With \$7 billion in revenues, Unicom Corporation is the parent holding company to Common-

wealth Edison Company (ComEd), its principal subsidiary, and Unicom Enterprises, Inc. (UEI), offering competitive energy-related products and services.

Engaged principally in the production, purchase, transmission, distribution and sale of electricity to retail and wholesale customers, ComEd provides service to more than 3.4 million customers across Northern Illinois, or 70 percent of the state's population.

Note: Subsequent to this story's original publication, Joseph Fiorito (fiorito_joseph_g@CAT.com) has taken the position of distributed energy manager with Caterpillar Inc. In this position, he is responsible for delivering similar projects in North America.