



## **Power for the People**

*by Walt Patterson*

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As you sit at the PC on your desk, if you think for a moment, you can probably remember what PC stands for. 'PC' is now generic; but it means 'personal computer'. Sometime soon the expression 'PP' may be similarly generic. It stands for 'personal power', and it's coming over the horizon at impressive speed. It may not soon sit on your desktop, or on your lap. But even these possibilities are already under examination by leading innovators in electricity generation. Meanwhile you'd better get ready for personal power in your basement or broom closet. Some of it is already in operation, in some unexpected locations. Much more is on the way.

The US wire service Knight-Ridder reports, for instance, that the nineteenth-century precinct house of the Central Park police in New York City now has its own power plant. The city's overloaded, antiquated electricity distribution system could not deliver enough electricity to run the station, and an upgrade to the lines would have cost \$1.2 million. Instead, for \$1 million, the police installed a fuel cell in the precinct house. On 1 May they disconnected themselves from the city's network. 'It's great to be self-sufficient', says police Captain James O'Neill.

Other examples are springing up across the US, of restaurants, banks and even residential areas electing to generate their own electricity from fuel cells, microturbines and other small-scale local plant. Dow Jones reports that a developer in Texas is negotiating to lay out a new residential area without recourse to transmission lines, instead providing 5000 new homes with fuel cells to provide their own electricity. Such arrangements do not necessarily entail disconnection from the network; but they reduce reliance on it, and consequent vulnerability.

One of the driving forces behind the surge of interest in small-scale local generation is increasing concern about the reliability of traditional central-station electricity in the age of liberalization. Users who have long regarded contracts for 'interruptible' electricity supply merely as an automatic price discount have been nonplussed and dismayed to find that 'interruptible' means just that - your supplier can summarily cut off your electricity supply. In the US, the Wall Street Journal reports that the latest major scare, a heat wave in New England in June that nearly led to a network collapse, has sparked a rush of enthusiasm for microturbine generators.



At the moment, microturbines appear to be the technology of choice for small-scale generation. Major manufacturers such as Allied Signal, Elliott - recently linked with GE Power Systems - and Capstone are already vying to seize what they expect to be a swiftly expanding market. But fuel cells are not far behind. Ballard Power Systems, with participation from major international players such as DaimlerChrysler, is developing fuel cell generators down to the size of portable petrol generators. GE is backing not only microturbines, through its Elliott licence, but also fuel cells, with Plug Power. Other fuel cell developers are also in the hunt. Some plant manufacturers now propose to offer novel packages to prospective clients, including not only direct purchase but leasing and rental, an additional inducement for technologies evolving so rapidly.

In Europe, too, small-scale generation, especially cogeneration, is attracting attention. The inexorable rise of clean, efficient and economically attractive small-scale generation raises thought-provoking questions about the future of electricity systems. Considering small-scale generation in the context of traditional systems, some analysts talk about 'distributed generation', on the basis that the new small-scale units will have to co-exist for many years with much larger traditional central generators, perhaps connected to the same network. A vigorous policy dialogue is already under way, about the implications of this trend for business transactions, prices and relationships, not to mention system operation, including reliability.

To support this dialogue Thomas Ackermann, of the Royal Institute of Technology in Stockholm, has produced a massive and exhaustively referenced working paper entitled *Distributed Power Generation in a Deregulated Market Environment*, now circulating in draft and attracting wide attention. The draft paper is available from him online, in PDF files; contact him at He also moderates an online discussion group on distributed generation, whose participants already number over 100, from many different countries.

Distributed generation, however, is not the whole story. Some analysts prefer to talk about 'distributed resources', in which participants on an interconnected system can contribute not only by, say, increasing electricity generation but also by decreasing load. In the 'distributed resources' dialogue, more efficient and flexible end-use equipment is also recognized explicitly as an integral part of system resources, and of the shopping-list for potential transactions.



One corollary of this development will be a gradual but steady change in the role of the network. A traditional electricity network is a one-way system, designed to deliver electricity from a small number of central generators to a much larger number of users. The emergence of distributed generation, and the active recognition of other distributed resources on the system, means that power flows will become two-way on an increasing proportion of the network. It also means that information flows along the network will become at least as important as power flows, not only for real-time system operation but also to track flows of value - who on the network is doing what, where and when, for whom, at what price. This evolution of the role of the network figures prominently in the long-term strategic analysis under way at the Electric Power Research Institute in the US. EPRI's 'Electricity Technology Roadmap', outlined in the EPRI Journal for summer 1999, foresees major changes in network technologies, operation and management by the early years of the coming century.

Your PC is probably already part of a network. You don't know nor care how the network functions, as long as your PC delivers the services you want. Sometime soon your personal power, your PP, may function much the same way.