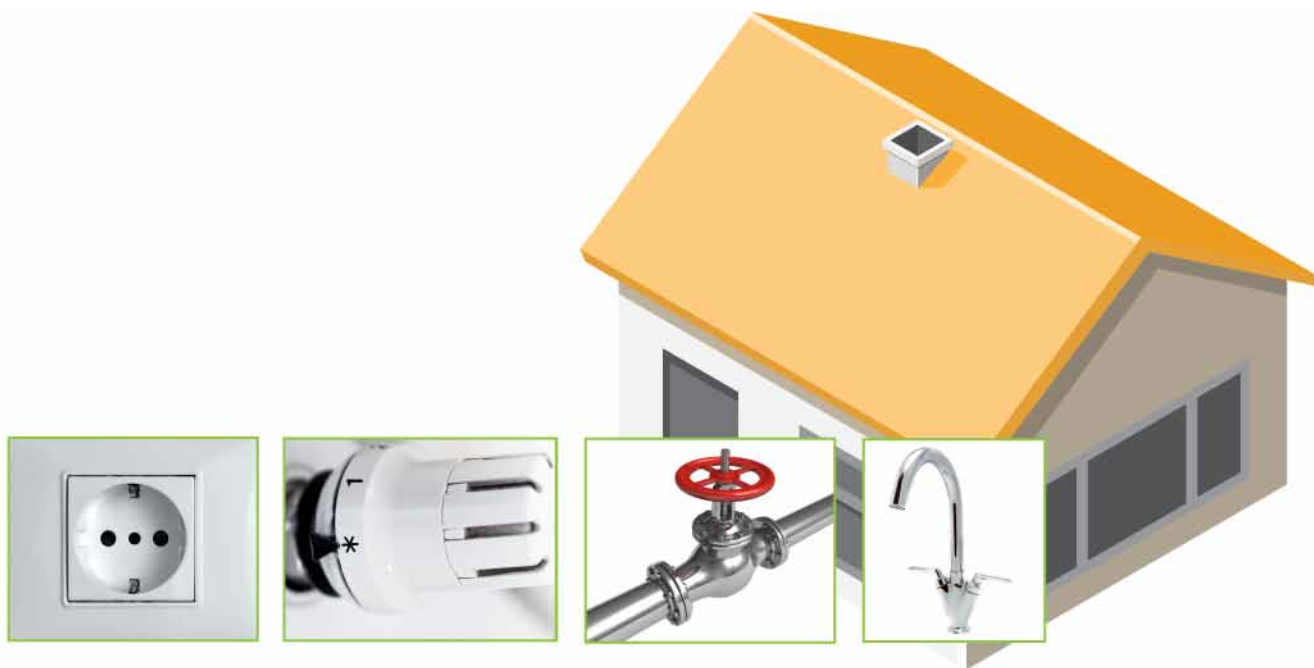


Smart Metering for Residential customers

– aiming for smarter use of energy



Effective use of smart metering technology is crucial for reaching the 2020 energy efficiency and renewable energy targets and for the future smart grids. However, smart meters themselves are only enabling technologies, which need to be coupled with innovative smart metering services.

This brochure will help energy utilities and suppliers, policy makers and service developers by presenting important aspects to be considered when developing and deploying new smart metering services for residential customers.

The brochure brings focus on different service categories that can be offered the customers one by one or in combination.

Residential customers

The average household usually acts as a passive energy consumer with a limited understanding of their energy consumption. The energy consumption is a low-interest product, which is abstract, invisible and untouchable for the customers.

To bring the benefits of smart metering to the consumers, they have to be provided with timely and accurate information on their consumption, and knowledge on how they can save energy, money and the environment. The consumers also have to be informed that their contributions have larger socioeconomic benefits.

The residential customers do not represent a homogenous group. When developing new smart metering services, small pilot actions can be important – to easier face the customers' behaviour.

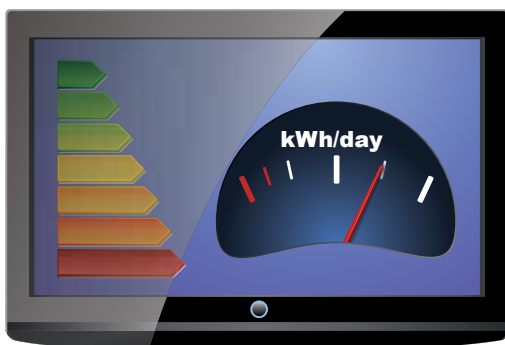
Information and feedback

Information and feedback about the actual energy consumption and costs will make customers more aware of their own consumption and motivate them to save energy. Different types of feedback have shown up to 10% energy savings.

The basic feedback types are direct feedback (in real time) and indirect feedback (based on processed data). Real-time feedback will mainly affect the moment-to-moment behaviour, whilst periodic feedback shows longer term effects.

Important aspects are:

- Easy accessible information through a user friendly interface
- Prevent information overflow
- Measure energy consumption, total and for different appliances
- Visualise energy consumption
- Compare consumption to previous periods
- Make energy saving rewarding - presenting energy consumption in monetary and energy terms and emissions
- Help customers set energy saving goals and track consumption
- Advice how to benefit from the service



Direct feedback on energy consumption.

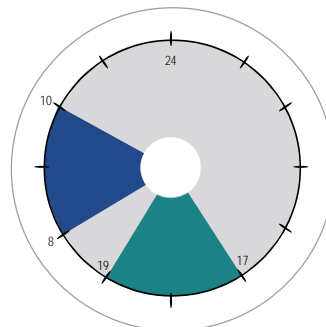
Demand response and innovative variable tariffs

Customers can change their consumption according to supply conditions and price signals, if they get proper and easily understood incentives to do this.

Demand response offers flexibility at relatively low cost, and in shortage periods a small amount of demand response can make the difference between a reliable system and rolling blackouts. Demand response included into the market bids can contribute to reduced prices. A small contribution from several customers represents a large accumulated potential, which is available even if one customer opt out.

Important aspects are:

- Incentives should be related to the market or the energy system
- Customers need information and knowledge about importance of demand response
- Same time steps in energy price and settlement
- A reminder of expected peak price periods will influence the routines for the customers
- The need for demand response may increase due to tight capacity balance, more local generation and wind power
- Technology for automatic load control is important to secure a stable and predictable demand response



Remotely controlled load sifting - "El-button"

Direct load and consumption control

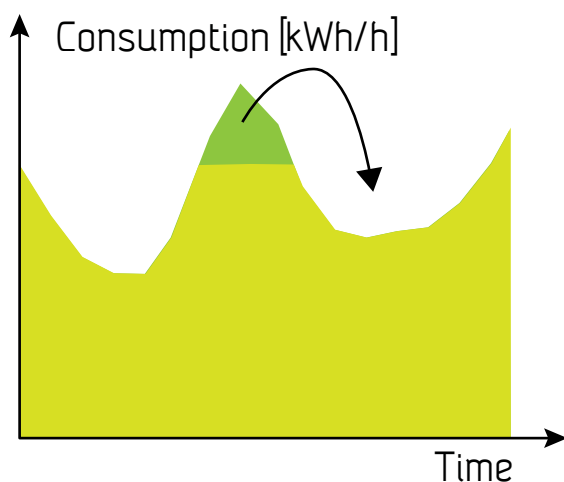
Direct load and consumption control carried out from the utility is automatic and inconspicuous to the customer. It can contribute to reduced peak loads according to external incentives, enable demand response in the market bids, reduced costs for stakeholders, ease the stress of the system, reduced energy consumption and increased energy efficiency.

Technology for automatic load control can disconnect loads with thermal storage capacity for a limited period in time, shift in time of other appliances and/or run appliances when renewable energy is available. This can help managing e.g. winter electric heating peaks and summer electric cooling peaks.

Technology for load control should make secure disconnection and reconnection possible. Random reconnection of loads will reduce the stress of the energy system and satisfy the purpose of the load control. To avoid negative effect on customers' comfort, reliable load control technology for suitable loads is important.

Important topics when discussing direct load and consumption control are:

- Compensation to the customer
- Limitations regarding disconnection (when, duration, resting time) and the possibility to opt out for a certain appliance and/or time
- Required response time when load control is activated
- Responsibility if no demand response is achieved, even if load control is activated



Load shifting for reduced peak load.

EcoreAction (Finland)

A web-based service portal where utility customers can view, compare and set goals for their electricity, district heat, gas and water consumption, based on hourly metering data.

The objective of the service is to save energy by empowering the utility customers with better understanding of their energy consumption, and help utilities offer better customer service and reduce peak loads.

The service features:

- A graphic view visualizing consumption and emission levels from green to red
- Monitoring of energy consumption from one hour to 5 years
- Comparing energy use to other users and own previous use
- Energy costs and forecast, planning energy goals with calendar to mark down actions affecting energy usage
- Tips and advice on how to save energy
- District heating primary energy and heating system performance

Remotely controlled load shifting (Norway)

In a trial 40 household customers with hourly metering of their consumption and Remote Load Control (RLC) of low prioritized loads were offered a Time-of-Day network tariff with predefined peak price periods. They were advised to buy an hourly spot price energy contract. The peak price periods coincided with the peak load in the power system and when high spot prices were expected. The customers were equipped with a small watch-like magnetic token, the "Elbutton" as a reminder of the peak periods.

The trial shows that customers can change their consumption according to dynamic and predictable incentives for load shifting, where RLC is used to secure a stable demand response. The peak load was reduced with 1 kW in hour 9 for customers with RLC of electrical water heaters.

Tempo tariff by EDF (France)

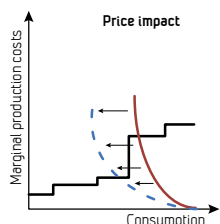
This tariff consisted of four regular price levels and two event-price levels, which were valid in case of an overload in the grid. The regular price levels were indicated by different colours on a control box or a website. The event price levels could also be announced by SMS, internet or telephone 2 days in advance. The tariff used consumption data in 15 minutes intervals.

The tariff gave the customers incentives to reduce the total energy consumption - especially during peak hours. 59% of the customers reduced their electricity costs by 10%. Compared to the average consumption, customers reduced their consumption by 15% on the second highest price level and by 45% on the highest price level.

The tariff seemed to be well accepted by the customers, and the reduced consumption did not involve a dominant reduction in comfort for the customer.

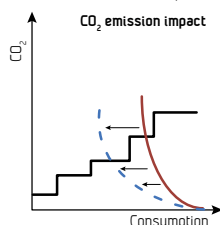
For further information, please study the project website or read **D2.1 European Smart Metering Landscape Report**, downloadable from this website.

Economical, environmental and societal impacts



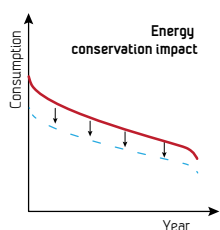
Price impacts

Demand response will result in reduced peak prices due to avoided use of expensive peak load production.



CO₂ emission impacts

Demand response will result in reduced CO₂ emission due to avoided use of polluting power plant.



Energy conservation

Load management and feedback regarding energy consumption will result in reduced consumption due to customers' awareness.

SmartRegions project – and further inspirations

The SmartRegions project promotes the uptake of innovative smart metering services and aims to inspire and encourage energy utilities, energy service providers as well as law makers across Europe to initiate the development of such services.

This publication is from the project "SmartRegions – Promoting best practices of innovative smart metering services to European regions" funded by Intelligent Energy – Europe (Contract No: IEE/09/775/S12.558252).



SmartRegions

www.smartregions.net



The sole responsibility for the content of this publication lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EACI nor the European Commission are responsible for any use that may be made of the information contained therein.