

IT brings control over electricity supplies

IT AND ENERGY

The need for energy efficiency and clean power are bringing the two sectors together, reports Sarah Murray

An unlikely marriage is being consummated. On one side is a monolithic industry, cautious, highly regulated and focused on ubiquity, reliability and affordability. On the other is an aggressively competitive sector with rapid product cycles and an insatiable hunger for innovation.

Yet the electricity industry and the IT sector are being forced together, as the need for energy efficiency and clean power sources becomes more pressing.

The challenges of transforming the electricity system look overwhelming; much of the infrastructure has barely changed since it was designed and built more than 100 years ago.

It is often said that if Thomas Edison were to revisit Earth, he would see still in place much of his work on power generation and distribution, whereas Alexander Graham Bell would find the telecommunications landscape altered beyond recognition.

On the user's side, the contrast is as striking. Telecom consumers have a dazzling array of payment choices and services, while electricity customers remain passive recipients of a one-way flow, use of which they are barely able to monitor or control.

"Most of us get this paper energy bill and all we understand is how much we owe and where to send the cheque," says Dan Reicher, director of energy and climate initiatives at Google. "It's a backward-looking, single snapshot of energy use over a specific period with very

little useful information about how one might control that energy use."

Introducing that control is now arousing the interest of technology companies. As utilities seek to increase efficiency, great hopes lie in a smart grid – a new form over which data and communications will flow.

With networked IT-enabled devices, consumers can see how much electricity they are consuming and modify their usage. Utilities can use variable pricing to discourage power use at peak times, smoothing out consumption patterns, reducing use of expensive and dirtier "peaker plants" and avoiding the need to keep these plants on permanent standby, saving large amounts of money.

"Peaker plants run 365 days a year but they are only necessary to respond to peak use for about 2 per cent of the year," says Scott Lang, president and chief executive of Silver Spring Networks, a California-based start-up producing smart networking products designed to boost utilities' efficiency. "So 20 per cent or more of our annual costs of generating power are to address that 2 per cent problem."

Silver Spring Networks is working with US utilities such as California's Pacific Gas and Electric and Florida Power & Light to replace customers' old electro-mechanical meters with solid-state wireless networked meters.

While setting variable pricing will be complex, needing input from regulators and rate-payer groups, smart meters will enable immediate tracking of use and are equipped to respond to pricing signals once they are in place.

"We can anticipate peak moments and turn the thermostat back for a few minutes and significantly reduce the need for heavy carbon emission-producing peaker plants," says Mr Lang.

The way power is generated and



Reverse the charges: you might be able to sell it back to the utility for more than you paid for it

Gelby

distributed is also changing, as the centralised system – a one-way flow of electrons from large generators – gives way to a more distributed model incorporating roof-top solar panels, ground source heat pumps and wind turbines.

"Smart grids and energy efficiency are an IT opportunity, when you think about the amount of distributed intelligence you have to put around this network," says William Swope, who heads Intel's corporate sustainability group.

Further into the future is the opportunity for plug-in electric vehicles to sell power back to the

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grid. Cars could charge at night and store that power in their batteries. When needed, utilities could buy power back from vehicle owners at a higher price, yet at a cheaper rate than resorting to peaker plants.

"You can't do that now, because the grid was not designed for that two-way flow of electrons and information," says Guido Bartels, general manager of IBM's Global Energy and Utilities Industry and chairman of the GridWise Alliance, a project to modernise the US elec-

tricity grid. "It's clear that information technology and innovation are going to play an extremely important role in this."

Use of renewable energy also calls for greater use of intelligent systems: natural sources such as wind and solar energy are intermittent and so transmission and distribution require close management.

"You need more IT to help balance the grid and anticipate better when you might lose these intermittent sources of power," says Mr Reicher. "Integrating solar and wind into the grid increasingly involves IT, both in the management of the grid and in the prediction of power these resources will be able to provide."

For the IT industry, the application of networking and internet protocols to the management of power is familiar territory.

"It's like the internet, where intelligent communication networks optimise the flow of information," says Christian Feist, senior manager of utilities for the energy and utilities practice of Cisco's Internet Business Solutions Group.

"You have exactly the same in a smart grid, where intelligent communication networks optimise the flow of electrons."

A range of business models is emerging: big companies such as IBM and Cisco are establishing energy practices and developing energy management services.

Through its energy and utilities industry unit, IBM, for example, is

now doing smart grid deals with suppliers such as American Electric Power and Consumers Energy, a Michigan electric and natural gas utility.

And Lorie Wigle, general manager of Intel's Eco-Tech office, says: "We're interested in the build-out of smarter energy and the integration of renewables into the mix as well as distributed energy generation and smart grid infrastructure. Because that will generate a lot of data and compute requirements."

Google, for its part, has a partnership with General Electric to lobby for renewable energy policies and develop clean energy technologies.

Start-ups such as Silver Spring Networks are becoming important. Others include GridPoint, a Virginia-based clean tech company focused on smart grids; California-based eMotor, which provides the software supporting smart meter technologies; and Grid Net, a San Francisco-based smart grid company.

At the same time, older companies are finding a role: Schneider Electric, for example, is a 170-year-old company that has shifted from iron and steel, shipbuilding and heavy machinery to energy management.

Aaron Davis, Schneider Electric's chief marketing officer, says: "You used to have power wires or data wires," he says. "Now, they're the same. So you have two massive industries with no separation between them any more."