

# Smart metering for Distribution Network Operators

**Now is the time to exploit smart data**





Distribution Network Operators (DNOs) should stop focusing on smart metering as a compliance programme and start thinking of exploiting the data to gain real advantage. With less than a year to go until smart data starts pouring into DNO systems, it's time to develop and enhance your business capabilities.

The benefits to DNOs of smart metering are less obvious than those to retailers, but they are potentially at least as significant, and DNOs therefore need to make smart metering part of their overall business strategy. In countries where smart meter penetration is more advanced than in the UK, such as Finland, Italy and Sweden, DNOs are already reporting many of the benefits we describe below. So, rather than just complying with your smart metering deployment obligations, it makes sense to maximise the potential opportunities.

A new world is coming where you can better manage all of the following – and will be expected to do so:

- Network operating conditions, through greater visibility of power consumption patterns
- Demand levels and patterns, including peak demand, line losses and reverse flows
- Operations near specified network limits, by identifying areas of voltage spiking
- Asset investment, by strategically targeting highly stressed assets
- Outages, improving customer service by identifying and locating outages more quickly
- Connections, by accurately forecasting, and responding to demand changes on the network
- Microgeneration, by identifying reverse flows



# Part of your Smart Grid and IoT strategy

Industry debate has so far focused on the potential benefits of being able to manage these aspects of the business better. However, with the data so close to coming through, the key question for DNOs now is, “How can we extract and realise these benefits?”

The answer is less than straightforward for a number of reasons. For one thing, the overall value of smart meter data to a DNO depends on the type, granularity, completeness, cohesiveness and speed of data capture. And smart meters do not capture all the technical data that a DNO needs to operate a totally smart grid. Hence smart meter data is part of the equation, rather than a complete answer.

Nonetheless, smart metering can provide real value to a DNO. In this paper we’ll take a closer look at what that value is, and how it can be realised.



# Business opportunities for DNOs

So what are the potential benefits of smart metering for DNOs, and how can they be realised? Smart metering opens up the possibility of a number of new or enhanced business capabilities.

## More cost-effective network design and operation

Smart meters make it possible to monitor demand across your network, ensuring capacity is available when customers need it. Where necessary, DNOs can take steps to influence network running conditions, or demand levels and patterns.

Smart meters can help DNOs tackle specific problems relating to customers' increased use of microgeneration technologies. Because these introduce localised reverse power flows when generation output exceeds demand at a given property, voltage can rise above statutory limits. With the increased visibility of low-voltage (LV) networks provided by smart meters, DNOs can better identify voltage spikes, and deploy controls to manage them.

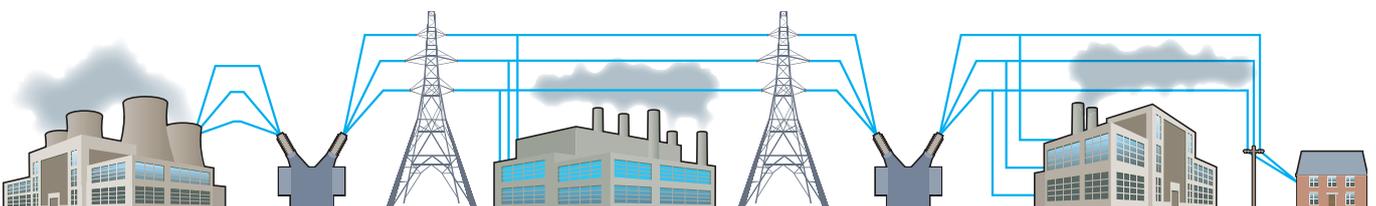
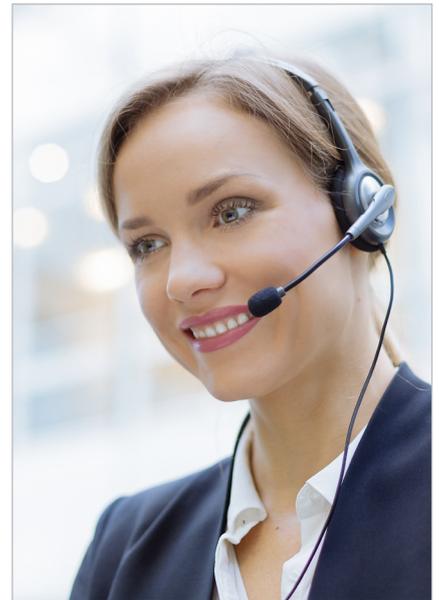
Smart meters can also help reduce energy losses on the network. As energy flows increase, losses during transmission inevitably increase with them. DNOs can use smart meter data

to manage this pattern. In particular, improved visibility allows DNOs to progressively improve the management of feeder voltage profiles with targeted and prioritised intervention, reducing losses.

## Better customer engagement and service

Smart meter data can improve DNOs' ability to detect power outages before customers call. At present, few customer interruptions are detected automatically; for the remainder – many of them due to LV network faults – DNOs are reliant on customer calls. By using smart meter data to detect more outages, DNOs can become faster and more efficient at diagnosing faults and restoring supplies (thereby avoiding fines). This is especially valuable during storms, when customer supplies can be severely affected for long periods.

In addition, this approach allows more proactive engagement with customers, leading to increased satisfaction. When real-time and historic data from smart meters is available, DNOs can respond more efficiently to customers with concerns about voltage or reliability. This is especially relevant now that customers can easily reach DNOs by dialing 105, the national 3-digit number (3DN) launched early in 2016.



## Understanding the network and managing demand fluctuations

In today's rapidly changing economic and physical environment, customer demand fluctuates constantly. Smart meters have the potential to manage and reduce peaks in demand through changes in customer behaviour, making life easier for DNOs.

Improved visibility of peak demand patterns allows networks to be operated closer to their limits, reducing investment needs and hence costs for customers. Planning and design costs can be reduced by taking advantage of improved visibility of network load and voltage levels and a reduced need to design reinforcement schemes. Direct reinforcement costs can also be reduced (depending on penetration levels) as a result of more accurate data.

However, demand management provides different, and potentially conflicting, benefits to retailers and to DNOs. This is true especially in a context where will come into play over the next 2 years – this will probably exacerbate the conflict of interest between DNOs and retailers. Realisation lies largely within the control of retailers, yet it is DNOs who would first face system of systems (SoS) issues. Industry-level coordination is key if chaos is to be avoided.



A hand in a light blue shirt sleeve is holding a silver pen over a calculator and a bar chart. The calculator is a silver electronic calculator with a display screen and various buttons. The bar chart is on a piece of paper with a grid, showing several bars in different colors (green, red, blue, yellow). The background is a soft, out-of-focus image of a person's hand and the calculator.

# Analytics: the key to realising benefits in sub-optimal conditions

From a DNO perspective, geographical coverage will emerge in a haphazard and patchwork manner, and DNOs can only realise the potential benefit of increased network data when smart meter penetration reaches a tipping point. Coordination between retailers and DNOs would be the ideal answer to this challenge, but at least in the short term will probably not happen.

One way of getting most value out of a patchwork smart meter rollout is to maximise the use of sophisticated analytics, such as extrapolation from samples. Using analytics is essential for other reasons too. If the smart meter rollout triggers meaningful changes in consumer demand behaviour then DNOs need to pick up and understand those changes to avoid their becoming a threat to performance. With analytics, DNOs can continue to plan, invest and operate effectively.

All this points to the urgency of putting in place clever analytics and system modelling solutions that enable you to effectively capture data and quickly turn it into insights for asset planning and operations.

Smart meters need to be viewed in context, as part of your overall Internet of Things (IoT), social, analytics and mobile strategy. Realisation of this strategy will require changing your operating model and breaking down operational silos.



# What DNOs should be doing now

To realise the benefits of smart meters, DNOs need, as we've seen, to invest in analytics. Other key areas for attention and investment include:

- Social strategy, and other aspects of customer data and relationship management
- Data handling, processing, compliance and security
- Asset management with associated maintenance work management, including network planning and investment planning
- Aligning the operating model to exploit the extra data strategically

## Analytics

Your ability to realise the advantages described above depends on how well you can work with vast volumes of data, analyse it and use the resulting insights to drive decisions about how to manage the network. Eventually DNOs will need to deploy sophisticated multi-layered analytics bringing together smart data, GIS, address, weather, network information, and more.

In order to get the best out of real-time smart meter information, and to ensure successful integration and functioning of future analytics enhancements, DNOs should develop a full smart meter data strategy. A full GIS connectivity model, at all voltage levels, can enable increased functionality of customer and distribution management systems.

## Social strategy

DNOs, like retailers, must connect with customers in a way that suits those customers, providing timely and useful

information about forthcoming outages, for example.



This depends on combining smart meter data with contact details and information about customers' preferred channels. This will enable DNOs to deploy sophisticated customer relationship management (CRM) techniques to create truly connected customers.

## Data handling, processing, compliance and security

Smart will bring a step-change in the volume of a DNO's interactions with the outside world. There will be issues relating to people and processes, as well as technology. Cybersecurity questions arise in relation to both the DNO and the customer. You need to ensure that your organisation remains compliant and secure. Cyberterrorism, and public awareness of that threat, makes security one of the most important considerations for a DNO.



Your longer-term plans for processing large data volumes should influence your decisions in the immediate future: for example, decisions about moving to a cloud computing architecture and hosted services.

## Asset management

DNOs can exploit smart meter data to better identify and justify capital investment decisions. To do this, you need enhanced asset management capability enabling the capital asset team to carry out research & development and to evaluate asset pilots based upon their impact on the grid.



From an asset maintenance perspective, the organisation needs to design enhanced asset care regimes that use smart meter data to drive direct efficiency savings. An example is condition-based maintenance, which can be done more accurately by examining smart meter data to identify potential weak assets in the DNO grid – and perhaps also of the relative condition of “last mile” assets. In addition, new data available from the field will enable DNOs to design improved processes to respond to asset failure events more quickly.

## Aligning the operating model

To realise the opportunities of smart, you must change the operating model, culture, processes and ways of working in your business, as well as the systems. How successfully you manage these changes will be a key determinant of your ability to turn smart metering technology to business advantage.

Throughout the organisation, new ways of working and new technology need to be put in place to take advantage of the new data. To make this work, you must first assess the level of cultural change required and how readily this can be achieved.

Processes need to be adapted to work with data from both traditional and smart meter dominated areas of the network. To do this effectively, DNOs need to fully understand their process architecture, and have both traditional and smart meter supporting end-to-end processes mapped and understood. The timeliness and accuracy of information will rise dramatically: unless your processes (and supporting systems) are designed to utilise this information as a basis for action, you will struggle to realise many of the benefits of smart metering.

Key organisational capabilities like schedule and dispatch or grid control should be enhanced to take advantage of greater network visibility. As smart meter coverage increases towards

saturation points in some areas, the data can be used alongside smart grid technologies and IoT to move towards automated asset control.

## Making the journey with Capgemini

As a DNO, you need to understand how you can successfully transition from the traditional to a smart world, encompassing the reality that both worlds will exist concurrently for many years.

Please contact us to talk about how you can best position your organisation to realise these opportunities, and to see what your roadmap for the next three to five years might look like.



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