

Smart energy saving at home

In brief

- 250 Austrian households were able to gain experience with smart meters in a year-long field trial.
- On average, these households reduced their electricity consumption by around five per cent.
- Smart metering, however, only led to a reduction in energy consumption when combined with comprehensive information and visualization.
- Based on the field trial, recommendations were derived for the design of future programmes on 'saving energy at home'.

What is it about?

By the year 2020, more than 95 percent of the electricity consumed in Austria is to be recorded by so-called smart meters. Amongst other things, these new devices are to contribute to a reduction of electricity consumption in households.

As part of the '€CO₂-Management' project it was investigated to what extent, and by which measures, smart meters would allow for a cut in electricity consumption in private households. The knowledge gained from visualising consumption data helps to initiate changes in awareness as well as behaviour, thus leading to savings in households. Such visualisation programmes could be offered by electricity suppliers or intermediate players on the electricity market in the future.

The use of a commercially available digital electricity meter created the necessary technical conditions for the measurement, visual processing and transmission of consumption data at household level. Furthermore, the project team developed a particular package of measures which was provided to the 250 participating households in the three regions Klagenfurt, Graz and Eastern Styria: Each household received comprehensive information material as well as a personal consul-

tation on saving energy. Using the provided iPod or an existing personal computer, participants had access to a web portal providing real-time information on their individual energy consumption. In addition, each household was supplied with a socket energy meter and was given the opportunity to make use of a unique 3-way eco tariff model in which electricity tariffs were lower or higher depending on time of day or night. At the end of the project, households were awarded with a micro emission certificate.

During the socio-scientific evaluation of the field trial, questions such as the following questions were asked: Are the devices 'user-friendly'? How much electricity can actually be saved? What are participants' individual motives and reasons to change/not change their behaviour? Also analysed during the test phase were actual savings of energy as well as reductions in CO₂. Based on this data, the project team prepared various options for micro emission certificates and worked out an appropriate business model.



Smart meters may help save energy

As part of the evaluation, the measured consumption was analysed and the participating households were interviewed before and after the field trial using written questionnaires. With the help of qualitative interviews with selected panellists and participating experts and two focus group discussions with members of the household, it was possible to get further insights into households' preferences and behaviours as well as factors influencing economic and ecological behaviours.

Basic data

Project title:	€CO ₂ -Management
Project team:	Ornetzeder, M., as part of a consortium led by PTS Energie mit Strategie GmbH
Duration:	08/2009 – 02/2013
Funded by:	Climate and Energy Fund, Program „NEUE ENERGIEN 2020“

Key results

Average energy savings of 4.8 percent: The analysis showed that the use of the specifically developed measures led to a significant reduction in electricity consumption: on average, the participating households saved 6.8 percent on annual electricity consumption. Taking into account a general trend amongst the test households towards a decline in electricity consumption (approx. 2 per cent), the net effect amounts to minus 4.8 per cent. Consequently, the results are similar to comparable international field trials, which identified savings between 3 and 10 per cent.

Considerable variation amongst savings achieved and energy consumed: In line with comparable field trials, €CO₂ results show that a number of test households had also noted an increase in their energy consumption during the trial period. In addition, there was considerable variation amongst the changes as there are households with savings of over 30 per cent, but also households with increases of more than 30 per cent. Savings were only achieved in approx. 70 per cent of households.



Keep an eye on one's own energy consumption

Behavioural changes and changing devices are not perceived as stressful: In part, savings were achieved through behavioural changes alone, e.g. by deliberately turning off electrical devices. Some of the savings were also achieved by replacing existing lights or electrical appliances. The necessary changes were not perceived as stressful and generally implemented without any problems or limitations.

Specific changes take place during periods of increased attention: The monthly development of changes in consumption shows a peak at the start and at the end. The highest savings were recorded in the first months; savings then levelled off but increased again towards the end of the trial period. At the beginning, most households regularly monitored not only their energy consumption but also the consumption of specific household appliances. After a while, a certain habituation effect appeared; participants only became aware of the original objectives again towards the end of the trial period.

What to do?

Based on the results of this research, the following recommendations can be issued for the development of future energy-saving programmes using digital consumption data:

- The interviews suggest that the different target groups joined the field trial with different motivation. It therefore makes sense to tailor energy-saving services to these different target groups. In most cases, participants enjoyed only a particular element of the package they had been offered. Whilst some households only used the iPod, others found the energy-saving device to be the most useful aspect. Consequently, future energy-saving programmes should be designed with a specific core element. Other measures could then be offered at a later stage, if necessary.
- In most cases simple visualisations to monitor energy consumption are more than adequate. However, more elaborated applications could be offered to a small group of tech-savvy customers.
- Already existing end devices, particularly handheld devices such as smartphones or tablets, provide a suitable user interface for the visualisation of consumption and enjoy a high degree of acceptance.
- Time-flexible tariff models allow for additional financial savings and thus contribute to households having an increased awareness of electricity consumption.
- Temporary programmes may create periods of increased attention and allow for better exploitation of the savings observed at the beginning and the end of the €CO₂ project.

Further reading

Seebauer, S. et al. (2013) €CO₂-Management Sub 3, Sozioökonomische Begleitforschung, Synthesis report. Graz/Vienna; solicited by: Climate and Energy Fund, Program "Neue Energien 2020"
epub.oeaw.ac.at/ita/ita-projektberichte/d38.pdf

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