

More than just wires?



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The future role and products of the DSOs Peter Williams

Significant change in the electricity distribution sector has been anticipated for some time. There is no doubt that the landscape has changed over the past decade, but are continued decarbonisation, decentralisation and the advent of 'smart' technologies about to drive major disruptive change for the DSOs? If so they'll need visionary strategies and insightful leadership to attract the investment needed to thrive and grow.

In comparison to many other industries, advancements in electricity distribution have, to date, been slow. To the outside world the networks of today look much the same as they did 50 years ago – with the exception of technical development in work processes and some advances in the technology of assets such as cables and switchgear. There have been some more notable changes in information management and in control, communications and IT – but many would say that even these have been modest compared to development in most sectors of the economy. Ownership structures, economic regulation and commercial arrangements for DSOs have also evolved across Europe in line with regulation on separation of monopoly from non-regulated businesses – albeit quite slowly.

THE WIND OF CHANGE

But drivers for change are now strengthening; underpinned by the push to decarbonise the energy sector. Lower cost, low-carbon, production (generation) is leading to an increase in the number of small generation units connected to the electricity distribution networks. Much of this distributed capacity is both intermittent and unpredictable. This is leading to somewhat unconventional, multi-directional, power flows on distribution networks. In some locations, the surplus of production – particularly solar PV – is even starting to mean significant export of power from distribution networks up to the transmission networks at certain times of day. The increased levels of renewable energy generation at the distribution level is also giving rise to additional and significant technical challenges associated with system stability and voltage management. The new usage patterns are set to continue as local energy production grows and technologies such as electric vehicles and heat pumps continue to expand as a key part of national decarbonisation strategies.

A BIT MORE FLEXIBILITY, PLEASE!

A significant amount of switchable load at industrial and commercial customer sites

represents a source of untapped ‘flexibility’ to help deal with the increasing variation in production output and the associated need to balance generation and demand at the national (and international) level. Customers are allowing themselves to engage more actively in the minute-by-minute operation of the power system through automatic response. At the domestic level the connectivity of customer load will increase through concepts such as the internet of things; and with smart meters providing dynamic price signals, greater demand-side participation is likely to occur.

Much of this will happen in the background as, for most, being a customer should not be a full time occupation!

DSOs will transition to owners and operators of a much more ‘active’ network, having access to a portfolio of responsive demand and dispatchable generation. We will start to see functional change; not just doing the same thing more quickly and easily, but changes in what the DSOs do. And with some regulators moving to remove any perverse incentive to invest in conventional long-life assets, DSOs are being encouraged to buy solutions from service providers rather than invest their own capital.

This means that DSOs are starting to exchange technical (asset-based) risk for commercial (contract-based) risk – a significant departure from convention which will require new ways of thinking.

Some DSO participants may be a customer during one hour, and a service provider during the next. Innovative commercial arrangements will be needed to make these markets work.

BYE – BYE SIMPLICITY. HELLO COMPLEXITY.

One thing seems certain, that the days of simple delivery of kWh down the distribution ‘pipe’ from the ‘top’ (high voltage) to the ‘bottom’ (lower voltages), are over. This transition is supported and enabled by rapid advances in control, monitoring and communication technology. Distribution networks are effectively being overlaid with technology, not only to optimise use of the conventional network assets, but also to unlock new products and services for both customers and service providers. With self-generation and custom-

er-driven participation on the rise – enabled by falling technology costs – and with many customers attracted to the idea of independence from the large energy companies, the service being offered by DNOs may quickly start to look quite different. For an increasing number of customers, the distribution network will provide a ‘safety net’ for when their own provision falls short. But a network which effectively provides ‘insurance cover’ will need to be priced accordingly. With the total cost of providing a network as a ‘back-up’ being much the same as the cost of providing a network for ‘main supply’, there will be increasing pressure on DSOs to recover costs through fixed capacity-based charges and to move away from commodity, or kWh-based, charging. This, in turn, will accelerate the process of customers aiming for energy self-reliance. Unless DSOs can fully recover network costs there is a growing risk of stranded assets and the associated implications for business revenues and for future investment. And with all of these changes afoot, huge investment in conventional network assets continues.

Billions of euros are expected to be invested in conventional copper and iron solutions over the coming years as part of the sector transformation – including the integration of high levels of low-carbon production connected at distribution level.

A clearer distinction between asset management, infrastructure delivery and real-time operation of the distribution system is emerging. The challenge for regulators, and the industry more generally, will be how best to structure and license the distribution sector in a way which encourages progression and innovation and supports future investment in the sector. Nobody knows for certain what trajectory DSO evolution will take. Some expect the change to be progressive rather than radical – supported by the incumbent players who are incentivised to preserve the status quo. Others see a huge threat to the established DSO role from new players applying innovation, creativity and a deep understanding of customers to disrupt the norm and circumvent conventional constraints in order to develop novel commercial opportunities.

The DSOs are rapidly moving from being staid and reassuringly predictable to enablers for a new, fast moving, consumer orientated electricity sector whose success will depend as much on effective cultural change as on technical and commercial innovation. More than just wires? Most certainly.