

Part II (II)

Decentralising Energy Generation

Renewable generation comes in all sizes, from massive offshore wind farms and community hydro electric schemes right down to the wind turbine in your back garden or the solar panel on your roof (the small scale stuff being what's commonly referred to as 'microgeneration').

Going local

Locating electricity generation close to where the electricity is consumed makes a lot of sense. Doing so reduces the inevitable energy loss that occurs when power is moved around, both in transmission and distribution. Recognising this, many governments are now encouraging microgeneration (generation in your home or backyard) through financial incentives such as feed-in tariffs aimed at producing a new breed of 'prosumers'. Creating your own Prosumers, consumers who can also generate electricity, benefit in a couple of ways:

- ✓ They meet some of their own electricity requirements and, thus, avoid the cost of purchasing it.
- ✓ They get paid for every kilowatt hour they produce and any excess that they put back onto the grid.

Experts have estimated that one in five of homes could put up a small wind turbine or solar panel without significantly impacting the distribution network (so long as they didn't all live in the same area!) But here's the dilemma. This amount of microgeneration won't be enough for us to achieve the CO₂ reductions that governments are striving for and yet any more is likely to cause distributors serious problems. Prosumers represent a significant challenge to distributors whose networks have been designed for a one-way flow of electricity from transmission grid to end consumer. Power flows can now be two-way and are likely to be less predictable. This has huge implications for the distribution network, not least health and safety issues during network maintenance, and creates the requirement for more realtime information to manage the network. Prosumers may also take the form of communities who share the energy produced by a mid-sized combined heat and power (CHP), wind turbine or hydro plant. These communities may form distribution islands on the network that are at least partially self-sufficient but also trade with the larger network to top-up their demand requirements or sell surplus generation.

Offering Better Consumer Service

Aside from saving the world (or at least doing their part), smart grids offer additional benefits to consumers. Smart grids offer good visibility of the network, which allows distributors to pinpoint and resolve outages more quickly, thus, reducing the time consumers are without power. Better network management via smart grids also offers the prospect of better quality of supply:

- ✓ Fewer brown outs.
- ✓ Less flickering.
- ✓ Less interference with communication systems and other electronics.

The ability to maximise use of the existing network capacity can reduce the time required to connect new customers.

Optimising Distribution

From a more parochial view, smart grids can offer a compelling business case to distribution companies. The improved asset monitoring and network optimisation of smart grids allows a distributor to 'sweat its assets' (maximise the investment it's made in its existing network). Distributors can move towards condition-based maintenance in which assets are maintained when required rather than according to fixed schedules. This form of maintenance can reduce both operating expenditure (OPEX) through less unnecessary maintenance, and capital expenditure (CAPEX) by extending the life of assets. Smart grids also enable smart investment strategies. Better visibility of power flows on the network gives distributors a better understanding of where losses occur, allowing them to target investment accordingly. And the ability to add more customers to the network without digging up the street and laying new cables means more revenue for less investment.