

Co-operative concept for providing energy efficiency services – pilot field study

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Abstract

This paper presents the first experiences from a pilot study in which a co-operative concept for providing energy efficiency services for households is tested in the field. The concept consists of a toolkit (which is used to identify and plan the needed actions in households) and the creation of a network (which will provide the commercial services). In addition, a network providing support for problem-solving is created.

The partners in the concept are a local utility, a local energy efficiency office and a national information and tool provider. The original idea was to educate a group of volunteers (10-15) to make an energy-saving plan for a group of individual households (75-100) using printed material and a web tool. Despite an extensive recruitment effort only 21 people volunteered. They turned out to have low electricity consumption in comparison with their reference households. In response to this, the project focus was shifted on finding ways to help the participants to tell others on their practises. From other studies we know that the majority knows very little of energy consumption and we expect that peers are more likely to be successful in this kind of communication.

The project has two aims. The first is gathering feedback of how useful the existing materials and tools are in practice. The second is to find out how well peer groups function in practice, what kind of problems will occur and whether these can be tackled with the planned network. If the concept is viable it can easily be extended and adapted to varying circumstances in other parts of the country.

Introduction

In Finland, only some requirements of the Energy Services Directive are implemented by state legislation. Among these is the requirement of article 13 paragraph 3 (European Union, 2006), which is implemented in Finnish law in the form that energy sales companies are to provide their final customers an annual report on energy consumption (Finlex, 2009). Generally, the requirements of the directive are carried out using voluntary energy efficiency agreements (Motiva, 2010a). For example, electricity companies can participate in two action programmes: one on improving generation efficiency (of which there are currently 33 participating companies (Motiva, 2010b)) and one on improving energy services (in which 85 companies currently participate (Motiva, 2010c)). The action plan for energy services includes a commitment to provide and improve energy efficiency services to their customers.

In spirit of this commitment, the industry has carried out a number of actions. Some, like the guide on household customer electricity consumption report (Rouhiainen, 2010), have been carried out in co-operation with the authorities. Some, like the Elvari program (Motiva, 2010d), involve only a few of the companies. Some, like this project, are part of a larger effort the industry is making to face the challenge of climate change and becoming a part of the solution.

A recent survey commissioned by the Elvari project (Motiva, 2010e) showed that 68 % of the households did not know their electricity consumption in kWh. Little over half (57 %) knew their consumption in Euros. Whether the customer had received a report on energy consumption from their electricity provider did not seem to affect the result.

The household customer electricity reports were tested in three customer panels. The discussions showed that the cus-

tomers were not familiar with the reports even though their electricity provider had sent them to them for years. Furthermore, some of the ideas the customers suggested, like net calculators, have been available for 15 years. Clearly, the information provided has not reached the customers.

The project has two goals. The first goal is to get feedback from customers on the present set of tools and to gather ideas on how to develop them further. This is especially important now when new technology offers large scope for new interventions and we need to evaluate which are the best options to carry out.

The second goal is to see if energy efficiency awareness can be increased with this concept of educating volunteers, who in turn spread the knowledge further. The tools are designed so that we also hope to see concrete energy savings, which we will try to quantify via measurement.

The project is designed so that it fits the planned model for providing energy efficiency information in Finland (Kasanen, 2009). If successful, the model can easily be used elsewhere in the country and abroad.

The paper is organised as follows: First the project is described in general. Then materials used in the project are described. Thereafter the project plan is described in more detail and the first conclusions are drawn.

General organization of the project

PROJECT PARTIES AND PROJECT GROUP

The partners in this concept are the local utility Turku Energia, local energy efficiency office Service Centre for Sustainable Development and Energy of Southwest Finland (Valonia), and national information and tool provider Adato Energia Oy.

Adato Energia Oy works at the source of energy information. It produces different services for Finnish energy companies. It was founded by the energy industry to produce information and to gather knowledge on current events. Its customers comprise energy companies, electricity and district heating companies, and network construction companies. Adato Energia Oy is owned by the Finnish Energy Industries, the trade association representing the Finnish energy industry. See www.energia.fi/EN and www.adato.fi.

Turku Energia is the leading power supplier in Southwest Finland. The company's operations are based on competitive energy prices, competent personnel, service reliability, profitability and environmentally-friendly processes. Its core business consists of procurement, distribution and the sale of electricity and heat, as well as development, construction and maintenance of power plants and distribution networks. Turku Energia's customer base consists of private consumers, companies and communities. See www.turkuenergia.fi

Valonia is an energy efficiency office operating in Southwest Finland. Annually, it organises a number of campaigns on sustainable development and offers educational services. These include courses for energy experts (10). The office is part of the organisation of the city of Turku, which with 176,000 inhabitants is among the largest cities in Finland. See www.valonia.fi.

Turku Energia and Valonia have long experience in carrying out projects in co-operation and this is why they were asked to become parties of this pilot study.

The project team has four members: Virve Rouhiainen (Adato Energia), Päivi Rae and Mikko Merisaari (Turku Energia) and Liisa Harjula (Valonia). Finnish Energy Industries, Turku Energia, Adato Energia and Sähköturvallisuuden edistämiskeskus, fund the project.

OVERALL PROJECT PLAN

A project can be described in number of ways. We distinguish between ongoing processes and project phases. Processes include the planning project phases, project administration, internal and external communication and maintaining support functions. The project phases include recruiting the participants, coaching the group leaders, creating the support organisation, creating the saving plans for participants, implementing the saving plans, collecting the project results, organising the concluding event for getting feedback and rewarding participants and writing the report. These are described in more detail below.

Information and tools used to set and achieve the targets

EVALUATION OF THE STARTING POSITION

To give households their starting position, we will adapt the more developed of the two reporting formats suggested in the report, "Sähkönmyyjän raportti asiakkaan energiankäytöstä" (Rouhiainen, 2010). In addition to reporting formats, this report specifies reference-user categories and the size of average and frugal levels of electricity use for each household category.

Thus each participant will get an idea of how his/her consumption relates to other consumers. In the customer panels where the report formats were tested, these reference user categories raised a number of questions. The next step is then to perform a more detailed analysis of the electricity consumption with the help of the internet tool 'Sähkötöhtori' (See <http://www2.energia.fi/sahkotohtori/>). This tool will break down the annual electricity consumption into appliance components and give the normal range of consumption on each component as well. These materials will be illustrated in the poster.

SETTING SAVING TARGETS

When setting saving targets the first thing to consider is the level of electricity consumption in the household. If the electricity consumption is low to start with, it is unrealistic to set a large reduction target. The largest household group in Finland (25 % in 2009) is singles living in a flat (Statistics Finland, 2011). For that group the first quartile for annual consumption is 1,090 kWh, the second quartile is 1,500 kWh and the third quartile is 2,160 kWh¹. An already-frugal household will thus struggle to achieve high saving targets, as all the low – hanging fruit would have been implemented already. A household in the last quartile should have various options – both behaviourally and technologically – of how to significantly reduce their consumption.

1. In Finland, practically all flats have central heating which includes warm water. The most common energy source for central heating in flats is district heat with a 90 % share. The second most common is fuel oil with a 5 % share.

Table 1. Number of Volunteers Recruited via Channels Used.

Recruiting via Massmedia		Recruiting via Individual Contact	
Channel	Number of volunteers	Channel	Number of volunteers
Newspaper article in Turun Sanomat	5	E-mail to association members	5
Newspaper article in Turku Posti	1	Personal letter from Turku Energia	2
Newspaper article in Turkulainen	1	E-mail to energy experts in Turku area	1
Story in local radio (Turun radio)	1	Leaflet delivered to mailbox	1
Ad in Turku Energia's customer Magazine	1		
Story in Homeowner's associations leaflet	1		
Ad in Turku Energia's webpage	1		
Ad in Valonia's webpage	1		
Ad in the webpage of city of Turku	0		

Further actions to reduce consumption vary in terms of required effort and cost. If the reason for high consumption is an old fridge, replacing it will involve the cost of buying a new one – something the household may not be able to afford. Some actions on the other hand are cheap to carry out. For instance, turning off the computer when it is not being used may well decrease the consumption by 700 kWh p.a. with no monetary cost involved².

The analysis of Sähkötohtori will be used as the starting point to set saving targets. To help identify possible actions, the participants will receive a self audit form (available in Finnish here http://www.motiva.fi/julkaisut/koti_ja_asuminen/tutki_pi-entalosi_energiankaytto_tee_se_itse_-kotikatselmus.1046.shtml). They can then themselves decide what actions they wish to take. These will be recorded on a form and collected back. Some of the actions suggested in the audit may be such that households find them difficult to perform and this information will be recorded as well. For some actions, instructions that are more detailed are available but new information needs and solutions for providing them will be identified, where possible.

FEEDBACK DURING SAVING

Earlier research shows that continuous feedback is important in achieving targets and, preferably, that feedback should be broken down to appliance categories (Gölz, 2009). Though it is possible to breakdown the load-to-appliance components, no reliable model calibrated to Finnish data exists today and this will therefore not be attempted.

The participants are required to have hourly electricity metering and they will be provided with a monthly report on their electricity consumption which will be related to their individual target savings. In case the savings do not materialise, the hourly consumption will be looked into in more detail.

Carrying it out

RECRUITING THE VOLUNTEERS

The original plan was to have volunteers and their groups come from the same organisation e.g. a neighbourhood association. Thus, the participants would know each other from the start and less time and effort would be needed in getting to know each other. Further, if they came from the same organisation, competition between groups might develop more easily.

First we tried to recruit the volunteers by contacting suitable organisations and entities like the homeowners' association. This recruiting effort was supported by placing information on the websites of Turku Energia and Valonia. It soon became obvious that this alternative was not viable as we only got three volunteers from this approach. So we decided to use another approach to recruiting. This consisted of sending a letter to 400 households (on January 11, 2011) having an hourly electricity meter and supporting the recruitment effort by local media coverage. Turun Sanomat, the leading local newspaper, published an article on January 14, 2011, and the project was mentioned in two broadcasts in week 3.

Recruiting the volunteers turned out harder than we had thought. By January 19th we had recruited 21 volunteers and we decided to carry on and revise the plan to suit the smaller number of volunteers. The main revision was that the coaching would be held for all participants and thus the role of the group leaders would become of lesser importance. Table 1 shows the channels through which the volunteers were recruited.

ORGANISING COACHING AND PROCEEDING TO CREATE SAVING PLANS

The plan for coaching included three occasions. The first occasion was a get-together on Jan 26, 2011 in the premises of Valonia in the city centre. The participants met each other and the project team. The purpose of this meeting was to boost spirits and to give the project team further information on participants. Liisa Harjula of Valonia has trained energy experts (Valonia, 2008) and this meeting was her suggestion. Why she suggested it became evident in the meeting where the participants vented their feelings about the electricity market. If the message is to be summarised in one sentence it is "Asking us to save electricity ain't fair".

2. One participant metering the electricity consumption of her computer in Kotitalouksien sähkökäyttö 2006 study, was able to achieve this annualised saving just by turning off her computer when it was not used. The computer was metered before and after the change in behaviour. This result was published in a newspaper article (Laitinen, Helsingin Sanomat Jan 30, 2008). The trial was carried out to provide a concrete example of savings possible for the newspaper. This single trial was not included in the project report, because the empirical establishing of savings was outside project scope.

It is interesting to note that a recent study (Korsunova, 2010) analysing energy conservation communication in Finland formulates the problem as follows:

Analysis of the combined data showed that much of the energy conservation communication is aimed at improved customer relationship-building, while the effectiveness of energy communication is undermined by a deadlock of factors that reinforce each other, e.g. consumer lack of energy market understanding, resulting lack of interest and lack of timely feedback to households. Thus, in order to make household consumption more sustainable all the barriers should be addressed ...

The first stumbling block we encountered was the general negative feeling about the electricity market. Information on energy efficiency alone is simply not enough – something that became obvious to the project group after the first meeting night.

The first coaching evening took place on Feb 15th and the second on Feb 22th. The venue was Turku Energia. Both occasions consisted of a lecture and group work. The planned focus of the first night was the size of household electricity consumption and how it varies and why. In addition to this we explained the structure of the electricity bill and why it is as complicated as it is. The participants were provided the starting point report and they did the analysis with Sähkötohtori. Unfortunately, we ran out of time before the participants were able to discuss the differences in their consumption. As homework, the participants were to perform the self audit and to think how to save electricity in one's own home. In addition, they were to underline the actions they would not know how to perform and mark the actions they did not understand with question marks.

Turku Energia had not yet provided its customers with these reports and the participants told us that it was really interesting to find out about the consumption of others. The analysis of the first evening results showed that our project participants belonged to the frugal segment of their reference groups. This is why we decided to focus on the second evening more on how to pass their knowledge on than how to make a detailed saving plan. In addition to that, each participant was to decide on one or two actions they would carry out at home.

The second night's lecture was about energy saving actions. Then the participants were divided into three groups on basis of their housing type and heating fuel. The groups were flats and row houses (4 participants), electrically-heated houses (5) and other houses (3)³. The participants were given three themes: to discuss what they had already done and what they still could do, to give feedback on the do-it-yourself audit and to make suggestions to improve energy efficiency information. Further, each participant made a promise what they themselves would do.

The analysis of the returned audit forms suggested that the audit itself was easy enough to understand. The group discussions were more critical. First, both non-electrical heating groups asked for an audit tailored to meet their situation. Second, some of the advice was considered too general. The groups

made a number of suggestions how to improve the provision of energy efficiency information. Even though the participants had already taken a number of actions to save electricity, they were all able to come up with something they still could do.

PROVIDING FEEDBACK AND SUPPORT

After the second meeting the participants were to carry out the energy saving actions while the project team prepared the feedback for those who have hourly metering and to plan the third evening set on March 30th. The idea is that the participants are asked to recruit people to try sähkötohtori. The details of how this is done are still to be decided.

The project group is busy working on how to provide feedback information as we need to decide how we address weather dependencies and seasonal effects.

At this point it seems likely that no surprising consumption patterns will emerge. A support function has been set up to continue this work. The core of the support organisation is the project group and we are looking for other professionals to partake. The union of electricians, for example, is starting a campaign where participating electricians are trained to help customers with energy efficient solutions. Contact with local electricians participating in this campaign has also been established.

The idea of a support organisation stemmed from the utilities' long experience of providing energy audits and the authors' experience with measurement studies. Unexpected arrangements have been discovered when conducting audits. For instance, a new owner of a house with extremely high electric bills did not realise something was causing the disappearance of the snow from the yard during the winter.⁴ In addition, clear evidence exists that households that are wondering why their electricity consumption is higher than their neighbours' tend to seize the opportunity of participating in measurement projects (Rouhiainen, 2009). The latter fact is something one needs to bear in mind when generalising the quantitative results of projects where participants can decide on their treatment.

Given that the participants of this project in general have rather low electricity consumptions, they have performed a number of actions to save electricity and their feedback from the first evening it seems likely that this type intervention will appeal to those people already interested in energy saving.

EVALUATION AND GETTING FEEDBACK

At the end of the project we will evaluate the results and collect feedback from the participants. The exact format will depend both on the number of participants and the clues we expect to find during the project. We will also reward the best idea(s) to develop the concept further and of course, we will reward the group with the best result. The rewarding criteria will be set when we have received the saving plans and gathered other necessary information on the participants. We may also involve the participants in the rewarding process.

3. Some participants were unable to attend this evening because of school holidays.

4. This 'something' was an electric cable installed to keep paved pathways free of ice and snow. This technique is more commonly used for heating gutters and water piping, but it can also be installed under yard paving.

Conclusions

Four conclusions can be made at this point of the project:

1. One needs to have flexibility in the project plan as the first alternative will not necessarily work and one may need to revise the approach – we needed to do that with respect to recruitment and we also needed to revise the original plan of how we could run the project as we were able to only recruit some 20 volunteers.
2. Stumbling blocks may be described in the literature yet very little advice is given on what to do about them. Luckily we had Liisa with practical experience and we were able to revert the negative atmosphere into something positive during the first evening.
3. Feedback on the material enforces the earlier message from customers: information needs to be tailored to meet the customer circumstances, the more personal the better.
4. The type of self selection bias may depend on the type of intervention tried. In studies with detailed measurements the participants tend to have higher than average consumption whereas with this non-technical approach we reached those with lower than average consumptions.

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