Case study: Sweden

E.on Sverige's residential electricity bill

Context

Sweden was one of the first countries in Europe to complete the deployment of smart electricity meters to household consumers. In 2003, the Swedish government required accurate monthly invoices based upon actual meter readings for all residential customers beginning July 1st, 2009. The legislation was in response to widespread dissatisfaction among residential consumers due to inaccurate invoices, data errors during switching and the long settlement periods (sometimes up to two years) which meant that some customers received very large invoices and sometimes had difficulty paying. In 2003, when the proposition was adopted, a survey of customer satisfaction found that the three largest electricity suppliers (E.On, Fortum and Vattenfall) were more unpopular than the tax office and customs (Svenskt Kvalitetsindex.) The only group which was close to being as unpopular was the police and even they scored higher than Fortum and E.On. Therefore, the aim of the Swedish government at the time was to be seen addressing these issues. The legislation did not specifically require smart meters to be rolled out, but set out to address citizen's dissatisfaction with the electricity industry. However, without any clear requirements from the regulator, unbundled network companies responsible for the roll out only sought to comply with the regulation while improving their own operations. They therefore did not pay much attention to the new capabilities offered by more advanced meters in terms for instance of being able to provide more frequent feedback to consumers, enabling more sophisticated dynamic pricing schemes and accommodating more intermittent generation. As a result, many of the meters deployed are not capable of supporting energy efficiency programs, nor is the national data handling and communication system capable of handling the necessary levels of granularity required for the most effective pricing or feedback programs. This greatly limits customer engagement and thus their ability to benefit from the smart metering infrastructure all the while bearing the cost (€200 per household). This is all the more unfortunate given that Sweden has arguably significant potential for energy efficiency. Average consumption at 9,000 kWh a year is amongst Europe’s highest and around half of its 4.5 million electricity customers have electric heating and typically use about 20,000 kWh a year. In addition, the cost of electricity is a concern for Swedish households during the long winter as a result of monthly billing based on actual consumption. Typical households spend about 4% of their disposable income on electricity and households with electric heating about 17%. In addition, electricity prices have increased by 21% between 2009 and 2012. The high share of electricity in household budgets, and especially those with electric heating, is one of the reasons why Sweden consistently has one of Europe's highest customer switching rates at around 10% per year. (Lewis, Brennan and Dromacque 2012.)

Objectives

Sweden did not mandate smart meters but only monthly meter readings in order to address customer dissatisfaction with the electricity industry. Proposition 2002/03:85 stated:

- "In order to facilitate supplier changes and give electricity customers a more direct connection between consumption and billing, the government has passed a decision to introduce monthly metering of electricity usage among all electricity customers by 1 July 2009."

21 Electric heaters are large sources of load but also provide great sources of flexibility.
22 http://data.riksdagen.se/dokument/GQ0385
Some of the key objectives were:

- To provide all consumers with accurate monthly invoices rather than estimated invoices;
- To further competition within the electricity market by supplying all end consumers with accurate monthly invoices, rather than estimated bills, in the hopes that this would increase awareness of electricity costs and encourage consumers to switch away from expensive retailers;
- To give electricity customers a more direct connection between consumption and cost in order to encourage behavioral change and increased energy efficiency.

Case Study

Main characteristics

Below is an example of electricity bills sent by E.On Sverige to residential customers from its distribution area who have not switched to another supplier. The bill is shown in appendix 4 in its entirety. The front page of the bill states in a transparent manner not only the total amount to be paid, but also which amount is due to the DSO and which amount is due to the retailer. The back of the bill constitutes the enhanced component and contains two interesting elements. As shown by Figure 15, the electricity bill is broken down into each of its different components (retailer's standing fees, DSO's standing fees, transmission, distribution, energy, electricity tax and VAT) and shows which amount goes to the different parties (retailer, DSO or state through taxes).

Figure 15: Breakdown of electricity bill into its different components. (Source: E.On Sverige 2013)

The back of the bill also shows historical consumption levels over the past year (Figure 16).

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23 E.On is one of the "big 3" with Vattenfall and Fortum who together share about half of the Swedish electricity retail market.
Supporting Policies

Smart metering policies

Sweden did not mandate smart meters but only monthly meter readings in order to address customer dissatisfaction with the electricity industry. Thus, the legislation did not specify any minimum requirements for meters although it was anticipated at the time that the most cost effective way to comply for the industry would be to upgrade the metering infrastructure. Proposition 2002/03:85\(^{24}\) stated:

- “In order to facilitate supplier changes and give electricity customers a more direct connection between consumption and billing, the government has passed a decision to introduce monthly metering of electricity usage among all electricity customers by 1 July 2009. Within the given timeframe, the network companies are free to decide the pace of implementation. The cost of the reform is estimated at around SEK 10 billion (€ 1.1 billion) and will be paid for by the end consumers.”

The possibility to use smart meters as a building block for a smarter electricity grid was overlooked. Measurements are delayed and real-time information is not transmitted to customers. As a result, the installed smart meters should already be replaced as the technology is not suited to next-generation smart grid technology. Furthermore, people regularly protest at the high electricity bills during the winter. The government has launched an investigation into the cost of upgrading the smart metering system and data handling capabilities in order to enable in-home displays and dynamic pricing programs for residential consumers. At the time this report was written, this was still under debate.

Billing rules

There are a few legal requirements on the Swedish electricity market regarding the invoice as it is seen as a component for competition. However, the network company is required to give the consumers’ meter readings. The meter readings include the following data:

- Meter readings at each month;
- Yearly consumption;
- Consumption per month (in kWh) for the last 13 months.

Another relevant aspect from the Swedish market can be the access of monthly and hourly meter readings. The consumer has the right to monthly meter readings and from 1\(^{st}\) October 2012 the consumer can, without any charge, sign contracts based on hourly consumption.

In Sweden, as in the other Nordic countries, customers who leave their incumbent supplier start receiving two bills; one from their network company related to distribution and transmission charges and one from their new supplier related to

\(^{24}\) http://data.riksdagen.se/dokument/GQ0385
the supply of electricity. The group of Nordic energy regulators (NordREG) sees the separate billing regime as confusing for consumers and as a hindrance to competition. NordREG (2012) recommends the introduction of mandatory combined billing performed by the supplier as early as 2015 as the Nordic countries work towards creating a common retail electricity market.

Impact/Evaluation

**Improvement in awareness of energy consumption**

The average Swedish consumer seems to be slightly more aware of their electricity consumption than in many other European countries (European Commission 2010: 17). This is perhaps due to the cold winters, high average level of consumption and monthly bills based on actual consumption. It is therefore complicated to isolate the impact of accurate monthly billing on awareness and consumption since it has not been quantified. The current bills, however, give little information to consumers as to what is actually consuming electricity in their homes nor how they could reduce usage. Consumers are likely to be most aware of their consumption and the associated cost and most receptive to suggestions as to how to reduce both when they receive their utility bills which makes them a logical place to insert energy efficiency advice. Further, the granularity of consumption data (monthly versus daily in the CER pilot) may not be enough to create more energy efficient behaviors. Information on personal consumption will not work without a motivation to conserve, which may be provided by other instruments like financial incentives, goal setting, or personal commitment. On the other hand, feedback will not work if households have no idea what they can do about their consumption.

**Improved transparency**

The energy industry is hardly known for its transparency. Most consumers are not aware that their electricity and gas prices are made up of different elements, that some of these are regulated or set by the government (taxes) while some others (in deregulated markets) are left to market forces, and finally that the amount is divided between the different actors. In many countries (Great Britain, Romania, France etc), electricity and gas bills do not contain any precise breakdown information relating to the different elements besides VAT. Utilities in these markets do not see the need for the inclusion of such detailed information with the bills of residential customers. It means that retailers can hide relatively high margins or inefficiencies without much notice. This can been seen as a double-edged sword, since it also means that retailers in deregulated markets are often wrongly blamed for increasing prices even when the increases are due to components of the price which are out of their control. A study of residential energy prices in Europe by Dromacque et al. (2013) found that the energy price component (including retail margins) represent a mere 43% of the total electricity cost and 53% of the total gas cost. The same study found that over the past four years the regulated components of the bill increased the most. Although the current separate billing system is deemed confusing by many including NordREG, Sweden's highly transparent bills makes it possible for residential customers to know exactly what they are paying and to whom, which then makes it possible to voice their concerns or complaints to the responsible entity. Interestingly, Great Britain has arguably Europe's least transparent energy prices while at the same time the British energy industry faces some of the loudest critics from media and consumer groups.

**Perspective**

Swedish residential customers have received monthly bills based on actual consumption since July 2009. The current advantages for households are better oversight of their energy consumption due to accurate monthly invoices and improved switching times and data handling processes. In that regard, the regulation was successful in that it did what it set out to do. However, the light touch regulatory approach chosen by the Swedish government has not been successful at exploiting the potential of smart meters as building blocks of smarter energy networks and brought comparatively low levels of service improvement,
notably in terms of enhancing bills\textsuperscript{25}. The accurate monthly bills are also in some ways a burden for consumers as well as a benefit. Indeed, electricity costs used to be averaged out over the course of the year. This lowered consumer awareness of how their actions influenced their costs, but it also protected them from extremely high bills during the cold winter months. On top of this, no real-time consumption information has been provided to help consumers control these costs, resulting in shock electricity bills for some with electric heating. It points to the need for mandated feedback and customer education requirements as an integral part of any smart meter policy and regulatory package.

\textsuperscript{25} Utilities are developing websites where customers will be able to view their consumption information either from the previous month or perhaps the previous day. Uptake rate figures are not available.