

# DEMAND RESPONSE

## THE MISSING LINK IN THE SCANDINAVIAN SMART METERING CASE

By Philip Lewis, Jessica Strombäck

*Already one of the longest established and most advanced liberalised markets in the world, Scandinavia will soon be an AMR-enabled region with an abundance of 'smart metering' by default.*

The next step for the region will be to develop the business case for an infrastructure which is already installed: to turn smart metering into smart business. However the question arises: can smart metering ever become a smart business on its own? The current evidence suggests that in general it cannot. Smart metering can only reach its full potential when coupled with a fully developed demand response programme.

### SMART METERING IN SCANDINAVIA

With its developed infrastructure and technologically focused cultures, Scandinavia (including Finland) is well placed to be the leading region for smart metering in Europe. It is expected that by 2010, 60 percent of the region's 13 million power network customers will be served by smart metering. Sweden is requiring that all homes be provided with AMR units by 2009, while Norway, Finland and Denmark are effectively adopting the same option, formally or not. While smart metering within Scandinavia is spreading quickly however, the perceived benefits have until now focused on efficiency rather than customer interaction or demand response. There is no doubt that Scandinavia has the underlying infrastructure required to use smart meters as a basis of fully implemented demand response programmes, and indeed this possibility could theoretically become a reality within 5 to 10 years if the will existed, but only now is the required vision emerging.

### EXTENDING THE BUSINESS CASE

Until now smart metering (or AMR) in Scandinavia has been justified on the grounds of the known cost savings for utilities. In addition to more efficient meter reading, other savings materialise through, for instance, improved accuracy of invoicing, remote verification and management of meters and contracts, energy loss detection, reduced billing and call centre costs (reduced complications, queries and complaints concerning metering and billing), and even theft risk reduction and reduced pay-back times.

Despite all the claimed benefits however, extensive research indicates that the currently planned implementation of smart metering within Scandinavia is typically expected to lead to substantial net financial costs that ultimately will need

to be funded through higher bills for consumers, whether mandated or not.

This hardly presents an overwhelmingly convincing business case, and in a market which is essentially monopolistic and increasingly political, a fundamental regulatory, ethical and strategic question arises from this situation: assuming that the costs and benefits of smart metering are transparent to customers, will they and the politicians who represent them accept the costs which they are expected to incur? Presently, the benefits which customers will realistically receive arguably fall far short of what they would expect in order to willingly pay the projected €15-30 per customer per annum higher bills for approximately 15 years.

The logical solution to this dilemma would appear to be to increase the benefits which smart metering can deliver to customers. By benefiting customers, utilities will also satisfy the politicians who regulate them.

### CUSTOMER BENEFIT MYTHS

Unfortunately, even most of the benefits which have been proposed for customers appear to be red herrings.

Accurate (as opposed to estimated) billing, for instance, may seem like a benefit to a customer who thinks they are paying up front for energy they have not yet used, but it may not be perceived so positively when the customer realises they will now receive large winter bills as opposed to the previous equal bi-monthly payments.

The notion that smart metering will lead to significant increases in customer switching is also highly questionable. While more accurate metering data will reduce some of the uncertainties and process costs associated with acquiring customers and providing comparable offers, the reality is that there is no evidence of a correlation between the level of smart meter deployment and the rate of customer switching. Customer switching is known to be driven by a much broader set of issues.

Even the belief that smart metering will provide advantages to customers through more varied tariff offerings is undermined by the reality that customers, especially in Sweden, are already confused by the lack of comparability of offerings.

As for benefits such as quality of supply and electrical safety, it is questionable whether the minor projected improvements will even be perceivable by customers.

Therefore when discussing the added value services afforded by smart metering, a sceptic might pose the following questions: Where are they? How much will they cost? Will the meters be smart enough or the communication medium capable enough? The reality is all too often nowhere, too much and no!

### INNOVATIONS FOR DEMAND RESPONSE

So where do the customer benefits lay? Ultimately, one of the most promising benefits of smart metering can be found within a developed demand response programme, through its potential to provide customers with what matters most to them – cheaper energy costs. By providing customers with appropriate and motivating tools with which to use energy in a more timely manner, they will be able to simply manage their energy costs more efficiently. Fortunately for utility companies, this efficient demand response behaviour will also turn customers into risk management partners – for a fee, of course.

Recent research, innovations and trials concerning demand response management have provided a beacon to the Scandinavian utilities market – a realisation that the extensive and advanced Scandinavian establishment of smart metering,

together with the Scandinavian cultural character, provides an outstanding platform for the development and rollout of mass demand response strategies. However, it is important to emphasise that these programmes are only effective to the extent that they are comprehensive, and to the extent that they truly succeed in establishing customer interaction.

### STATE-OF-THE-ART DEMAND RESPONSE

As a tool in the battle for the timely use of energy, smart metering alone is futile. Smart metering gains its true social significance only when applied as part of a larger demand response service design, when it is used as an interactive tool, not only to give accurate measurements of electrical use but as a mutually beneficial communication device between energy companies and customers.

As Dr Sarah Darby from Oxford University put it, "Technical solutions alone are not going to reduce demand...(what is needed is) better feedback – part of building a more energy-literate, low-carbon society...Time to say goodbye to the 'energy consumer' and encourage the 'energy citizen'."

Customers must become aware of their relation to the larger environment and the role of their consumption behaviour.

In this way demand response becomes a tool empowering customers to use energy more consciously – to either use it or conserve it, but in either case to have this be a choice, rather than something that is done but never considered.

Clear, user friendly, intuitive and ambient in-house display information relating to consumption, cost and behavioural significance/comparisons, pay-as-you-go (new generation smart prepayment tariffs), dynamic pricing and demand response tariffs coupled with warnings of high price periods, more frequent accurate bills based on readings, annual or quarterly energy reports, and reward-supporting, behaviour reinforcing ethical services coupled with CO<sub>2</sub> and environmental impact information, are just some of the feedback tools which are potentially at the disposal of Scandinavian electrical utilities.

### KEY CHALLENGES FOR SUCCESSFUL DEMAND RESPONSE

Yet the development of successful demand response programmes is by no means a simple task. Because the public must be educated to become 'energy citizens' rather than 'energy consumers', half way measures will rarely produce the desired effect. The programmes present the industry with a few key challenges that must be met before they can be successfully established. These challenges come in the form of adequate visual displays, dynamic pricing and standardisation in the handling of data.

Visual in-house displays provided for the customer must be stimulating and communicative. The mass Scandinavian rollout of advanced smart metering, coupled with current developments by the international white goods manufacturers, would technically allow for a large proportion of the above feedback tools on a hitherto unseen scale within 6 to 10 years. However the current European concept of in-house displays, for instance is not far short of pathetic. Simply putting an illegible, ugly, uninteresting and unintuitive single-site display within a home is far removed from the vision of the energy citizen. New stylish, intuitive, ambient solutions are an essential step towards the use of smart meters within any holistic demand response solutions.

Scandinavia, especially Sweden, is currently at the heart of design developments to tackle this issue. Sweden's

Interactive Institute in Stockholm, for instance has developed a fascinating array of innovative products and service concepts to turn appliance consumption and meter data into information which has a meaning to the consumer. Plugs, cables, lamps, light displays and projectors, wall pictures, home pages and loyalty schemes take on a whole new meaning when combined in the fight against customer ignorance and apathy. Energy efficiency and its timely use can be simple, meaningful, and a desirable compliment to the lifestyle of today's self-conscious consumer.

## *“Demand response becomes a tool empowering customers”*

Dynamic pricing presents another key challenge. Its necessity is clear: through giving customers prices which change from hour to hour (albeit in a warned and reasonably predictable manner) depending on the electricity resource situation, it allows customers to make simple ex ante decisions and actions concerning their electricity volume purchases, provides customers with empowerment/autonomy/control over their costs when costs are high, and turns customers into more aware and conditioned 'energy citizens' who respond to market price changes.

Extensive research has indicated that customer activity, be it consumption or loyalty-related, is closely related to the degree of price volatility within the market. Customers respond to large and sudden price shocks by becoming more conscious of the unpredictability of their situation. In an attempt to address this unpredictability, customers can respond by either obtaining security through fixed price contracts, or by adjusting their use or source of consumption.

Since fixed price contracts are not in the interest of demand response or the environment, there is a necessity for Scandinavia to desensitise customers to a new market reality where prices reflect resources and environmental impact – a situation where customers can control their impact and costs only through their consumption and choice behaviour. This adjustment will take time and receive some opposition in Sweden and especially in Finland and Denmark where prices have been remarkably predictable until now. In Norway price volatility has been a reality for years, partly due to liberal price change legislation, and is already reflected in greater levels of customer activity and responsiveness.

Another key challenge concerns standardisation and integration, handling and management of demand response data. It is not an easy task to develop a common feedback infrastructure without coordinated capabilities and protocols for data collection, communication, analysis and distribution. With so many different smart metering and communication solutions within the Scandinavian market, even within individual utilities, advanced gateway technology is seen as a partial solution in conjunction with current attempts to achieve Scandinavian and European harmonisation.

Gateway technologies in particular, offer the opportunity to move from simple functional monitoring capabilities of today, to a future that is a more progressive and rewarding interactive relationship between the end user consumer and the energy provider. This forms the basis for building a truly sustainable business services model. Rob Lenihan, founder of Cogo Group comments, "Consumers value choice – if they are at home they can choose to turn a light off or the

heating down, so why not extend that choice to when they are remote from their homes. Enabling users to access their home remotely, via their mobile device, and turn the heating down because they are going to be two hours late is a positive advantage – it saves them money, maximises the use of energy and adds value to the service provided without necessitating any additional actions from the energy provider. This may be extended to provide a carbon calculator, analysis of use and other reports not dissimilar in the way many telecommunications companies do now for phone usage.”

Even with such solutions, demand response programmes typically require back up from advanced, yet highly flexible and adaptive CIS and billing software. Currently, systems within Scandinavia tend to be either excessively heavy and labour intensive, expensive and slow to adapt, or otherwise simplistic legacy systems incapable of practically supporting vast quantities of new data for a purpose never envisaged when the systems were developed or installed. More appropriate systems do exist, as proven within Australia and the USA, but apparently not yet with Scandinavia.

#### SMART METERING FOR A FRESH BRAND

Scandinavian utilities companies have been dogged by poor image since liberalisation began over 10 years ago. There is a vision that the onset of mass smart metering will herald a new era for the image of

the industry, that it will provide signals to the consumer and the electorate that the industry is finally moving into the new millennium, that it can be innovative, convenient, and ethically minded. Such a vision can only become a reality however, if smart metering is applied in a highly visible, interactive and mutually beneficial form, such as through demand response programmes. Only time will tell if the potential is met or missed.

Within the next few years it is expected that there will be a genuine shift in emphasis from the metering benefits per se, towards benefits which can be derived through smart meter related customer interaction. Innovations in energy efficiency, demand response and distributed energy in particular will facilitate both the corporate objectives of utility companies and the ever growing climate and customer protection concerns of politicians. Smart metering through demand response can play a key role in a win-win-win scenario for consumers, environment and utilities. ■■



**ABOUT THE AUTHORS:** Philip Lewis is a specialist in utility customer psychology and behaviour and head of the VaasaETT energy think tank. Formerly with a leading UK energy retailer and then the University of Vaasa, he has conducted research and consultancy during the past 10 years in over 40 countries for many of the world's leading energy companies. He is on the editorial board of the 'Energy Efficiency' journal and holds a PhD in Marketing from the University of Edinburgh.

Jessica Strombäck is a director at VaasaETT specialising in demand response issues.



**ABOUT THE ORGANISATION:** VaasaETT is an independent international think tank for the global energy and utilities industry; networking expertise in utilities markets. VaasaETT focuses on efficient management of the psychology and behaviour of customers in response to changes in their environment (e.g. prices, services, regulation, liberalization, etc.). VaasaETT's core team of specialists represent seven nationalities, span eight languages, and have provided assistance to more than 300 organisations in nearly 50 countries.

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