

ATTITUDES, EXPECTATIONS AND EXPERIENCES WITH SMART METERING. KEY FINDINGS FROM THE NORWEGIAN MARKET 2006 – 2014.

Eva Fosby LIVGARD
TNS Norway
eva.fosby.livgard@tns-gallup.no

ABSTRACT

Over the next five years all Norwegian electricity customers will follow the rest of Europe in implementing automatic meter reading. For the customers this means new opportunities to monitor own power consumption, simpler invoices, access to new services, and it is no longer necessary to read and report the measurements to the grid operator. For the power sector this is an extensive project, where details need to be planned out, line of technology chosen, and where the customers' trust and the companies' credibility is at risk if the project fails. On the other hand, it lets the sector enjoy better control, more efficient readings, and a unique opportunity for direct contact with the customers. However, to succeed in this effort is not enough that the single actors do a great job. Interaction, consistent information to the customers, right timing and quick response to customer inquiries are even as important success criteria.

INTRODUCTION

What are the consumers' trust in, expectations to and knowledge of AMR? Will the implementation of AMR affect the customers' behaviour regarding their own electricity consumption? Are they willing to pay for the new technology? Will the transition to new technology affect the relationship between the customer and the grid company? Is there any disparity in attitudes to automatic meter readings between those who have the new automatic meters installed, and those who are still waiting for the new technology? These questions will be answered on the basis of experiences from the Norwegian energy market. By studying the behavior of those who have experiences with the new meters, one can form an impression of how the rest of the market will react with regards to attitudes and behavior.

Data has been collected through yearly surveys from 2006 until 2014. More than 8000 energy customers have been interviewed. The aim of the research is to study developments in the population's attitudes and preferences to the implementation of automatic meter readings.

Initially, the paper discusses the current situation in Norway, before attempting to answer the questions posed above, as well as analyzing the development in the consumers' opinion over time. Finally, the paper will address possible challenges facing the sector when communicating to the customers.

BACKGROUND

In 2007 the Minister of Petroleum and Energy (NVE) gave the Norwegian Water Resources and Energy Directorate instruction to commence the introduction of smart metering to all Norwegian electricity customers. With this the grid companies are moving towards a major technological shift, perhaps one of the most extensive projects in the history of Norwegian grid operation. The companies have about four years left to change approx. 2.5 million meters.

«Smart strøm» is the name of the implementation project, with its own logo. National, cost effective communication campaigns, that the entire power sector will have the advantage of, are planned by the Norwegian Energy Association. "Smart strøm" is an overarching term for the new technology, describing the possibilities that lie within it; smart use of power and smart communication.

With smart metering both electricity customers and grid companies will benefit from more accurate meter reading, continuous monitoring of consumption and simpler invoices. The new technology will also let electricity customers access many new, advanced services.

The Norwegian Water Resources and Energy Directorate estimates that the full roll-out will have a price tag of approximately EUR 1 billion and should be completed by the end of 2018 [1]. The number of meters is not so high compared to many other countries, but all meters are assembled inside the houses and there has to be made appointments for the changing of each meter. Norway is also a long stretch of land with many rural areas, which increase the travelling costs for the grid companies when the new meters are to be installed. Therefore, good customer communication is important to reduce the sector's costs in the roll-out of new meters.

The introduction of smart metering can be seen as a risky project for the Norwegian power sector, which has had at least three major reputation crises during the last decade, caused by high rise in electricity prices over a very short time period. If the sector fails in realization of the project or by choosing faulty or the wrong kind of technology, one stands at risk of losing the trust and credibility that the sector has worked for many years to regain.

In Sweden the implementation of new meters started approximately 10 years ago. Few years later there were reports of some meters providing incorrect readings. Electricity customers experienced invoices that were twice as large as those received before changing meters. A small number of meters had the leading role in a media struggle for the customers' trust. The experience from the

Swedish market shows that the media could be quick to criticize the new technology if something goes wrong [2].

ATTITUDES TO SMART METERING

Awareness and expectations

Even though smart metering has had little publicity in Norway outside the power sector, the majority of the electricity customers (65%) are informed that the government has decided to change the meters in all Norwegian households. The awareness is significantly higher among men (74%) than it is with women (51%), and it increases with age, from 34% among those below 30 years to 74% among those over 60 years. The differing awareness is probably due to men being more interested in electricity and electricity-related issues than women. That the awareness increases with age corresponds with other surveys. The elderly read more of the information they receive from the energy companies, and are more interested in electricity-related issues [3].

The awareness of the implementation of smart metering is also increasing with the household's yearly electricity consumption, from 69% among those who uses below 15000 kWh annually, to 73% among those who use more than 25000 kWh. Most likely, this can be explained by the fact that those with higher electricity consumption are more conscious consumers, seeing a larger part of the household budget is spent on energy and heating.

According to the electricity customers the government's motives for introducing smart metering are to obtain more accurate measurements and better control of the electricity consumption in the households. When asked which advantages it will give the consumers, most state that the greatest benefit is that they no longer need to read and report the measurements to the grid company.

However, collection of measurement data has never been a problem in Norway. If we are to believe the Norwegian electricity customers, 84% read the meter and report the measurements to the grid company every time (72%) or almost every time (12%) they are required to. In addition, close to 30% of the electricity customers read the meter more often to monitor their own electricity consumption. This has to be seen in relation to the high electricity consumption in Norway, which is almost five times the European average, close to 30000 kWh per year, and the highest electricity consumption per capita in the world.

Measurement reporting today

Online reporting is still the most frequently used channel of measurement reporting (Fig.1). 39% of the electricity customers report their readings through the distribution company's web pages, while 25% report through SMS. Interestingly there has been a shift over the last years from phone to SMS. Few years ago telephone was the most preferred channel. Today telephone ranks number three (21%) after Internet (39%) and SMS (25%).

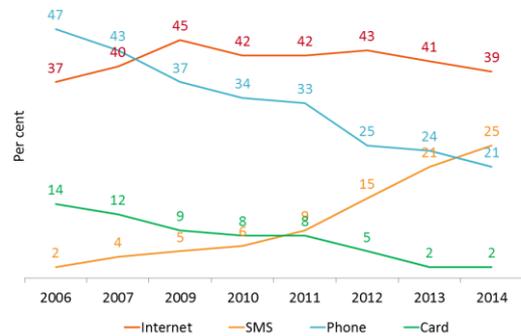


Fig. 1: Which channel the electricity customers report measurements data, 2006 - 2014.

Today, all age groups from the age of 30 use the Internet almost to the same extent. This is the preferred channel, even among those over 60 years. Previously the elderly have preferred to report by phone, but over the past years the elderly have changed their behavioral pattern. The younger customers, below the age of 30, prefer to report measurement data by SMS.

Few years ago the transition was from phone to Internet, since 2012 the transition has been to SMS. Usage of telephone as a reporting channel is declining from 2006 to 21% in 2014 while the share that uses SMS increases from 2% to 25% in the same period.

Even though the work with smart metering started several years ago, only 13% of Norwegian households currently have the technology installed. Over the past years, the power sector has been pending further deployment awaiting possible demands for international standards. This is reflected in the data collected from the market. In 2006, 6% of the country's households had installed new meters, while the share has only reached 13% until 2014.

Trust in the new technology

Two out of three (67%) of the consumers are positive or very positive to the implementation of automatic readings. The share increases with 20%-points since the deployment started in 2006. The numbers show that those who already have access to the new technology are far more positive than those who do not (Fig. 2).

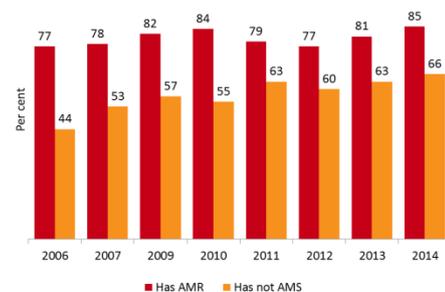


Fig. 2: The share that is positive or very positive to automatic meter reading split on access to the new technology, 2006 - 2014.

While 66% of those without AMR view it as positive that they in the future will not have to read and report their measurements, the share is 85% among those with AMR. The strongest increase of positive respondents, however, is among those without AMR, from 44% in 2006 to 66% in 2014. Among those with access to the new technology the share has been almost stable on a high level, from 77% in 2006 to 85% in 2014. The results indicate that the general experience with the new technology is positive.

Initially, Norwegian electricity customers have high trust in the analogue meters that are used in almost 90% of the households today. 78% of the customers state that they have high or very high trust in these meters. When 88% of consumers are of the opinion that the automatic meter readings will be as good as or better than the current arrangement, it clearly expresses the population's trust in the new technology. The share increases from 78% in 2006, and there are few (6%) who doubt the accuracy of the readings. The trust remains almost the same, whether the consumers have access to the new meters or not. These results are very satisfying, and show that there should be no problems with lack of trust in the new system in the coming years.

One of the main reasons to implement smart metering is to achieve more accurate measurements and precise readings – which will be profitable both for the consumers and the grid companies. It is very important that the technology contributes to strengthening the quality of the readings, so corrections can be avoided. If one has to return to the customer to acquire new measurements, this will increase the costs for the sector and diminish the consumers' trust in the system.

70% of the electricity customers do not have any security related concerns regarding the implementation of automatic meter readings. Interestingly the share is higher (83%) among those who have already installed the new meters. However, 26% of the customers are uncertain as how secure the new technology is. The main objections are that the consumers feel they lose control over the measurements, and that the readings may turn out to be inaccurate. They are worried that people will use electric appliances when the electricity price is low (night time), and that this will increase the risk of fire. Others are scared of hacking and power theft, while some do not trust that the grid company will store the data properly.

AMR and electricity consumption

In the Norwegian power sector there has been a discussion regarding the need of hourly measurement. One of the motives for the implementation of smart metering is to make the consumers more aware of their own electricity consumption, and some claim that hourly measurements might stimulate the customers in this regard.

In Norway, electricity prices are generally lower during the night and during weekends. But are the electricity customers willing to switch consumption to these off-peak periods, when the price is at its lowest?

The research shows that there are relatively few consumers (23%) who consider it likely that they will change their consumption patterns. 46% of the consumers consider it unlikely or very unlikely that they will change consumption to periods when prices are lower (fig. 3).

Statements such as “I can't be bothered to track electricity prices by the hour”, “To me it is completely idiotic to change consumption patterns to the time of day when prices are lower”, “I use electricity when I need it, regardless of what time it is”, demonstrate that Norwegian electricity customers are accustomed to using electricity without considering price.

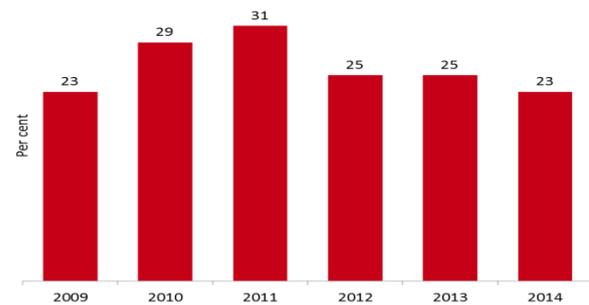


Fig. 3: The share of consumers that find it likely or very likely that hourly meter reading will alter their electricity consumption, 2009- 2014.

The results are in accordance with the experience from Sweden. The power company Vallentuna, was among the first grid companies in Sweden to implement smart metering in 2003. Five years later, the manager in charge for the grid said: “We didn't recognize any change in consumption patterns among our electricity customers” [4].

Willingness to pay for smart metering

The Norwegian government has signaled that the costs of introducing smart metering will be financed through the grid fee. The customers' willingness to pay is, not surprisingly, very low, but it increases over time.

Following several estimates of the cost of the new technology, consumers have been presented with a solution during interviews where they would pay approx. EUR 20 (NOK 150) per year for a ten-year period to get access to the new technology. In 2006 88% responded that they were not willing to pay to have the technology installed. “The arrangement represents considerable savings for the electricity provider and should not cost consumers anything”, “The electricity provider will benefit the most because everything will be automated”, “Such services will save both parties a lot of trouble and customers should be saved from paying for it”, were typical comments. Today 53% of the customers report that they are not willing to pay any extras for automatic meter reading. Many consumers are of the opinion that the rationalization the grid companies achieve through smart metering and communication should automatically benefit the customers.

The interaction between the customer and the grid company

There is a possibility that when the grid companies get their automatic meters in place, thereby removing the customers' need to read and report their measurements, the companies will become only one of many invisible providers of necessary goods, together with water companies and sanitation companies.

39% of the Norwegian electricity customers report their readings through the grid companies' web pages today, and meter readings is the most important reason for the customers to visit the grid company's web sites. This gives the companies a unique opportunity to present their services and communicate important information to the customers. But almost 70% are of the opinion that they will not visit the grid company's website as often as now when they no longer need to report the meter readings. More than 60% of those who have already installed the new meters state that they do not frequent the grid company's web sites to the same extent they used to. 24% of the customers believe the commitment to the grid company will be weakened after the implementation of smart metering.

Even though the share is low, the grid companies should be aware that reading the meter reminds the customers to pay attention to their own energy consumption, while giving the grid companies an opportunity to convey important information to the customers. As the readings are automated this opportunity is reduced. Thus, it is important that the grid companies consider how the process of changing meters might be used to develop the customer relationship.

SUCCESS CRITERIA

A small county (Hvaler kommune) in Norway has been a pilot area for the roll-out of new meters. The experience from this project shows that four success criteria are central to succeed in the roll-out of new meters;

Firstly – **interaction**; It is important that the power sector is united and communicates an aligned message. The use of a common term and logo emphasize interaction.

Secondly – **consistent message**; All grid companies have to tell the same story about why smart metering is introduced. The message to the customers needs to be simple and clear; For the customers smart metering means new opportunities to monitor own power consumption, simpler invoices, access to new services, and it is no longer necessary to read and report the measurements to the grid company.

Thirdly – **timing**; Appointment with the customer of changing the meter has to be made several weeks in advance and be repeated through various channels. A text message should be sent the day before so the customer remembers the appointment. If one has to return to the customer for a new appointment, this will increase the costs for the grid company.

Last, but not least – **response**; The grid company must be prepared for increased enquiries from the customers and be able to respond quickly. Relevant information should be available for the customers on the grid company's web site. This phase is all about giving and receiving useful information. Surveys about what experience the customers made with the change of the meters and their experience with new meters will give useful information to the sector.

CONCLUSION

The research from the Norwegian market shows that the consumers are positive to the implementation of new meters, and that they have high trust in the new technology.

It is uncertain whether the consumers will become more conscious of their own electricity consumption, and change their consumption pattern to the time of day when the price is lower.

The research indicates that the grid companies' relationships to their customers will be more distanced with the implementation of automatic meter readings. Partly because the grid companies' web sites' function as a communication channel with the customers will be reduced, and partly because the grid companies will stop sending out regular reminders to the customers to read their meters. With this in mind, it will be important for the grid companies to consider how to maintain the contact with the customers.

The customer's wishes and needs should be taken into consideration during the implementation, and it is essential that the automatic measurement works as it is supposed to. If the customers experience any problems with the reading or billing, this might damage the sector's reputation and be very harmful for the consumers' trust in and expectations to the new technology.

The implementation of the project starts with informing the customer about what smart metering is and what the customer can expect from the new technology. Then the power sector has to prepare the customer for the changing of the meter by making appointments for changing the meters. After the change of the meter the grid company must be prepared for quick response to customer's inquiries. Evaluation of the implementation through customer satisfaction surveys will provide valuable information to the power sector.

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