Case Study reports on
ENERGY EFFICIENCY AND BEHAVIOUR

Annika Kunnasvirta, Martti Komulainen & Katariina Kiviluoto (eds.)
Authors:
Anni Kunnasvirta, Katariina Kiviluoto, Martti Komulainen, Heli Kanerva-Lehto, Nico Nieboer, Trine Agervig Carstensen, Susanna Thörn, Olov Åslund, Kaspar Alev, Jaanus Tamm, Sébastien Danneels, Pavel Vitiemov, Fernando Suárez Lorenzo, Lauri Penttinen, Anne Ahtiainen & Liisa Harjula

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FOREWORD

The PLEEC project – “Planning for Energy Efficient Cities” – funded by the EU Seventh Framework Programme uses an integrative approach to achieve a sustainable, energy-efficient, smart city. By coordinating strategies and combining best practices, PLEEC will develop a general model for energy efficiency and sustainable city planning.

By connecting scientific excellence and innovative enterprises in the energy sector with ambitious and well-organized cities, the project aims to reduce energy use in Europe in the near future and will therefore be an important tool contributing to the EU’s 20-20-20 targets.

As a part of the PLEEC project, identification of reduction potential in energy use from a behaviour driven perspective has been assessed. This has been achieved by exploiting the Best Available Practices (BAP) related to behaviour driven potentials in energy efficiency.

The report at hand introduces examples of behavioural interventions to promote energy efficiency in cities. The cases have been collected in January–June 2014, and they represent behavioural interventions from different sectors of energy efficiency from the PLEEC partner countries: Denmark, Sweden, Finland, the UK, the Netherlands, Estonia, Bulgaria and Spain.

This report is meant to serve as a catalogue or source of inspiration presenting various examples of good behavioural intervention practices to cities. It is up to the cities to assess whether they could implement similar measures. Experiences and outcomes are shortly described, but the success factors are analysed in more depth in the Final Report. In addition, the cost-effectiveness of selected interventions will be analyzed in a separate report.
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### SYMBOLS

- Renovation
- Public transport
- Waste, water and sewage management
- Industry and commerce
- Fossil and nuclear energy
- Building technologies
- Motorized private transport
- Electrical power grids
- Private and public services
- Renewable energy
- Pedestrian traffic and cycling
- Private households
- Spatial structures and land-use
- Transport of goods
- Heating and cooling grids
- Public lighting
INTRODUCTION: BEHAVIOUR AND ENERGY EFFICIENCY

“Energy use is not determined just by the equipment we purchase, but how we use it” (American Council for an energy-efficient economy, ACEEE)

It has become clear that behaviour plays a crucial role in promoting energy efficiency, and understanding the causes and patterns behind behaviour is the key to successful energy efficiency programs. Many surveys support the view that communication measures can truly have an influence on energy use and, at best, behavioural interventions can reduce energy use in a cost-effective way.

The role of behaviour is in many occasions hard to determine as there is relatively little information available on the actual effectiveness of different types of behavioural interventions implemented under energy efficiency programs. Moreover, the link between behaviour and technology makes it difficult to define behaviour-based interventions and it is also relatively hard to establish a causal link with actual energy savings.

Many energy efficiency programs have focused on “hard”, technological means to enhance energy savings because behaviour is seen as a difficult issue to handle. Trying to influence the sensitive realm of homes and households can also potentially be seen as incorrect and patronizing. Behaviour is also a complex process not only at the individual level, but also as a social process with neighborhoods, communities and cities setting the boundaries for individual choices.

There is a wide variety of behavioural interventions implemented under energy efficiency programs, as the report at hand shows. The interventions have been classified under key fields following the structure chosen for the PLEEC project. A different kind of classification based on “drivers”, motivations, target groups or methods could have possibly been more suitable in evaluating behavioural interventions.

Towards reduction of energy consumption through better information and guidance

The majority of the behavioural energy efficiency programs or single interventions represent the “cognition” type. Categories under this type of interventions include general and targeted communication efforts, social media, classroom education, and training. They are based on the assumption that serving people information about their energy use, energy issues and environmentally sound choices in general, changes their attitudes and eventually behaviour (“information deficit model”).

But information alone does not suffice. Providing information may somewhat influence attitudes but it will rarely alone have lasting effects on behaviour. Environmental sensitivity to the issue is also needed, raising from personal values and experiences. This ideally leads to empowerment – the concept of how much influence and meaning our personal choices have in a wider context.

Communication and how messages are conveyed also makes a difference. Use of individuals as “trusted” messengers or as models for aimed behaviour seem to work. Social pressure and peer-to-peer tactics have shown promising results. The message itself has to be clear, simple, touching and engaging. People want to relate to an issue at a personal level (raising environmental sensitivity; me instead of the masses) and they crave for meaning (empowerment; this really matters).
Understanding energy behaviour – do people act rationally?

Individual energy behaviour doesn’t always follow the rational choice model. The financial savings which might be generated in the longer timeframe have a limited power, too. Instead, people often make choices with their hearts, relying on personal feelings and motivations. People are also heavily influenced by what others around them are doing.

One observation made in behavioural economics shows that individuals tend to go with the flow of pre-set options, despite the fact that this might not be rational or energy efficient. People do not behave rationally at home, and energy clearly needs to be something they can relate to without triggering their defenses. Home is a place of warmth, not of rational decision-making.

Success factors

Some research on the success factors of (behavioural) energy efficiency programs have been made, but often the planning of new programs is based on pre-assumptions and rarely on deeper knowledge on the behaviour of end-users.

According to “Changing Behaviour” project (Mourik et al. 2009) the success factors of behavioural energy efficiency programs can be classified into the following categories:

- internal factors (e.g. financial support, commitment of stakeholders, sufficient time, regular monitoring, evaluation and feedback to participants, planning process according to end-users’ capacities and needs)
- external factors (cultural, political, socio-economic context)
- timing (using the “window of opportunity”, motivation of target groups, linkage to regional development and previous projects).
- engagement of end-users and stakeholders (knowing the target group, tailoring the message, personal, face-to-face approach, peer-to-peer communication)

Of these especially the latter, an understanding of the target group, was highlighted in the project.

Some remarks about the success factors in the studied cases are mentioned in this report, but deeper analysis will be made in the Final Report.

Behavioural insights embedded into energy efficiency programs

Instead of treating behaviour as a separate issue, behavioural perspective should be an integral part in all energy efficiency programs to aid in reaching the programs’ targets in energy saving. Programs can achieve greater effectiveness by incorporating insights from behavioural sciences. What is needed is an understanding of the end-users’ motives and barriers, and the know-how in formulating clear, simple and engaging messages.

The true touchstone of behavioural programs and interventions is to have rigorous evaluation methods to assess the cost-effectiveness of the interventions. These are needed to convince the policymakers about the relevance of the programs.
The case studies were collected in January–June 2014. The intention was to map out behavioural interventions from different sectors of energy efficiency from the WP5 partner countries: Denmark, Sweden, Finland, the UK, the Netherlands, Estonia and Bulgaria. The criteria for case collection was simple: to find Best Practice interventions from the partner countries which aimed to address the behavioural aspects of energy efficiency. Partners were given free hands in this mission. Interventions were to be collected among all relevant key fields: transport and mobility, green buildings and land use, technical infrastructure, production and consumption and energy supply.

The BAPs in this work package refer to different measures that have been implemented to promote energy efficiency. These might be for example campaigns, projects or advisory services for consumers or organizations. The common factor is that the interventions have aimed to address the behavioural aspects of for example consumption or transportation of different target groups – households, offices, schools, the private sector – to name but a few.

The partners filled in the required information on a case study form covering all relevant aspects of the intervention, ranging from the implementation budget to determinants of behaviour addressed, goals, objectives and evaluative information to details on target group feedback. The cost-effectiveness of selected interventions will be analyzed in a separate report. As most behavioural interventions contain hardly any data on cost-effectiveness, this proved a challenging task.

Altogether 38 interventions were collected, analyzed and evaluated. A majority of case studies, 17, concentrated on promoting energy efficient transport and mobility. Offering advisory services on energy efficient consumption to citizens was another prominent field to feature among the interventions with 13 interventions presented. Out of all the key fields, energy supply was least represented with one case study.

The collected interventions were evaluated by the WP5 university partners: Delft University of Technology, University of Copenhagen and Turku University of Applied Sciences and also Eskilstuna Energi och Miljö. The main question to be answered in the evaluation was: What makes an energy efficiency intervention a Best Available Practice in terms of achieving behaviour change? Particularly the indicators of success, effectiveness, cost-efficiency and relevance of the intervention in promoting energy saving were reviewed.

The evaluation criteria was the following:

- Outcome
- Effectiveness
- Cost-efficiency
- Relevance
- BAPs derived

Some challenges were encountered while evaluating the interventions. More often than not, an evaluative component had not been built into many of the interventions from the outset. Therefore finding appropriate data for conducting one proved difficult at times. Also, as most behavioural interventions do not include monitoring of results after the intervention has ended, it is difficult to establish cause-and-effect relations. Even if there were quantitative data on energy use reduction, it is always hard to assess whether the effect is attributable to the said intervention. Long-term attitude and behaviour change is therefore difficult to pinpoint to be a result of a specific intervention. In any case, the main purpose of evaluating the BAPs was to establish as accurately as possible that the reviewed BAPs have achieved their goals of promoting energy efficiency in different key fields.
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The Green Buildings Key Field includes the domains of “Renovation”, “Building technologies” and “Spatial structures and land-use”.

Buildings currently generate 36% of the CO2 emissions in the EU, but there is a lot of potential for energy efficiency and energy savings in this sector. Much can be accomplished by integrating an energy smart mindset to land-use planning, but direct measures targeting energy performance in both new and old buildings are also needed. Energy performance certificates, requirements for new nearly zero energy buildings and energy renovations are examples of measures directly targeting energy consumption. Each EU member state has also made national plans regarding energy efficiency requirements for the building sector. As 35% of the buildings in the EU are over 50 years old, special attention should be paid to retrofitting schemes and introducing financial support for energy saving renovations.

**Targeting people’s behaviour** is a key aspect in achieving energy savings in the building sector. People make daily decisions affecting energy use at home, at work and in leisure time. Some of these decisions have only short term effects on energy use, but many of the bigger decisions (e.g. renovations, new buildings) can curb energy consumption in the long run. All in all 4 case studies were gathered and analyzed by the PLEEC project in this key field. Some of the key findings in these case studies were:

- People value practical information and readily attend energy efficiency related training.
- Financial incentives can lower the threshold of investing in bigger energy-related renovations.
- Energy efficiency needs to be integrated in all levels of land-use planning and planning of new buildings.
- Shopping centers can encourage both shop owners and customers to consume less energy by adopting energy efficient policies.
Most buildings in Estonia are energy inefficient. The average annual heating energy used in the buildings is 200–400 kWh/m² compared to the figure in industrial nations with a similar climate which is only 150–230 kWh/m². Thus Estonians consume more energy and also pay quite a lot for it. The majority of Estonians live in Soviet era apartment buildings that have poor construction quality and are inefficient. To encourage the apartment house associations to invest in reconstruction the Estonian Government is providing the associations with loan guarantees and investment grants.

Since 2010 it is possible to apply for a grant in the amount of 15%, 25% and 35% of the total cost of the construction work depending on the level of integration in reconstruction of apartment buildings. The main eligible tasks are:

- insulation of envelope structures
- exchange of windows and front doors
- replacement or reconstruction of the heating system
- reconstruction of the ventilation system or installation of a system with heat recirculation
- installation of equipment necessary for using renewable energy
- reconstruction of the control system or drive of lifts
- design, project management and owner supervision.
The target group of the activity is apartment building associations. 91 apartment buildings received a grant during 2013 in amount of 2.707 million Euros. Tartu received 11 grants in the amount of 486 thousand Euros. The investment grants’ total sum has risen from 174 thousand Euros in 2010 to 2.7 million Euros in 2013. The funding is received from the Estonian Ministry of Economic Affairs and Communications.

In essence, the overall goal is to decrease energy consumption in soviet-era apartment buildings all over Estonia by promoting energy efficiency of residential housing and increasing overall awareness of energy saving measures. It has been determined that a building receiving a grant must deliver at least 50% energy savings in heating energy consumption.

From 2010 to 2014, KredEx has allocated grants in a total amount of EUR 37.7 million. KredEx has helped to renovate 663 apartment buildings with a total closed net area of 1.9 million square metres, which is 9.7% of the total heated area of all the apartment buildings erected in Estonia before 1991.

It is estimated that as a result of the renovation works the apartment buildings have managed to save 43% of energy. In practice it means that the combined stock of apartment buildings reconstructed by the end of 2013 save an average of 60 GWh of heating energy, which is estimated to be equal to the total amount of heating energy used yearly by the heating network of the town of Haapsalu. Given that the price of heating is EUR 75/MWh, it means that EUR 4.5 million was saved in a year.

Feedback on the financial support has been positive. Many occasions show that the grant is a tipping point in deciding whether to renovate or not. Not only has the grant effects on energy efficiency, but it raises the apartment owners standard of living. People feel better about their apartment and the building they live in. Feedback from the target group shows that housing associations educate apartment owners after the renovation works.

Feedback has also shown that energy prices are not high enough for the renovation to give financial effect. Energy consumption and money spent on energy is reduced, but as the grant covers only 30% of the renovation costs, the final yearly loan payment is roughly the same as energy bill before the renovation.

Best results are gained in fully renovating an apartment building. Education of apartment owners is crucial for achieving energy efficiency goals. All in all, in a country with massive old building stocks, grants for energy efficient renovation are essential for reducing CO2 emissions. The project is a good example of how funding possibilities for energy efficient actions are crucial but also of the importance of having well defined goals for achieving the grants which impacts the quality of the renovation itself and of the users’ behaviour changes afterwards. Demanding 50% reduction of energy consumption for heating is aligned with the biggest challenges in local energy consumption and seems to be a good way to create a need for education to change behaviours.
In 2012, Tartu City Government and Tartu Science Park held a training program “Energy efficient building”. The program consisted of 12 courses lasting 8 hours each. The courses were free of charge and although the courses were available to anybody interested in the topics, the courses were targeted to people who have constant contact with energy costs or energy efficiency in buildings and have a need for better knowledge in that area including engineers, architects, property managers, property owners and other parties involved in designing, constructing and managing a house or a building.

Subjects of the courses included:
- Politics of energy performance of buildings
- Energy performance and feasibility study of building
- Impact of designing to energy performance of building. New ways in design.
- Combined impact from techno systems and walls of building
- The impact from techno systems to the building
- Using different sources for energy production in buildings
- Alternative ways to energy production.

More than 160 people registered for the courses. Attendance at each day was over 100 people. The updated and shorter version of the courses will be held again in 2014–2015.

Tartu City Government has chosen to look for best practices in building energy efficiency in Tartu and share the knowledge with the public. For this, a competition is held each year. Citizens and companies that have constructed or renovated a building in previous two years can present their work for the competition. The aim of the competition is to look for best practices and good solutions in buildings and houses that help the building serve its purpose and at the same time are energy efficient and/or innovative. In 2014 the competition is being held the second time. 2013 presented the city government with a number of highly efficient solutions in private and public buildings. The information about the competition and the winners is available on the city’s website. Articles introducing the winners and their solutions were printed in 11 nationally distributed magazines. News about the competition and results were mentioned on a national TV channel. The competition is one of the first of its kind in Estonia and first one held by a public authority. One of the reasons for the competition is to encourage soviet era apartment building owners to renovate and invest in energy efficiency. The information about the benefits and risks in investing has to be distributed to reduce fear and stimulate apartment owners to invest.

The target group of these activities has been architects, designers, property managers, property owners and energy specialists in Tartu region and Southern-Estonia. The activities are financed by IEE, Tartu City Government and Tartu Science Park with a yearly budget of 31,000 €.
The intervention addresses the motivation, attitude, knowledge of consumers as well as potential barriers, laws and regulations and capacities to energy saving. The intervention applies different means to save energy via behavioural adjustments: a competition and a training program for specified target groups.

**INTERVENTION DESIGN**

Feedback on the courses was positive. Topics were considered relevant. Content was highly valuable and included new information. Courses were well organized. Overall, the courses were extremely successful. Attendees showed interest in joining further courses. The courses will be continued in 2014–2015. The subjects will be reevaluated.

The main quantitative objective for application courses was 96 hours of courses with 720 unique attendants (60 attendants per course; 12 courses). The result was 1492 that is 12 courses and average attendance of 124 per course. Despite their success, it is difficult to say if the courses or the prize have led to new investments or better quality of investments, or even better use of energy than before the activities.

Receiving applications to the competition proved difficult. A lot of the times owners of innovative solutions or energy efficient houses do not want to promote their homes. It is a lot easier to have companies to join the competition than it is to include home owners. The objective for the competition was 15 applications and 3 winners. The goal of 15 applications was achieved in 2013. 2014 saw 8 applications.

The courses have only been organized once. Feedback from the attendance was very high. The courses resulted in very high interest and attendance reaching all of its goals.

The cost of organizing the competition is not high – approximately 4 Euros per attendee. However, promoting the results in media has a high cost. There is a lot of room in making the promotion of the results more cost effective. The target group can be defined more specifically. Following the specification, the means of reaching the target group can be optimized.

The competition is evaluated after it is presented to the winners. The current results show that the prize needs to be promoted more and value needs to be added. General awareness of the prize is not high enough and it is difficult to get people involved. It is much easier to involve organizations, companies and enterprises than it is to involve private owners. In 2015 the competition will be held for the 3rd time.

All in all, these interventions are very good examples of how knowledge building can be integrated with other measures like identifying best practice through competition and disseminate these examples widely. It seems like the project is solid in terms of organization and economy, and that the capacity building will continue, be developed and adjusted to new problems identified. From a city point of view, both cases can be relevant in promoting energy efficiency in buildings.

The overall goal is to raise awareness of energy saving potential in Tartu and Tartu region. Sharing best knowledge in Estonia with specialists in Tartu and Tartu region is also an important objective. The goal has been to reach at least 760 attendances on the courses and 15 applications for the competition.

**RESULTS**

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**LESSONS LEARNT**
Skanssi shopping centre in Turku, Finland, was built in 2009. Environmental issues have been taken into account already in the building phase. The goal was to decrease the environmental loading of shopping centre activities as well as the maintenance costs in the building.

LEED, or Leadership in Energy & Environmental Design, is a green building certification program that recognizes best-in-class building strategies and practices. To receive LEED certification, building projects satisfy prerequisites and earn points to achieve different levels of certification. Prerequisites and credits differ for each rating system, and teams choose the best fit for their project. LEED certified buildings save money and resources and have a positive impact on the health of occupants, while promoting renewable, clean energy.

Skanssi shopping centre is the only shopping centre in Europe which has two LEED certificates. The first one was awarded on basis of green construction. The other one was awarded for the sustainability of building operations and maintenance. The second LEED certificate is very much connected to behavioural aspects of energy efficiency as the certificate aims to constant improvement. Energy saving behaviour and solutions on part of the centre operators is needed to achieve that goal.
The shopping centre has been planned from the start keeping in mind environmental and energy saving aspects. Shop owners are encouraged to minimize their water and energy consumption via informative measures. For customers, environmental issues are addressed via events and information campaigns. Public transport has been made easily accessible both from Turku city and nearby Kaarina city centres.

Environmental issues have a positive effect on the building. Maintenance costs decrease and the value of the building is higher than for the same kind of building without the certificates. The relevance for the cities is especially in the design and planning phase of a shopping centre. If legally possible, energy efficiency norms can be set as conditions for obtaining a building permit. The Skanssi case provides a good example on how to integrate environmental issues to green buildings already in the planning phase.

The acquired LEED certificates presume environmental considerations both in the building phase (certificate acquired in 2010) and in its operations (certificate acquired in 2012). Skanssi shopping centre has aimed to act as a forerunner to all Finnish shopping centres. Environmentally friendly actions have been heavily invested in. As a result, the following goals have been met:

- Energy consumption has decreased
- Waste recycling has improved significantly
- Carbon footprint of the shopping centre has decreased
- Skanssi uses 100% renewable electricity
- Solar panels have been installed to produce electricity for neon lighting

All procedures have decreased the carbon footprint over 60% during five years. Water consumption is 45% lower at Skanssi compared to other Finnish shopping centres.

Skanssi not only aims to change the behaviour of consumers but the operatives too. All operatives are given the “green handbook” instructing on energy saving and other environmental issues. LED-advertising is a prerequisite. Recycling is well managed. The building has an intelligent monitoring system, e.g. there are motion detectors in spaces which are not in constant use. Air condition, heating system and cooling is automatic. Consumption of water and electricity is constantly monitored. There are solar panels on the roof of the centre.
The Mobility and Transport Key Field includes the domains of “Public transport” and “Motorized private transport”, “Pedestrian traffic and cycling” and “Transport of goods”.

The EU has set ambitious targets to reduce overall CO2 emissions by 2050. Transport emissions should be cut by at least 60% by 2050 in relation to the 1990 levels. Reduction potential is seen especially in urban areas, where mixed strategies supporting both smart solutions and sustainable modes of transport such as walking, cycling, collective transport and public transport should be stressed. Efforts should also focus on transport infrastructure and land-use planning, both of which should encourage sustainable transport.

The need for behaviour change is explicit in the EU strategies, and various measures targeting transport behaviour have been proposed to meet with the ambitious CO2 targets. But to get people to embrace sustainable transport modes requires not only a change in individual behavioural patterns, but also a change in the way urban areas are planned. Thus strategies targeting transport issues should use an integrated approach, which addresses behaviour, technical aspects and urban planning. As transport has such a vital role in the emission reduction strategies, it is not surprising that the majority of the case studies collected and analyzed by the PLEEC project were related to transport and mobility. Key conclusions in the case studies indicate that in relation to transport and mobility, people seem to respond to interventions, which utilize or underline:

- financial incentives,
- social pressure,
- easy, funny and creative solutions,
- practical and timely information and guidance,
- safety and health.
Employees of many business parks predominantly travel to work by car, which is a high-carbon and low energy efficient mode of transport. This intervention developed travel plans for commuters in a business park, Lautrupgård in Ballerup, striving for reducing employees’ car-based travel (i.e. daily commuting and business travel) by optimising car-driving with e.g. carpooling, and by switching car-travel to more sustainable and energy efficient transport modes (e.g. walking, cycling, public transport).

This was done by the means of travel plans developed and implemented in a collaborative business network with various partners involving four knowledge intensive companies (Tryg, Nordea Liv & Pension, Topdanmark and Siemens with a total of 5,000 employees), Ballerup Municipality, Movia (Transport company), Nobina (Bus operator), and GATE 21 (green mobility office).

Supported by the municipality and GATE 21 the four companies in the network shared experiences of local challenges for sustainable transport and inspired each other to find ‘greener’ solutions targeting daily commuting and business travel. The intervention was carried out in from 2011 to 2013. Lautrupgård business network was one of a total of 7 business networks, forming the demonstration track ‘Travel Plans in Business Networks’ under FORMEL M.
The intervention was about developing and implementing travel plans. A travel plan comprises soft and hard instruments, efforts and activities – also called ‘transport services’ – aiming at reducing, optimizing and converting car-travel into more sustainable and energy efficient transport modes.

The travel plan was developed on the basis of a mapping of the existing provision of transport services in the six companies and in the business park. Further did it build on data from a baseline survey examining employees’ transport habits, attitudes and perceived barriers transport behaviour before the intervention.

A wide range of transport services for reducing, optimizing and converting car-use were implemented, including e.g.:

- A ‘commuting check’ campaign checking car-driving employees’ commuting habits to increase awareness of alternative transport and routes modes, such as cycling and public transport.
- Optimizing bus travel itinerary in Ballerup
- Production of a flyer showing bus lines, bus stops and paths for cycling and walking. The flyer was distributed to all companies in the business park
- Organizing a mobile bicycle reparation workshop during working hours
- Purchasing commuter bicycles and electric cars for work related travel
- Delivery of private net-shopping goods at workplaces

The travel plan was evaluated by a survey among employees in four of the companies after the intervention, which made it possible to assess if employees had changed their transport behaviour.

The overall goal was partly achieved. The aim to create more sustainable transport behaviour was achieved in the short term. Whether these changes will last is uncertain, but due to the collaborative network organization, the intervention has involved many actors and organizations. The intervention has been disseminated widely, and many hands-on tools for future application and further development have been developed for further use.

Specific results for Ballerup intervention:
- Less car-driving (from 80.5% to 72%)
- More working days from home (an increase from 6.8% to 8.5%)
- More cycling (from 10.5% to 16%)
- More multi-modal travel behaviour (from 7.5% to 11.7%)
- 50% more passengers on the optimized bus line.

Employees are now more aware of the possibilities for changing travel behaviour and they talk more about it with colleagues. Encouraging sustainable transport modes is embedded in some of the companies’ accounts/strategies for CSR.

The municipal traffic planner found it hard to commit the local businesses in the network. It required new ways of acting (new roles) for all participants.

The relationship between the municipality and the local businesses was first in need to be established and to be developed into a platform for collaborative project development.
The built environments around many Danish hospitals are presently facing traffic congestion due to car-based transport behaviour of employees, patients and visitors. These years many hospitals are being re- and outbuilt and it is expected that the traffic congestion will increase and the demand for parking areas will increase in the period of construction as the number of parking lots will be temporary abandoned. Herlev Hospital is enlarged from 2014 to 2017 with 57,000m². During the period of construction the congestion is expected to increase further and a demand for 400 parking lots has been assessed.

In this intervention a collaborative network of Herlev Hospital, Herlev Municipality, The Capital Region of Copenhagen and GATE 21 developed, implemented and evaluated travel plans in order to reduce employees’ car-based transport and the demand for parking lots here and now in order to reduce in the future hospital setting. Sustainable transport has been promoted with its health benefits and the general well-being it creates among employees.

The efforts are evaluated by a pre- and post-intervention survey of employees’ travel behaviours and attitudes, and a pre- and post-intervention mapping of the available ‘transport services’.

The driving forces behind the project were a municipal traffic planner and a HR consultant at the hospital.

The intervention was carried out in one year starting from October 2012. The Herlev Hospital intervention was one of a total of 3 interventions at hospitals, forming the demonstration track ‘Travel Plans for Hospitals’ under the FORMEL M project.

Surveys on employees’ transport behaviour before and after the project period were made. These provided knowledge on the existing transport behaviour among employees (including transport modes, distances and time) required for developing relevant local transport services. The surveys also created travel awareness among employees by asking the employees about their daily travel choices. They also mapped how aware the employees were of the transport services provided by the hospital.

The hospital intranet had direct links to the national ‘trip planner’ (www.rejseplanen.dk), which had a CO2-calculator and also showed updated real-time information on public transport services. Employees were also regarded as ‘test-pilots’ of public transport and new employees were made aware of travel possibilities and trip itineraries. Employees were also offered a partly paid travel card.

Herlev Hospital was certified as Bicycle-friendly place of work in 2009. It was re-certified in 2012 when the hospital invested in 958 new bicycle stands, which were placed by taking real needs into consideration. Many of the bicycle stands were protected from weather and some of which were also locked and video surveilled.
RESULTS

The intervention was successful in many ways. Changes in transport behaviour among employees included:

- Car-driving was reduced by 9% in all distances (from 57% to 48%)
- Increased co-driving (from 3.5% to 5.2%)
- 10% less driving alone in car (from 53% to 43%)
- 7% more cycling (from 33% to 40%)
- 1% more multi-modal travel behaviour (from 8.8% to 9.8%)

The intervention also resulted in changes transport behaviour awareness among employees. This could be seen in the increased popularity of bicycle services. Employees were also more aware of the possibilities in changing travel behaviour and they talked more about travel modes with their colleagues. Sustainable transport was also embedded in the hospitals' accounts/strategies for CSR and HR health.

LESSONS LEARNT

This intervention is a good example of an integrative approach, where different types of tools are used simultaneously to tackle an issue. Integrative approaches usually have promising results.

The intervention introduced many useful tools for other cities. Having infrastructure (e.g. bicycle parking, showers, bicycle lanes, bus stops etc) that supports sustainable transport is instrumental in achieving good results with similar interventions.

Commitment from management is very important. Without committed management, results will remain modest and quickly wear off after the intervention has ceased. Making sustainable transport part of the everyday working life and a topical subject is helpful.

Linking sustainable transport with health benefits is a good way to promote sustainable modes of transport. People not interested in environmental issues could be persuaded with potential health benefits.

Further considerations included:

- Shower, towels, changing facilities for all employees.
- A monthly mobile bicycle reparation workshop
- Automatic bicycle pumps
- Purchase of 5 electric bikes
- Fee for participation in the national "cycling to work" campaign paid by the hospital and check of personal bicycles before the campaign as well as a physical condition test before and after the campaign
- PR for cycling in the hospital premises and on the intranet
- Lecture on 'good advices for winter cycling' by a consultant
- Partnership with Danish Cancer Society on the project "From car to bicycle", where barriers and possibilities for healthy and sustainable transport are revealed from focus group interviews with employees at Herlev Hospital.

In addition to the measures one employee was made a test-pilot for an electric car and a campaign for colleague co-driving was initiated.
Cities need to grow and transform in new ways as land-use policy and urban form tend to support car-dependent and low energy efficient transport behaviour. Urban design and infrastructure, which invites people to choose sustainable transport is needed. This can be achieved by integrating mobility management in municipal planning right from the beginning by ensuring collaboration not only between various actors like traffic companies, carshare companies, housing associations and businesses, but also between different municipal departments (e.g. urban and transport planners, environment, climate and businesses departments).

Musicon is a former industrial area of 250,000m², in the centre of Roskilde. The area has been transformed into a new neighbourhood containing housing, creative businesses and various services. The mobility plan envisions an urban neighbourhood with low visible car dominance with a 60% modal split for sustainable transport (walking, cycling, public transport).

The intervention was carried out between June 2012 and November 2012 and the initial idea came from a municipal traffic planner.

The intervention was part of a bigger project called Formel M, which consists of 25 local ‘demonstration projects’ organized in 5 ‘demonstration tracks’, all targeting energy efficient transport and how municipalities can play a role in green transition. The project is inspired by the notion of Relational Planning (by Patsy Healey) where planning takes place in networks with various actors. The overall budget for all cases was 2.7m€ and they were funded by the Danish Transport Authority, Capital Region of Denmark and other partners representing both public and private actors.

Through the adapting with the SUMP a new tool was developed: the VEMA tool.

VEMA is a free excel-based scenario tool that serves to calculate the effects of mobility plans for smaller geographic territories. VEMA is applied in two ways. Firstly, it is used in the preparatory phase of the mobility plan for mapping the base-line situation: what is the transport modal split without a mobility plan to promote green mobility. Secondly, it is applied to assess and calculate the effects of implementing the mobility plan. It can assess how distinct composition in the mobility plan (which and how many transport service and measures, see below) will result in distinct effect for traffic volumes, modal splits and CO2 emissions compared to the base-line situation. This makes it possible to assess what measures it takes to reach the municipal goals for traffic volumes and CO2 reductions.

VEMA builds on data from the National Travel Survey; norms for generated trips from residences, retail and business and information from transport authorities on relevant public transport services’ passenger volumes. Besides VEMA comprises a range of transport service and measures developed in the superior Formel M project: i.e. priority for bicycles; bus information and campaigns; separate cycling paths; norms for car parking; parking payment; locked bicycle
The municipal planners pointed out two key challenges for implementing mobility assessment plans. According to them, it is difficult to reduce the parking capacity when huge parts of the area seem well-suited for parking. It is likewise challenging to ensure the consultancy of the mobility assessment plan in all relevant decision processes and that relevant stakes and considerations are equally balanced.

Experience from the intervention has been used for further work in adapting the SUMP- and VEMA tools to other Danish cities. The results from the intervention have been of use especially in utilizing these tools in smaller municipalities. The intervention also introduced many useful tools and ideas to be used in other cities.

- Reduced norms for car-parking
- Location of parking-house in periphery
- Parking lots are ‘moved out’ and spread out to peripheral location for gradually realisation.
- Shuttle bus (bus line A-type) through Musicon was established December 2011.
- Raised norms for bicycle-parking
- Key walking and cycling efforts form part of the municipal building and lay-out budget.

The intention is also to expand the mobility plan in the future by the following transport services and measures:

- Business bike and bike-share systems will be realised.
- Vision and objectives will currently be presented to area developers, whom is inspired to become co-responsible.
- Items of building and lay-out budget will currently be integrated in over-all budgets to secure realisation.

The Musicon mobility plan is politically adopted by the city council. By means of a range of transport services and measure (see above) the mobility plan envisions an urban neighbourhood with low environmental and visible dominance of the car and with a sustainable transport modal split of 60% (walking, cycling, public transport).

If carried as planned the mobility plan will result in transport modal split that doubles daily trips by bus, bicycle and train and diminishes car trips by one half. This implies a reduction of CO2 emission from 14,253 tons/year to 9,050 tons/year, corresponding a 37 percentage reduction.

Traffic scenarios have been calculated on future car traffic volumes that will grow as the district will be revitalised. In a ‘worst case’ traffic scenario for Musicon (projection of traffic Musicon with only reduction of parking lots) the urban development generates 14,000 more cars a day. A ‘best case’ traffic volume scenario for Musicon will generate 10,000 more cars a day.
MOBI is an ongoing project promoting and stimulating sustainable transport of employees. It aims to raise awareness on the benefits of using sustainable transport modes and to encourage organizations and their employees to use energy efficient and sustainable transport modes for their commute and business travel journeys. The project also targets local authorities, policy makers, public transport providers and companies providing e-vehicles about how to further increase energy efficiency in commuter travel.

The intervention aims to reach its goals through the implementation of MOBI: ‘ProMOting Smart MoBIlity to Employees’, an award winning sustainable mobility online game originating from the Netherlands. MOBI has a simple formula: for every workweek, use one day for smarter commuting. In addition to promoting walking, cycling, public transport and car sharing, employees in the demonstration cities will also be incentivized to use e-modes of transport (e.g. e-bicycles, e-scooters and e-cars).

MOBI is funded by the Intelligent Energy Europe programme and has an overall budget of 970,000 €. The project started in 2013 and ends in 2016. Project partners come from Bulgaria, the Netherlands, Romania, Belgium, Portugal and the UK.

**INTERVENTION DESIGN**

The MOBI game encourages employees to use smart modes of transport for work-related travel as well as having fun whilst competing against their friends and colleagues. Organizations can compete solo or form teams with others, which can then challenge each other. The idea is to see how many sustainable trips teams have made each week. This competition element has proven to be a strong part of the game’s success. In return, the website gives employees information about how much energy they have saved, calories burned as well as the opportunity to win prizes.

The web-based MOBI platform allows keeping a diary of the trips made. With these diaries the players can see their saved kilometres, expenses and even calories burned. MOBI works as a trainer giving the participants advice and ideas on optimizing their commuting and business travels. The platform favors cycling, carpooling and walking, which get higher scores than private vehicles.

**RESULTS**

The intervention is ongoing and thus no conclusive results are yet available. Despite this, there are some promising results already. A player in Eindhoven (the Netherlands) has saved 4,000 € in fuel costs and has had a 22% decrease of peak hour trips resulting in 4 saved tons of CO2 and a burn of 122,000 calories.

**LESSONS LEARNT**

Adding gamification elements into interventions seems to work. Social pressure and competitive elements seem to encourage people to participate.
Bus traffic went through some major changes in Eskilstuna in 2011. As a way of introducing these changes to the people, the city of Eskilstuna and the regional public transport authorities (Länstrafiken) decided to launch a promotional campaign between June 2011 and June 2012 to introduce the changes in bus traffic to the habitants of the city. The intervention had a budget of 50,000 € and was funded by the municipality and the regional public transport authority.

**INTERVENTION DESIGN**

In addition to public promotional outdoor campaigning, an informative letter was sent to almost all households in the city. In this letter a free monthly public transport ticket was offered to anyone meeting certain criteria and agreeing to take part in a two part online questionnaire before and after finishing the experiment period. The overall goal of the intervention was to make bus transport more attractive, elevate the public image of public transport and to make bus travel a viable option to car commuting. The intervention was targeted to 22–60 year old car commuters with no current customer relation with Eskilstuna mass transit. In addition to fulfilling the criteria, people chosen to receive the ticket, were asked to take part in two questionnaires made before and after receiving the monthly ticket. The idea was to gather information on the commuting habits before and after the experiment.

The intervention utilized subsidies and incentives by offering free tickets to citizens meeting the criteria. It also used information, lobbying and education of citizens to intervene with transport behaviour. A promotional letter with an advertisement and information on the free monthly ticket campaign was sent to the citizens of Eskilstuna. All interested people fulfilling the criteria were asked to sign up for the campaign and eligible people were sent a free monthly ticket. An outdoor advertising campaign was also done.

**RESULTS**

The numeric goal was to get 5% (2,385) of the 47,400 inhabitants between 22–60 years to take part in the free monthly ticket commuter experiment. The overall goal was partly reached as only 676 people of the targeted 2,385 joined the intervention. According to the questionnaire 58% used their free monthly ticket and at least 46% increased their mass transport use during the test period. 14% increased their mass transport use after the testing period and 92% of the participants would recommend public transport to their friends after the experiment.

According to a study analyzing public transport interventions made by the Swedish Transport Administration 25% of the people who take part in public transport interventions change their behaviour and use more public transport after the intervention. The Eskilstuna experiment did not however succeed as well as the other interventions have. It was clearly a bigger challenge to find people interested to join the experiment than was expected, but the reasons have not been researched.

**LESSONS LEARNT**

Free ticket interventions are commonly utilized to encourage people to use public transport and make them appreciate public transport more. Cities planning interventions based on this well-known test-design should pay special attention to target groups. The target group/s should be clearly defined and a clear marketing strategy should be made already during the planning phase. The campaigning should also not overlap with cycling season, as people are more likely to cycle to work during the cycle season instead of taking the bus. The target group should live in the vicinity of the public transport network in order for the bus to be a real alternative to car commuting. People will use the bus, if the bus stops are conveniently located and the transport network is suitable for their needs.

This type of an intervention is particularly interesting to cities with a municipal transport company and promising results can most certainly be attained, if the target group is clearly specified. It should, however, be noted that free monthly ticket interventions cannot be repeated endlessly, as the novelty of the experiment wears off quickly.
The project “Optimal use of hybrid buses” researched the energy and cost effectiveness and reliability of hybrid busses. The main partners were Tampere University of Technology, Aalto University and Turku University of Applied Sciences. In this project, the main task of Turku University of Applied Sciences was to carry out the economic driving training for bus drivers.

Financed by the TransEco Research Programme, Turku Municipal Transportation Authority and Turku University of Applied Sciences, the project totaled a budget of 37,000 €.

The overall goal of the project was to clarify if it is possible to get savings in fuel consumption by increasing the general knowledge of economic driving of bus drivers. Also, the goal was to introduce the bus drivers the way of driving where hybrid technology is maximally exploited.

One of the objectives was to find out what the savings are in percentages of fuel consumption that can be reached with these measures. In former training cases, the average decrease has been 20% and the range of variation between 10% to 40% for passenger car drivers. Naturally, the range of variation depends on driving habits before training. For bus drivers who are professional drivers and have already recently been trained, lower savings percentages were anticipated. However, one of the objectives was to carry out the interactive and dialogic lessons in order to motivate bus drivers to adopt economic driving habits of hybrid buses permanently.

The intervention was essentially an educational campaign for Turku city bus drivers. The project addressed both the motivation, attitude and knowledge of the participant companies on energy efficiency. Potential barriers to energy saving behaviour were also addressed, as well as the means with which to promote behaviour change.

The objectives set for the intervention were reached satisfactorily. Most of the bus drivers regarded the training in a neutral way, some were motivated during the training, and others saw it as a bothering factor. A 9% decrease in fuel consumption was reached according to the monitoring system. The decrease rate is not unambiguous as the consumption monitoring system was not installed before the training but after the training begun. A 2% decrease in fuel consumption was reached according to the refilling data of average consumption.

This research, the economic and anticipating driving training concerning the whole personnel, gained 5 percentage savings for the company. This is 46,000 € savings only in fuel consumption plus other technical savings, for example brake costs. Because of the training, the travelling comfort has risen considerably. Feedback was gathered from bus drivers after the education. Others experienced the hybrid busses positively and others negatively, partly because of their driving habits.

The reliability of hybrid busses was worse than expected. The hybrid busses did not function as expected and the engine did not stop as often as expected at bus stops. The manufacturer was informed about the problems and was interested in doing improvements in transmission software. In general, the functioning of hybrid busses differs less
from normal buses than most hybrid cars differ from normal cars. The training concerning optimal driving habits of hybrid buses is maybe as vital as the corresponding training for hybrid car drivers.

LESSONS LEARNT

All in all, the main effort here was to motivate the bus drivers to adopt economic driving habits permanently. Some of the drivers were motivated and they experienced that the lessons gave more interest to their work, whereas others considered the training and economic driving as a nuisance.

Some of bus drivers were so interested in the education that they even did some extra work on developing what they had learned. Due to their enthusiasm, the problems faced in stopping were partly diminished.

The monitoring systems installed in buses during the project are still in use. The enterprise (Turun Kaupunkiliikenne Oy) exploits the data coming from those and is monitoring the consumption. Over-all, costs for project realization were moderate (37,000 €) and costs were as was budgeted. Because the savings on fuel are more than the costs of the project, this must be a cost-effective project.

The project is definitely relevant to cities with own public transport. Not many interventions have addressed bus drivers or other professional drivers. As public transport makes up a lot of the CO2 emissions in cities, improving their efficiency is very important. To a large extent the success and effectiveness of such an intervention requires the acceptance of the bus drivers. In other words, in order to achieve sustainable results, the mindset of the drivers has to be addressed as well. A matter of concern is the long-term effect: how often must this project be repeated to gain a long-term effect?

All in all, the project managed well in testing the energy efficiency of a relatively new technology and identifying important knowledge on the relationship between technology and users’ behaviours and attitudes. The project exposed the importance of targeting both behavioural and technical aspects of energy efficiency. The educational programme of bus drivers can only gain small savings and not all drivers are motivated to change their behaviour if it’s not easy. Therefore the feedback to the manufacturers of the buss is important in order to overcome technological challenges that might also support the behaviour of non-motivated drivers.
Sustainable Urban Mobility Plan (Plan de Mobilidade Urbana Sostible, PMUS) is a tool for improving the quality of life of citizens through better transport conditions and mobility measures. The PMUS is a locally adapted version of the European SUMP tool. The planned improvements have mainly focused on small changes and in gradually increasing the awareness of the citizens. The intervention has also introduced the concept of mobility management, which is expected to change the mobility patterns of the city, resulting in a reduction in the negative effects of private vehicles. The intervention is targeted to all citizens of Santiago de Compostela.

The intervention is implemented by Concello de Santiago de Compostela (Local government), INEGA (Energy Institute of Galicia), IDAE (Institute for Energy Diversification and Saving) and Xunta de Galicia (Regional government). The intervention is funded by the local and regional government, INEGA and IDEA. The budget is 104,000 €. The intervention was started in 2010 and is still ongoing.
Feedback from the citizens was gathered by surveys before the redaction of the PMUS (6,253 by phone, 4,942 in public transport) for knowing the behaviour of citizens regarding transport. 450 surveys were made after finding out the preferences in transport (e.g. pricing, schedules, and modes of transport).

Awareness raising was done in various meetings with different stakeholders (e.g. shop-owners in the historical center, taxi and bus drivers, university staff). These meetings increased awareness and helped the diffusion of good transport practices between the stakeholders.

Future measures planned in PMUS include e.g. annual promotion campaigns for public transport and better identification of bus stops.

Regardless of not being able to reach the holistic targets of improving the sustainability of the mobility system in the city as such, the intervention has had some success. For example, useful information has been accumulated through a web-based feedback system. Feedback has also been gathered from the citizens on how to change and develop urban mobility to better respond their needs. A Mobility Plan was designed based on the feedback gathered from citizens through the web-based system and telephone surveys. Actual infrastructure improvements will hopefully be made at a later phase.

The use of certain sustainable means of transport, such as the bicycle, were not as well received as was expected. This was due to lack of awareness, climate limitations and the poor quality of the service. Santiago de Compostela is a very rainy city with 141 rainy days per year on average. The city infrastructure is not planned for cycles and more cycle paths are needed. Cycling is not safe in some parts of the city because of the traffic.

Some actual improvement measures were realized in the city, and for example public transport coverage was increased. No direct relation with increased public transport use could be established though due to the socioeconomic situation.

The intervention clearly showed that it is necessary to continue improving the mobility system of the city.

The use of sustainable modes of transport, such as bicycles, was not as active as was expected. This lack of success has been explained by low levels of awareness, climate limitations and quality of the services. Interventions should focus on factors preventing the use of sustainable transport.

The current financial situation could be beneficial for sustainable mobility. For example in Spain public transport is cheap compared to private cars. The economic crisis can potentially make public transport more attractive in places with low public transport ticket prices.

Involving active stakeholders (e.g. neighborhood communities) is always useful. In this intervention the contacted organizations and communities proposed many fruitful ideas, which were used in the design process and in the planning of improvement measures.

Infrastructure needs to support cycling and other sustainable modes of transport. The experiences gained in this intervention clearly showed that the entire system of mobility needs to be continually improved.
Turku City and the Service Center for Sustainable Development and Energy of SW Finland (Valonia) are promoting sustainable transport and smart mobility in the Turku city area by different mobility management measures. The overall goal is to make sustainable transport modes like walking, biking and public transport a viable option for all citizens of the city and engage people in a healthier, safer and more sustainable way of life. The Bus to Work/Työbussaile campaign was initiated to promote public transport and to increase smart mobility and sustainable transport in the city of Turku.

The campaign idea was to make bus commuting a positive and a fun experience and to show that taking the bus can also be a user-friendly way to commute to work. The overall goal of the campaign was to increase the public appeal of public transport and to change people’s attitudes towards it. The campaign also aimed at lowering the threshold of bus commuting and to increase the use of public transport even after the campaign.

The budget for both interventions was around 50,000 €. They were carried in 2013 and 2014. The campaigns were financed by the Ministry of Transport and EC’s Do the Right Mix program.

The campaign was planned, carried out and evaluated with the MaxSumo tool. In the first part of the campaign (autumn-winter of 2013–2014) all in all 60 one-month bus travel cards were given to selected commuters travelling in the city area. Half of the cards were raffled among participants taking part in a net-based questionnaire, the other half was selected from volunteering employees working in five regional key workplaces. The participants were requested to report their experiences in a Facebook page during their free month and their commuting habits were examined before and after the campaign with a survey.

In addition to free travel cards, 15 experiential bus rides were organized with various artists, musicians, comedians and other performers. The experiential bus rides also had specific bus-sponsors (usually politicians) who were to be present in the bus rides to discuss topical transport issues with fellow bus-riders. In addition, 5 public transport clinics were organized in the Turku marketplace. The aim of these clinics was to lower the threshold of bus-riding by providing guidance on public transport bottlenecks such as helping those unaccustomed in using a travel card.

Due to the successful first campaign, a second campaign will be carried out in autumn-winter 2014–2015. In this Bus to Work 2/Työbussaile 2 campaign, 200 one-month travel cards will be raffled following the same principles and criteria as in the previous campaign. This time the campaign area has been widened and eligible participants can come from all the municipalities belonging to the new regional public transport network “Föli”. At least 5 experiential bus rides have been planned for the second campaign with a focus on situational art in the buses.

The campaign was targeted to commuters living in Turku city (part 1) or in the municipalities belonging to the regional transport network “Föli” (part 2). Both campaigns targeted especially car drivers i.e. those using a car at least 3 times per week for commuting. The participants also had to live close by to a bus stop and be able to commute to work by bus.

The intervention was promoted with an awareness raising and educational campaign with an overall goal of increasing the public appeal of public transport through positive messages. One main idea was also to gather user
experiences and improvement suggestions to be used for making public transport more user-friendly and appealing, and to tackle practical issues preventing the use of public transport. The campaign utilized social media, leaflets, bus bench stickers and teaser videos to attract participants to take part in a web-based questionnaire used as the main place of recruitment for the intervention.

RESULTS

The overall goals were partly reached and the intervention was regarded as a positive experience. As the intervention will be renewed and regionally broadened, it can be said to have been successful. The first intervention reached the goal of 30+30 participants. It saved 3,800 kilometers and the estimated CO2-saving was 650 kg. The participants used the bus approximately 4 times per week during their free month. The individual use of private car was decreased by approximately 5 days’ worth of commuting per month during the campaign. Of the 60 participants 42 persons took part in the follow-up questionnaire, which was carried out in spring 2014. Over 50% of those taking part in the questionnaire stated that they had continued using the bus even after the campaign.

All in all 5 public transport clinics were organized and these reached approximately 100 people. 18 experiential bus rides were organized with 11 different performing groups. These performances reached close to 1,000 people. The FB-pages were not as successful numerically as was expected with only 340 likes of the targeted 600 and 150 comments of the targeted 240 comments.

The qualitative objectives were partly reached and the campaign increased the public appeal of public transport. There were interesting discussions and comments on the FB-page and these can be used to further develop public transport services. Some were also interested in continuing bus commuting and their negative view on bus commuting became more positive. Some respondents also considered the time spent on the bus as an asset (i.e. as precious time spent on their own). Some participants who reverted to car commuting after the campaign said that they did so, because they needed the car during or after work.

The target group were asked to take part in a web-based survey after the intervention. The intervention received a general grade of 4 out of 5. The results of the second campaign are not yet known.

LESSONS LEARNT

Keeping the terms for participation flexible enough is important. In this intervention the participants were given a 4 month period to start their free month. Thus the holiday season did not hinder the campaign.

Biking seems to be more popular that bus commuting. This was noticed especially in the FB-pages, which did not attract as many people as was anticipated. It is more of a challenge to get people on buses than to get them to cycle to work.

The experiential bus rides were a good way to get media attention. The core campaign did not attract that much media attention except in the beginning when the call for the participants started.

Using the MaxSumo tool for planning, executing and evaluating a campaign makes data gathering and analysis a lot easier. Comparisons with other campaigns are also easier, if similar campaigns can be planned using similar tools.

This campaign was a good example on how giving a free travel card can help in changing misconceptions people have towards public transport and how positive messages can be used to influence people’s behaviour. The experiential bus rides are also a good way to get media attention, which again can raise awareness and influence people’s behaviour.
CAR FREE WEEK

Tartu city government has organized an annual car-free week in cooperation with local NGOs as a part of the European Mobility Week since 2009. The overall aim has been to reduce car-based person transport in the city of Tartu and to raise awareness on the effects of car driving. The campaign aims also to reduce air pollution by reducing the amount of cars in the city and to promote walking, cycling and other alternative modes of transport. Public transport is affordable in Tartu and the number of public transport users is growing steadily, but the public transport system is not yet very developed and the quality of the services has been estimated low by the customers.

The intervention has an annual budget of 5,000 € and is funded by the Tartu City Government, which has been committed to the campaign from the beginning.

Tartu's car-free week offers a variety of light traffic and public transport promotional events since 2009. In 2011 the intervention for example closed the city center for cars and people were encouraged to try out sustainable modes of transport including sky runners, scooters, bicycles and super segways. People were also encouraged to take public transport by giving them free public transport tickets, if they parked their cars outside of the city borders. A program targeted for kindergarten children was provided including bicycle exercises, traffic tasks and games. An exhibition of buses and bicycles was organized as well as a bicycle school for all. A GPS competition for pedestrians and cyclists as well as a bicycle orienteering event were also organized as a part of the campaign.

An evaluation questionnaire was made in 2011, which showed promising results indicating that at least 15% of the 301 respondents answering to the evaluation questionnaire in 2011 changed their everyday driving habits. 63% of the respondents saw car dominance as a serious problem in Tartu and 80% used alternative means of transport during the campaign week. 23% of the respondents used car on a daily basis, 21% use public transport daily and 19% walked every day. According to the target group public transport or other means of transport is not as convenient, as fast nor as practical as car use, if there are several trips during the day.

The number of cars has remained the same in Tartu, but public transport, cycling and walking have become more popular since 2009. Around 200 daily car trips (40,000 trips per year) were cancelled due to the campaign.

The campaign has been widely introduced in media since its beginning and tends to get good annual publicity.
Sustainable travel interventions can be realized with a very modest budget through clever campaigning, branding and annually repeated efforts.

This type of intervention benefits from the low public transport prices.

Closing the streets in the city center is an effective way to reduce the number of cars. However it should be noted that there’s no data to estimate the effects the intervention had on car use after the actual car-free week.

Cultural issues should be taken into consideration when planning similar interventions. For example the car is a strong status symbol in Estonia, which if not taken into consideration during the planning process can potentially diminish the success of the campaign.
SPRING VACATION FOR THE CAR CAMPAIGN

Spring Vacation for the Car campaign was aimed at the challenging target group of private car drivers. The goal was to get this group not only to try public transport for two weeks free of charge, but also to change their generally negative attitudes towards public transport. The intervention also promoted public transport at a more general level and aimed to get new customers for the regional public transport company.

The intervention was funded by Helsinki Region Transport (HRT) and the Ministry of Environment. The campaign was organized initially in 2013, but due to its success, it was repeated in 2014. The budget for the 2013 campaign was 250,000 €.

INTERVENTION DESIGN

The campaign design corresponded to a similar campaign organized in Gothenburg (Sweden), where the intervention had been successfully carried out a few times. To confirm that the campaign was on the right track, some interviews were made in advance. According to the interviewees, private car driving was seen as a difficult and a time consuming mode of transport. Bearing this in mind, HRT decided to concentrate on the negative sides of private car driving (for example parking place problems, traffic jams and winter issues) instead of stressing the positive sides of public transport. Public transport was presented as the easier, more carefree and quicker way to travel.

The travel card offer was targeted to both new customers with no prior personal travel card and returning customers, who had not used theirs travel cards in three years. To get a free travel card, the customer had to be at least 18 years old and a resident in the Helsinki Region Transport district. Helsinki Region Transport hoped especially to activate male car drivers to use their public transport services. The goal was to get 7,500 travel card orders.

Marketing efforts and publicity campaign were carefully planned and media coverage was heavily invested in. The intervention was covered in newspapers, Internet and local radio stations. Outside advertisements were widely spread in key places and promotional leaflets were delivered to households. The campaign travel cards were available for order for one month at the campaign website.

The strategic decisions of handling travel card orders via the campaign website as well as delivering travel cards by mail were made to keep the threshold as low as possible. The idea was to get even the laziest car driver to participate and seize the travel card offer and just wait for the ordered, ready-to-use travel cards with two weeks’ worth of travelling credits to drop to their mail box.
RESULTS

During the five week campaign, Helsinki Region Transport got 33,934 (target was 7,500) travel card orders and in total 28,473 travel cards were delivered to customers fulfilling the criteria. The orders’ gender share was 63% men and 37% women. As one of the campaign’s main objectives was to reach male customers, the quantitative objectives were reached. The age range of the orders was 15% under 30 years old, 30% 30–45 years old, 34% 45–60 years old and 21% over 60 years old.

According to a follow-up study with 5,158 answers, 75% of those who got the travel card used it during the two weeks travel time. The share of those, who did not use the travel card was 25% and their main reason for not using the card was an unsuitable point of time.

By the end of August 2013, 9,976 (of the 28,473) campaign travel cards were reloaded amounting to a total sum of 474,791 €. By the end of January 2014, Helsinki Region Transport had furthermore sold reloadings to the campaign card owners for an additional 1.5 M€. By the end of August 2014 (after 16 months), 10,500 campaign cards were still in use and reloadings amounted to a total of 2.3 M€. Nearly 40% of the campaign travel card owners were still using their cards after 16 months. Campaigning costs were covered with additional travel card reloadings in two months making the campaign highly cost-effective.

In August 2013, HRT reported that the modal split of public transport was growing faster than car driving in the Helsinki district for the first time in 50 years. Particularly the use of public transport among men was growing.

The campaign was so successful that another campaign was launched in 2014. This campaign targeted middle-aged people and had a budget of 190,000 €.

LESSONS LEARNT

Interventions can use different communication approaches to get their messages through. In this intervention the negative sides of car driving were stressed and used to create a positive image of public transport as the easier, more carefree and quicker way to travel.

Lowering the threshold for participation is very important. In this intervention people could order their travel cards via a web-based order-form and get their ready-to-use travel cards home-delivered by mail. Thus there was no need to make calls or queue in the transport services, which most likely increased campaign participation. However, due to the enormous success of the campaign, additional personnel had to be recruited to handle the orders and there were some delays in deliveries.

Interventions should be planned carefully and an evaluation plan with follow-ups and clear indicators (including economic data) should be included in the planning process from early on. In this intervention follow up studies were made accordingly and in a practical way resulting in useful and applicable evaluation data. The experiences gained in this intervention can be used when planning similar interventions in other countries.

Interventions can be transferred from one cultural setting to another, but need to be adapted to local settings and local knowledge. This intervention successfully utilized an intervention design, which was originally created in another country.

The target group should be carefully chosen and segmented. This intervention had a clearly defined target group and succeeded in reaching their target audience by first making a survey and then utilizing the results in the campaign design. This way the campaign targeted the specific needs and wishes of the target group.
Eskilstuna has taken part in the European Mobility Week by organizing their own annual Mobility Week in September. In 2014 Eskilstuna chose to focus especially on public transport. One day was dedicated to bus transport and children, and a special day for bus transport was organized with activities aimed specifically at children. Another bus transport related activity was a commuter experiment, where free monthly tickets were handed out to car commuters. The goal was to find 100 car drivers willing to travel by bus at least thrice a week in October. The car commuters were also asked to fill in two questionnaires – one before and one after the test period.

The intervention was targeted to people who mainly use car for commuting. The recruitment process of interested people took place during the Mobility Week. Everyone who joined the experiment had to fill in a questionnaire about their travel patterns before they got their free travel pass. Three weeks after their test period was over, they had to fill in another questionnaire about their travel habits after the test period.

The intervention was promoted in several ways. A publicity campaign was organized with advertisements in several different locations including busses, billboards and parking meters. Social media was also used as well as a traditional press release. Some commuters were also recruited during the day dedicated to bus transport and children. All in all 98 interested car drivers were recruited, but as some of the people did not qualify for the intervention, only 71 people became test travelers.

The total cost of this intervention was close to 7,000 € and it was financed by the City of Eskilstuna.
Campaigning does not need to be expensive to be effective. Peers, word of mouth and social media were mostly named by the participants as the prime sources of information regarding the intervention, although the source from where peers got hold of the information regarding the intervention was not asked. It should also be noted that peer/word of mouth information is hard to control. Promoting similar interventions through direct contact with e.g. key employees could be a potentially effective way to reach the target group.

It would be interesting to study the effects these type of interventions have in the transport behaviour of other members of the household, i.e. is there any potential for multiplier effect regarding free monthly tickets. This aspect should be considered, when planning future interventions. The MaxSumo tool takes also this aspect into consideration.
The Kilometer race campaign is a playful team competition encouraging individual people, teams and different organizations to cycle as much as possible during the work week and also at leisure time. The competition stresses especially the positive health benefits of cycling, but also encourages different organizations to take part in the competition to build up team spirit. CO2-savings are counted as a part of the competition. The competition has been arranged since 2007, but made a final breakthrough in 2011. The competition is open for all.

The competition is coordinated by the Finnish association Network of Cycling Municipalities. The competition is funded by the association and the Ministry of Education and Culture, and has an annual budget of 23,000 €. Various companies have provided prizes for monthly raffles. The winners of the competition also receive sponsored prizes. The Kilometer Race competition does charity work in cooperation with the Finnish Red Cross and participating teams have donated money for the charity organization’s Chain Reaction – cycling campaign in 2013 and 2014.

The intervention is built around a website, where participants register for the competition as individuals or as a part of a team. Participation is free of charge and any group be it friends, colleagues or other can take part in the competition. The registered teams compete against each other in three categories: small teams (teams with 25 cyclists or less), big teams (teams with over 25 cyclists) and super teams (semi-professional cyclists, cycling clubs etc). Individuals register their kilometers in the website and the registered kilometers are added to the team’s kilometers during the whole competition time. In 2014 the cities of Turku and Tampere competed against each other in the competition.

The idea was to challenge the employees of the cities to cycle as much as possible. The competition is organized twice a year. The summer competition is from May to September and the winter competition starts in January and ends in March. The competition is not only open for traditional bicycles, but also to kickbikes, tandem bikes, box bikes and with some limitations even to electric bikes. Monthly prizes are raffled between all the participants, and the winners and runners-up of each category are awarded with sponsored prizes like bicycles, bicycle accessories and gift vouchers.
RESULTS

The intervention has seen a steady raise in participants. The 2013 summer competition had 27,000 participants and the total amount of cycled kilometres was 27,800,000. Fuel savings were 19,500,300 litres and CO2-savings were 4,870,000 kg. The 2013 voluntary Red Cross charity campaign got 68,900 € in donations from participating cyclists. The 2014 summer competition had 28,697 participants and 2,438 teams. The charity campaign got a record donation of 84,000 €.

According to a survey made 2013 the competition had a 30% increase in participants in comparison to 2011, when a similar survey was conducted. Nearly half of the participants were first timers, which clearly shows that the people are beginning to be aware of the competition. An invitation to participate to an e-survey was sent to 1,500 participants via random sample and the reply percentage was 43%. According to the 2013 survey 65% of the participant cycled more during the competition than before the competition.

This was 10% more than in 2011. 87% of the passive cyclists cycled more than before the competition. 59% of the cyclists cycled more after the competition. 65% of passive cyclist continued the positive change after the competition. 16% new passive cyclists were activated and their positive change continued after the competition. The competition has a continuous feedback system and the competition has also been improved based on the feedback.

According to estimations done by the organizing association, the competition is very cost-effective with an average cost of 0.85 € per participant.

LESSONS LEARNT

Similar intervention designs have been used also in other countries with positive results. These types of interventions can be effectively used to promote positive attitudes towards cycling and help in creating a stronger cycling culture.

Positive social pressure in combination with managerial support seems to be effective. By allowing competition between cities and municipalities, the intervention has been received enthusiastically by municipal organizations. Organizations have given support and rewards to participating employees, which has added motivation to participate. This together with social pressure within the teams has been a driver for motivation. Also the playful undertone can encourage cities and municipalities as well as organizations to participate.

Continual campaigns should be frequently improved. This intervention gathers feedback regularly and improvements are made to the intervention design according to the feedback. It should be noted that processing feedback and technical support requires resources and personnel. This should be taken into consideration when planning similar interventions.
The municipality of Houten (around 48,000 inhabitants) has an integral structure of bicycle paths. Cars have to follow the two ring roads to the town and cannot cross the built-up area in between these roads. The built-up area of the municipality has 130 kms of cycle paths. The cycle paths were constructed during the extensions of the built-up area. Houten was once a small village, but underwent massive extension in the 1970s and in the 1990s. In both ‘extension waves’ special attention has been given to the structure of streets and cycle paths.

The municipality of Houten strives to increase the modal split of cycling and to generally promote bicycle use and decrease car dependence in Houten by integrating cycling into the city planning processes. The aim is to expand the concept of “Houten Cycle town” beyond the built-up area by constructing “top routes” to adjacent villages and to improve cycle connections between station and industrial areas. There are also plans to reward the cycle use of commuters and to improve parking facilities for cyclists in the city center.

This intervention is an ongoing process and is financed by the municipality. The intervention is targeted to all citizens of Houten.

Cycling has been integrated in city planning. For example, Houten has 31 residential districts, which are only accessible to cars via a peripheral road encircling the town. A network of different types of paths for cyclists and pedestrians has been created throughout the area, with a direct backbone thoroughfare to the town center. Mostly all schools and important buildings are located along the cyclists’ backbone.

The railway station is right in the center of town and improvements have been made to bicycle parking facilities at the center. Companies are offering commuter bicycles to their employees. Road safety has been improved by e.g. closing the peripheral road encircling the town from bicycles and making all road crossings safer by tunnels or bridges.

Public investment is dominant in this intervention. When considering various policy options, cooperation with e.g. companies providing commuting traffic and other public bodies involved in the construction of cycle routes outside the built-up area is needed.

In Houten 42% of personal movements shorter than 7.5 km are made by bike and 21% by foot. Traffic safety is also twice as high in comparison with other new towns. The results have been achieved with a persistent policy of giving precedence to cyclists and pedestrians in the urban planning processes.

Developing a cycling friendly city is a long process. Planning processes need to be constantly adjusted and improved for the focus to remain in cycling.

Bicycle parking facilities improvements should be located with carefully considering cyclists’ parking behaviour, by e.g. locating them as close to the destination as possible. This is especially relevant in cities, where short distance cycling is predominant, but might be worth considering also in less high-level cycling countries.

Location analysis and assessments of spatial behaviour should also be considered in addition to pure parking capacity improvements.

Cycling related interventions can be easier to introduce in countries with strong traditions in cycling, but countries without this advantage can also succeed in becoming more cycling orientated by integrating cycling into city planning and strategic work.
Bike Rental Service “Combici” is a tool for the installation, management and maintenance of a bike rental network. The main goal of this service was to reduce the massive use of private vehicles in the urban area of Santiago de Compostela and to offer a sustainable alternative transport system for the citizens. The intervention focused on increasing cycling and creating a bicycle culture in the city. The intervention was targeted to all Santiago de Compostela citizens.

The intervention was coordinated by the local government (Concello de Santiago de Compostela), TUSSA and TUIMIL Electricidad. The intervention was funded by the local government and had a budget of 150,000 €. The intervention was carried out in 2008–2011.

The intervention was not very successful and evaluation results were also limited. During the first 6 months the council registered 2,794 shifts on weekdays, and 401 users. The daily average was 13 shifts with an average length of less than 20 minutes. The intervention did not succeed as well as was expected and it was also suspended temporarily due to climate conditions and bad illumination. The use of the bicycle rental service was much lower than was expected.

Climate conditions and bad illumination were seen as the main causes for the low success. However, massive use of private vehicles is widely spread in the region and bicycles are not commonly used in the area. The socio-cultural context and urban form could also provide likely explanations to the lack of success.

**RESULTS**

**LESSONS LEARNT**

Intervention design should be adapted to local habits, conditions and user perceptions. Creating a bicycle culture is a long and a challenging process. A better understanding of local habits and conditions is crucial.

Interventions should be carefully planned. A comprehensive cycling strategy needs first to be integrated into urban planning in order for these types of interventions to succeed.

Cycling infrastructure such as street illumination should be addressed beforehand. Also a survey mapping the preferences of the service users should be conducted prior to the intervention.
The intervention concentrated on reducing carbon emissions, noise and congestion caused by daily car commuting of parents and school staff in certain elementary school areas of Eskilstuna. The intervention focused on improving road safety along school routes and affecting transport attitudes and behaviour. The overall objective was to reduce the number of school kids taken to school by car, and to make both kids and their parents aware of the impact car driving has on climate, health and safety around the schools. The project encouraged parents and school staff to choose more sustainable modes of transport and to avoid car commuting.

The intervention was carried out in 2005–2008 by the Eskilstuna Planning Department and it targeted the schools of Lundby, Tunaflors, Skogsängen, Odlaren and Djurgården. It was funded by the city of Eskilstuna and the Swedish Environmental Protection Agency. The budget was approximately 644,000 €, half of which was used on various infrastructure improvements based on the school route evaluations.

The intervention was mainly informative, but had also practical aspects. Safety along the main school routes was evaluated and safety improvements were made in the form of e.g. lighting improvements, shrubbery trimmings and by otherwise improving general road safety along the school routes. Information evenings regarding health, environmental and safety issues were organized for both parents and staff. Cycle pools and CyGo’s (a school bus in the form of a chain of parents walking or cycling the children to school) were organized.

The intervention was targeted to elementary school children aged 9–12 years, their parents and school staff. The intervention had both qualitative and quantitative objectives. It aimed at reducing carbon emissions, congestion and traffic noise. It also promoted health issues related to increased walking and cycling. It aimed to increase safety along school routes by evaluating school routes. At a more general level, the intervention focused on changing travel behaviour and raising the status of walking and cycling especially among young people, but also among school staff and parents. The reduction target for car commuting with kids was set to 10% and to 6% for school staff.

The overall goal was achieved and the project was successful. Many other schools also showed an interest in the intervention. As a response to this, the project group started a slimmed version, the “school travelling plan” for other schools. This network has been active even after the intervention and it still organizes regular meetings on traffic issues. The slimmed version concentrates on educating network members on how to promote sustainable and safe transport in schools. The project has also provided network members with different tools for traffic education purposes. The intervention design has also been used in other municipalities in Sweden.

Quantitatively the intervention exceeded its goals. The amount of school kids taken to school by car was reduced by 18% (target 10%). School staff car commuting was reduced by 25% (target 6%). According to the feedback received from the parents, most were satisfied with the outcomes and thought that their opinions were taken into consideration during the intervention.
School staff and the principal need to be committed for this type of an intervention to work. The principal must give the school staff mandate and resources to work with the project. Without staff commitment, these types of interventions will not be successful.

PTA’s are a good way to reach the parents. In this intervention there was a decision to offer information for both the parents and children in the evenings. With this approach parents and their children had the opportunity share the information and learn together. Social and peer pressure can be effectively created by using children as a stepping stone for motivating their parents. Pressure can also be created between other parents.
The aim of the campaign was to increase the modal shift of sustainable transport and to provide positive cycling experiences. The campaign aimed to raise awareness on the health benefits of cycling. One of the goals was also to offer a sustainable alternative to work-related local mobility and to map the potential barriers for work-related bicycle use. The campaign targeted organizations and companies located in the city of Turku and Southwest Finland. The campaign included an awareness raising campaign, sustainable mobility related consulting in participating workplaces and some cycling-related pop-up events. The campaign also researched the potential benefits of using social media as a campaign tool.

The campaign was organized by Valonia and it was funded by the Ministry of the Environment and the Ministry of Transport and Communications. The budget was 40,000 €. The campaign was carried out in 2012–2013.

The goal was to get 20 local organizations and companies to take part in the campaign. Previously redesigned bicycles were offered to interested organizations and companies for a one month period. The companies and organizations were obliged to share their experiences on cycling in social media. The bicycles were used for local work-related trips (e.g. meetings) during the work week.

The campaign also included several playful pop-up events on bicycle maintenance, cycling and sustainable mobility. Information related to sustainable mobility was given to participating organizations and mobility mappings were conducted before and after the one month period.

The intervention was evaluated with the MaxSumo tool. The participating organizations had some positive experiences with the campaign. The campaign also demonstrated to some organizations that it can actually be more efficient to cycle to local meetings. Due to the positive nature of the campaign, cycling was seen as a fun alternative to work-related travelling. Some employees continued cycling also after the campaign and in their free-time. The designed bicycles had their own fans and began to have a life of their own. A diary of the bicycles was spontaneously created in the Facebook page and bicycle dates were organized.

On the down-side negative attitudes towards work-related cycling are still prevalent and a lot more awareness raising is needed. Winter was also seen as a major challenge for cycling. The actual effectiveness of the campaign was hard to estimate, as CO2-savings were not calculated.

Facebook was seen as a useful tool for campaigning and the participants were quite active on the campaign Facebook page. The campaign was also a relatively inexpensive way to promote cycling.
Work-to-work transport is a relevant issue to consider. In this intervention work-to-work transport was tackled in a fun way and the intervention got positive media coverage.

Management needs to be committed and supportive for this type of an intervention to succeed. Additional policies might be needed to push employees to use bicycles for work-related travel.

Winter cycling is a challenge especially in the Nordic countries. This should be taken into consideration when planning similar interventions.

This type of interventions work better, if the distances are not too great and the urban form supports cycling.
In the 1990’s the cycling levels in Stoke-on-Trent were similar to the national average, with cycling accounting for less than 2% of all trips. However public interest and the fact that more cycles than cars were sold each year showed that there was undoubtedly enormous potential to increase the number of trips made by bicycle across the conurbation. Therefore Stoke-on-Trent started the strategy work to promote cycling in 1996 together with a wide range of interested organizations, groups and individuals. The aim of the strategy was to promote cycle use in the City as a viable, alternative mode of transport and to make cycling an integral part of the Local Transport Plan. The overall goal was to increase the number of cyclists around the city, to increase road safety, to reduce peak hour flow and to improve air quality with fewer cars on the road. The aim was not only to increase cycling and generate additional travel, but to change modal split.

The strategy work has been funded through various channels including Department of Transport, ERDF, Sustrans and the city council. Cycling England funded the development work aiming to transform Stoke-on-Trent into a Cycling Town. The strategy work started in 1996 and is still an ongoing process. The cycling strategy was targeted to all citizens of the city of Stoke-on-Trent. The strategy consisted of various measures including promotional work, infrastructure improvements and development of city’s cycling network. The strategy was also integrated to other city strategies and for example to new development projects including new road schemes, traffic management and traffic calming schemes. The strategy work was strongly linked with cycling infrastructure improvements and development of Greenway Routes (e.g. disused railways and canal towpaths) and the development of on and off road paths for cyclists and pedestrians. The idea was to increase the number of safe, clearly signed and well-designed cycle paths in the city and the surrounding areas. The strategy also promoted better integration of cycling and public transport by providing better storage facilities for bicycles in bus and rail stations and on buses and trains. The strategy was also linked with the local road safety strategy.

The strategy included promotional work aiming to increase travel awareness, to encourage cycling and to reduce car travel demand for example by taking part in the “TravelWise” initiative and “Greensteps into the Future”. The City Council developed also its own Green Travel Plan.
The overall goal was achieved. Throughout the cycling strategy the City has counted the number of cyclists in and out of our City Centre (Hanley). This count has been completed in the Spring of each year. These counts first have showed a decline in the level of cycling, but after 2006 the work on the cycling strategy started to show some positive results. In 2008 the City became a ‘Cycling Town’ and received £4.8m of extra funding to boost the Cycling Strategy, branded Cycle Stoke, with the aim of doubling cycling levels by 2011. Extra resources meant extra counts in summer, autumn, and winter. These extra counts showed that, whilst cycling levels are affected by the different seasons the level of cycling was on the increase.

In 1997 Stoke-on-Trent had:
- No cycling strategy
- No cycle lanes
- No officer commitment
- No political support
- No cycle map
- No cycling promotion
- No school cycle storage
- Low levels of cycling

In 2011:
- Cycling strategy in place
- New infrastructure – over 160 kilometres of cycle routes
- Cycling promoted through Workplace and School Travel Plans
- Rail Station Travel Plan (a demonstration project)
- Strong cycle training programme
- Cycle maps and guides
- Cycle rides and activities
- Marketing and promotion of cycling

The project shows that turning a low-cycling city area into a cycling supportive one takes a lot of time and requires strong funding expertise to keep them going long enough. The key is to combine funding possibilities innovatively when such occur. Success can be achieved through strategic practice and strong commitment from all levels of the City organization. Strong partnerships and cross-sectional cooperation are also a prerequisite for successful strategy work. Strategic, policy and planning work can be strongly supported, if transport behaviour data is collected over a long period of time.

Road safety was one of the issues emerging from evaluations made during the strategy work. For example school children would cycle to school, if school routes were made safer.
The Technical Infrastructure Key Field includes the domains “Waste, water and sewage management”, “Electrical power grids”, “Heating and cooling grids” and “Public lighting”.

Implementing energy efficient technology policies is one of the options available for the reduction of carbon emissions and the usage of energy. As a part of the 2020 strategy, the EU has set a target to improve energy efficiency in the European Union by at least 20%. This requires increased energy efficiency also in the technical infrastructures of cities and municipalities. New innovations and smarter use of existing infrastructures are needed to meet the demands.

Reducing the quantity of waste and improving the effectiveness of water and sewage management can partly be solved with technical measures. Smart grids are expected to bring a significant contribution to the overall improvement of energy infrastructure. Technical innovations such as LED technology have already brought about a major opportunity to reduce electricity consumption. The role of behaviour is, however, essential in implementing any improved technology. The success of the introduction of new technologies depends to a large part on the acceptance and perceptions of the people using them.

All in all 4 case studies were reviewed by the PLEEC project in this key field. Key findings in these were:

- People seem to respond to peer-to-peer approaches and social pressure.
- Social media seems to be an effective channel to get people more interested in energy saving.
- The use of existing infrastructures requires careful planning and calculations.
Japa ry, the Jyväskylä association of sustainable development, is an association founded in 2001 by the inhabitants of local residential areas of Jyväskylä, and has a mandate and funding from the City of Jyväskylä. Their task is to promote sustainable development through citizen-oriented activities and to work as a link between Jyväskylä citizens and authorities. Their ultimate goal is to make the sustainable way of living a part of the everyday lives of Jyväskylä residents.

For several years, Japa has offered communication campaigns and training on waste management for Jyväskylä citizens. The information offered includes themes such as reducing the amount of waste, proper sorting and recycling of waste, and reducing littering in the city. The actions cover training peer-to-peer waste advisors and organizing information events for citizens living in small houses and apartment buildings. They also have an annual tour to all the city’s day care centers to offer recycling information for pre-school children, through dramatized and playful visits of Anssu, a troll living in a landfill. The tour reaches 1,500 pre-school children every year, enabling awareness at an early phase of life and bringing good practices to home. Annually Japa organizes a cleaning bee (people gathering to carry out non-profit work) after May Day, to clear public areas from the waste revealed after winter in Jyväskylä. Every year the event gathers around 13,000 citizens who collect 13,000 kilos of trash. Japa’s activities have also partly spread to the surrounding municipalities.

The intervention aimed to address the motivation, attitudes, knowledge and capabilities of citizens on waste management issues to reduce the amount of waste, promote proper sorting and recycling of waste and to reduce littering in the city. Peer-to-peer advisors increased the sensitivity for social influence in promoting the goals. Information provision via communication campaigns, educational events, training and personal advice as well as hands-on methods (the cleaning bee) were the primary means to address waste management via behaviour.
The objectives of the intervention have been considered largely successful. Due to their persistent work in the long term, the volume and effectiveness of activities, persons reached and cooperation with different actors have increased over the years. However, the funding resources present a limiting factor, as they do not allow hiring new permanent staff that would be needed to further develop and increase the activities.

In Jyväskylä, Japa annually implements 15 waste advising events which reach 350–400 citizens, and visits all the pre-school groups in city’s daycare centres which reach altogether 1,500 children and their homes. The cleaning bee gathers around 13,000 citizens who collect 13,000 kilos of trash every year. In addition, as they implement some similar activities in other surrounding municipalities, the total numbers are somewhat larger.

The activities are annually steered and evaluated by Japa and their executive board. Feedback is collected from longer waste advisor trainings and it has been mostly positive. Particularly the visit to the regional waste treatment area where people can see in real life how waste recycling and treatment works has received positive feedback. Feedback collected from daycare teachers through an electronic feedback form indicated positive experiences, the visits have been seen both as entertaining and educational, thus increasing their effectiveness.

The main identified challenge is how to get the people who are less aware and motivated to reduce waste and recycle to come to the events and trainings.

RESULTS

LESSONS LEARNT

All in all, the intervention presents an inspiring variety of events on how to reach various citizen groups. Well-planned and consistent education on waste management issues can at its best have a significant impact on energy efficiency. Integrated into sustainable development education, arranging this sort of activities can be also cost-effective. The project would gain from combining these measures of researching target groups with measures of the city’s waste production and management in order to qualify the project’s effects and support in the future.
In Sweden a national target to increase the collection of food waste and waste recycling was set in 2005. As a result, Eskilstuna Energy and Environment started to investigate the possibilities to fulfill this target. By 2009 Eskilstuna Energy and Environment came up with a proposal to implement optical sorting of waste. Optical sorting was seen as a cheap and flexible system, and existing garbage trucks could be used.

20,000 households were recruited to this experiment and it was realized in 2010–2011. Eskilstuna became the first city in Europe to colour sort six different fractions of waste materials. Food, packaging and newspapers are sorted from other waste and placed in coloured plastic bags, which are then thrown into regular trash. The waste is collected by Eskilstuna Energy and Environment and optically sorted by a machine at the recycling centre. Food waste is turned into biogas, packaging becomes new packaging and the remaining fragments are incinerated for energy.

The overall goal was to get detached house households to sort waste in six different fractions. The idea was to increase the efficiency of sorting and to better use waste also in the waste processing unit. The intervention also aimed to educate households on waste generation, sorting requirements and to increase the share of food waste, which could be turned into biogas.

The intervention addressed motivation, attitude, knowledge and the potential barriers to energy saving behaviour. Sensitivity for social influence, capacities for energy saving, laws and regulations, feedback and social pressure were also vital determinants in this case. The main instrument in reaching the goals and objectives were education of citizens through information and lobbying campaigns. A start kit was sent to every customer at the beginning of the intervention.
The intervention was successful and the goals and objectives were achieved. Awareness raising together with the change in the waste gathering system was a big success. Sorting rate has been measured every month since 2011 and it clearly shows promising results. The ratio between burnable waste and food waste has become better after the start of the intervention. The initial target for food waste ratio was clearly surpassed in the spring of 2014.

**OPTICAL SORTING OF HOUSEHOLD WASTE IN ESKILSTUNA**

- **2011:** burnable waste 59%, food waste 22%
- **2012:** burnable waste 52%, food waste 23%
- **2013:** burnable waste 48%, food waste 29%
- **2014:** burnable waste 43%, food waste 36%

A carefully planned marketing and information campaign is vital for these types of interventions. In this intervention, the information campaign was successful and resulted in a high-level of commitment from the households.

The cost-efficiency and effects of the investments should be researched thoroughly before starting similar interventions. The experiences from this case are relevant for cities with similar waste handling and gathering systems. Eskilstuna did not invest in new vehicles, because existing ones could be used resulting in a relatively low cost intervention.

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**RESULTS**

**LESIONS LEARNT**

- Food waste
- Paper
- Metal
- Plastic waste
- Cardboard
- Other/combustible waste
The Digital Environment Home Energy Management System (DEHEMS) project was a European Union funded project (Framework 7 Programme) looking at how technology can improve household energy efficiency. The project partnership included a mix of European local authorities, private businesses and universities. The intention was to develop and test a home energy management system for the home market using Living Labs in 5 cities across Europe. The duration of the project was 2008–2011. In Bulgaria the project was implemented by the University of Ruse and the municipality of Ivanovo.

The aim of the project was to improve the current monitoring approach and examine how household energy monitoring technology can improve domestic energy efficiency and change behaviour. The other overall goal was to map out the potentials in personalizing actions on climate change and gather information how energy is used. The project had many specific objectives and one of them was to examine to what extent monitoring systems contribute to behaviour resulting in reduced energy consumption. Community dynamics’ influence on motivation to move towards a more environmentally motivated behaviour was also examined as well as the key factors in maintaining the changed behaviours. The use of online social networking together with monitoring energy use was also examined.

Due to energy monitoring, the main instruments in reaching the goal and objectives were subsidies and financial incentives, information and lobbying campaigns, education of citizens and cooperation of different actors. The intervention addressed motivation, attitudes and knowledge. In addition to this the potential barriers to energy saving behaviour were addressed. Capacities for energy saving and sensitivity for social influence were also vital determinants in this case.
The project goals were partially achieved. A survey was made after the project. The respondents were asked to list changes that they had made to their energy use as a result of participating in the DEHEMS project. 92% of the respondents reported behaviour changes. The survey provided respondents also with an opportunity to enter up to 4 examples of the changes they had made in their behaviour and almost 50% gave at least 2 examples. However, it is difficult to judge whether these behaviour changes were permanent, but some of the changes listed will have a significant long term effect on household energy consumption.

Results gotten from both the quantifiable survey data and open-end survey questions show a significant number of users reporting behaviour changes, which will yield considerable energy savings over time. These include reduced lighting, purchase of more energy efficient appliances, resource efficient cooking, washing/drying of clothes and showering/bathing and turning off appliances. There is also evidence that participation in the project itself changed users’ attitudes and behaviours.

Linking energy saving performance to the performance of other households by creating community-based teams (Energy Team Challenge) seems to impact individual behaviour, but the results are not entirely clear. 86% of the Energy Team Challenge participants viewed their DEHEMS dashboards, which is considerably higher than the share of all project users (35%).

Providing opportunities for people to discuss energy monitoring through focus groups was valued by the participants. In addition, creating online communities through social networking seemed to increase information sharing and DEHEMS Facebook users tended to consume less household energy than non-Facebook users (e.g. 77% of FB-users viewed their energy data on Facebook during the monitoring phase, compared to 65% of all project participants).

Some challenges were also met. There were some technical difficulties with the equipment, but most participants valued the experience. Some dropped out due to changed circumstances or because they got frustrated with the technical problems. However, most users remained actively engaged for at least a 10 month period. However, falling back into old behaviour is a clear challenge.

Participation in an intervention can have an effect on attitudes and behaviours. Creating online communities through social networking shows promising results and can increase information sharing and result in energy savings. In this intervention, Facebook users were more engaged and active in the project than non-Facebook users. Facebook seemed also to attract different age groups, including those in the 50+ age group.

Social pressure is effective. In this intervention, households participating in the community-based Energy Team Challenge regarded the challenge equally as effective in promoting behaviour change as incentives. Participation in the community-based challenge also considerably increased the likelihood of viewing energy monitoring data.

Self-reported behaviour and measured behaviour are not the same. People tend to embellish their behaviour when asked, but when their energy consumption is actually measured, the results can be less encouraging. Also the long-term energy saving effects of household energy monitoring appliances remains unclear and needs more research.
The decline in natural resources, growing population and climate change are all factors which are increasingly forcing societies around the world towards wiser use of resources. Recycling-based economies, energy efficiency and cooperation between companies to save raw materials should become everyday activities. Furthermore, the wiser use of natural resources is becoming an increasingly important asset in international competition.

In 2013, the City of Jyväskylä and the Finnish innovation fund Sitra launched a joint project “Towards Resource Wisdom”, with the purpose of creating duplicable models for ecologically resource-wise lifestyle in urban environments. By the end of 2013, 14 brief trials were conducted in Jyväskylä with the aim of identifying good practices to save natural resources, reduce emissions and increase the well-being in the region. The ideas came from citizens in a search for suggestions run by Sitra. The interventions were also funded by Sitra. The maximum budget per trial was 8,000 € (incl. VAT)

The Finnish Environment Institute (SYKE) carried out a review of the trials, looking particularly at their impact on greenhouse gas emissions and use of natural resources, while also accounting for social effects. This case study report summarizes the trials that were assessed in most detail and are the most relevant for the PLEEC project, i.e. where the aspects of energy efficiency and GHG emissions are tackled most explicitly: a public (bus) transport day (with the motto “Try at least once”), LED-lighting housing company trial and water saving housing company trial.

Based on the review, three pilot projects were selected for further development based on trials conducted as part of the Towards Resource Wisdom initiative run by Sitra and the City of Jyväskylä: Bussiloikka, aiming to increase public transport use, Resource-Wise Housing, which is related to green living, and Massainfo, which aims to rationalise the use and logistics of soils.

For the public transport trial, the target group was citizens of all age; for the LED-lighting and water saving trials, the target group was the two housing companies included in the trial. Furthermore, the aim was to disseminate the information to spur nationwide duplication of the actions done in the trials.

The interventions aimed to increase motivation, awareness and capabilities of citizens on resource-wise lifestyle in urban environments, and to test and prove the opportunities to reduce emissions and resource use in everyday life. Also, one objective was to engage citizens to participate and create a culture of open-minded fast trials to see what actions work (and have clear positive impacts) and what do not work (or have very little impact). Rather than having large scale pilots and campaigns from scratch, this is seen as a good way to start testing something new.

In the public transport trial citizens were offered the opportunity to use public transport for free for one day, the LED-lighting trial included a lighting solution implemented at a housing company, and the water saving trial included information campaign and closer monitoring of water use for the residents of a housing company.
The trials gained positive results. Models to increase resource efficiency were successfully trialed, yielding concrete results and also potential for duplication. Motivation, awareness and capabilities of citizens were increased and proven opportunities to reduce emissions and resource use in everyday life were found. Also, tangible quantitative results were attained and the benefits of creating open-minded fast trials to see what actions work were proven.

The trials, Resource-Wise Housing, gained a lot of attraction: altogether 24 housing companies enrolled as voluntary candidates to have resource efficiency pilots in their buildings (from which 4 buildings were selected for the pilot).

Compared to the budget, a large number of trials were carried out and concrete information and results were attained. Thus the activities can be considered cost-effective.

Based on the review, three pilot projects were selected for further development based on trials conducted as part of the Towards Resource Wisdom initiative run by Sitra and the City of Jyväskylä: Bussiloikka, aiming to increase public transport use, Resource-Wise Housing, which is related to green living, and Massainfo, which aims to rationalise the use and logistics of soils. From these, the results, impacts and best practices of Resource-Wise Housing will be monitored in the frame of PLEEC WP5.

The current financial situation and the need to improve competitiveness both call for more efficient resource use as well as creating a culture of trials to test and refine innovations. Also, the positive social effects and increased sense of community implied in the trials are much needed and asked for in the modern society.

Many of the trial ideas were generated by citizens, and this process might have raised the awareness of natural resources. This seems to be the main result of the project. Behavioural aspects of energy or resource efficiency are mostly addressed in the public transport trial, while the LED lighting trial addressed mostly the technological aspects of energy efficiency. The water saving housing company trial concentrated on water use monitoring, with some behavioural aspects taken into consideration.
The Production and Consumption Key Field includes the domains “Industry and commerce”, “Public and private services” and “Private households”.

The major energy users in industrial societies are residential and commercial buildings, industry, transportation, and electric power generators. The production and consumption of goods and services encompass a vast part of all activities in any given society – and therefore also release a large share of global carbon dioxide emissions.

As consumers, citizens have the possibility – and the responsibility – to cut back on emissions via the consumption choices they make. Industrial energy use from the production of these goods and services can also be influenced indirectly via consumption choices. City officials have a chance to effect both citizens and the industry in choosing for example more energy efficient transport modes and public purchases by addressing the behavioural aspects of consumption choices.

Among the interventions reviewed, choices in production and consumption have mostly been targeted both via continuous advisory services or shorter term, “training for trainers” type of activity. Target groups have covered citizens in general and companies, households or workplaces in particular. Key findings suggest that following aspects should be considered, when planning behavioural interventions targeting production and consumption:

- Peer pressure both in the home and at the workplace,
- Timely information and guidance on energy consumption,
- Strong commitment at all levels.
Eskilstuna’s horse race track used a heating system based on fossil oil and direct electricity. In cooperation with Eskilstuna Energy and Environment the company built a local heating plant fueled by wood pellets. They also improved their waste handling system and certified the race track according to the Swedish environmental certificate “Svensk miljöbas”. The overall goals of the intervention were to save energy and money, and to implement an environmental management system.

The intervention was financed by the Eskilstuna harness racing and Eskilstuna Energy and Environment. Sundbyholms harness racing was the implementing party in this intervention.

**INTERVENTION DESIGN**

The main instrument in reaching the goal and objectives was cooperation of different actors. The task was to educate all the employees and to find a structured way to work with environmental issues. The determinants of behaviour that case addressed were motivation, attitude, knowledge, potential barriers to energy saving behaviour. Capacities for energy saving, organizational culture, laws and or regulations and feedback were also vital determinants in this case.

**RESULTS**

Overall goal was achieved and the specific objectives were also partially met. A more efficient heating system was taken in use in the horse race track during the process. An environmental management system was also implemented (see case P2). As a result of these actions, the race track was able to save 200 ton CO2 per year.

Implementation of the environmental management system was carried out. As a part of this process, key environmental issues were identified and based on this work, a set of key environmental targets and an action plan for meeting the targets were formulated. All employees participated in the environmental education the certification demanded. The demands set in the Svensk Miljöbas standard were fulfilled.

The case was evaluated systematically by Eskilstuna Energy and Environment. Feedback was given by the companies working with environmental certification. The companies were satisfied with the system and they got more benefits in form of a more structured way of working within the whole organization. The certification process raised environmental awareness within the organization.

**LESSONS LEARNT**

Managerial commitment is needed in these types of interventions. This intervention was successful, because of the commitment of the board. Once the board was changed, the certification process slowed down.

Standards and environmental management systems seem to be a good way to reduce CO2 emissions generated by heating.
The goals were partially achieved. Implementation of environmental management system was carried out, environmental aspects were identified, environmental targets were set up and action plans for fulfilling the goals were made. All employees were given environmental education, and processes for activities with high environmental impact were set up. All the demands in Svensk Miljöbas standard were fulfilled.

The case was evaluated systematically by Eskilstuna Energy and Environment. Feedback was given by the companies working with environmental certification. The companies were satisfied with the system and they found the structured way of working with environmental issues beneficial. The certification process also raised environmental awareness within the organization.

Employees need to be informed about the process. In this intervention, the results could only be reached, once the employees are familiar with certification requirements and understand why these requirement need to be fulfilled.

The main instrument in reaching the goals and objectives was cooperation of different actors. The task was to educate all the employees and get them to acknowledge the importance of the certification process.

The case addressed motivation, attitude, knowledge and the potential barriers to energy saving behaviour. Capacities for energy saving, organizational culture, laws and or regulations and feedback were also vital determinants in this case.

The example case (P1) was realized in 2012 and the environmental certification was financed by Eskilstuna harness racing and Eskilstuna Energy and Environment and the implementing party was Sundbyholms harness racing. The average budget of a miljödiplomering-case varies between 1,500–4,000 euros depending on the size and the amount of employees in the company.

The overall goal of the intervention was to implement an environmental management system and find a structured way to work with environmental issues. The main objectives of the case were to save money, energy and the environment.

The target groups of this intervention are small and medium sized enterprises.

Environmental certification (Miljödiplomering) is an environmental management system created in accordance with the demands of the Svensk Miljöbas standard. This means in detail that a certified organization has:

• an environmental policy, objectives and an action plan,
• a current environmental report, in which the most significant environmental aspects have been identified,
• made concrete environmental improvements,
• completed basic environmental training for the entire staff,
• gained approval and made account for environmental performance,
• been approved at the audit of recorded documents as well as practical environmental performance.

The main instrument in reaching the goals and objectives was cooperation of different actors. The task was to educate all the employees and get them to acknowledge the importance of the certification process.

The case addressed motivation, attitude, knowledge and the potential barriers to energy saving behaviour. Capacities for energy saving, organizational culture, laws and or regulations and feedback were also vital determinants in this case.

The overall goal of the intervention was to implement an environmental management system and find a structured way to work with environmental issues. The main objectives of the case were to save money, energy and the environment.
The City of Oulu has set as its target to offer extensive guidance for its citizens and professionals to build sustainable and energy efficient new buildings that go beyond the current regulation and towards the future level of renewable energy and energy efficiency. This is implemented through the services of its building supervision office. Citizens building small houses receive free (included in the building permit fee), and proactive guidance, training and tools from the experts to ensure high technical and architectonic quality of houses. The guidance starts from an early phase of building planning process, and includes also the professionals involved (such as architects and building designers). Citizens are guided to build best quality low energy houses and that have flexible energy solutions, thus enabling turning them into near zero energy houses in the future. District heating is favored when it is available (utilizing local fuels), and in the areas outside the network hybrid heating and electricity systems are favored.

The office also defines best practices and concepts how to integrate local RE sources into buildings. The services also include guidance for citizens planning energy efficiency renovations. Furthermore, guidance and training is offered to building sector companies and professionals to further ensure the good quality in planning and construction.

The overall goal has been to offer extensive guidance for the citizens and professionals to build sustainable and energy efficient new buildings that go beyond the current regulation and towards the future level of renewable energy and energy efficiency. This has been achieved by promoting quality, energy efficiency and renewable energy sources in new buildings, especially in small houses, and also in renovations. The key is not to force, but to raise awareness and knowledge so that people realize the results and significance of their decisions in the long run, and thus become motivated and willing.
The project addresses both the motivation, attitudes and knowledge of the target group. Potential barriers to energy saving behaviour were also addressed, capacities for energy saving explored, as well as different means of promoting energy efficient building together with relevant laws and regulations.

The guidance service utilizes information campaigns and educates citizens and professionals to achieve its goals. Cooperation of different actors is essential.

The objective has been to build energy efficient and high quality buildings that exceed the current level of regulation. Success has been indicated by the number of houses built, citizens, companies and professionals reached, the amount of energy, money and CO2 emissions saved as well as the cost-effectiveness per the service costs.

Results in numbers indicate success of the activity. The sum of results in new small houses built between 2005–2011: energy savings and emission reduction in the lifetime of houses (50 yrs) is 2,790 GWh and 726,700 tonnes respectively, and the resulting savings in annual energy costs are 6,68M€. The results are evaluated regularly by the building supervision office.

In Finland, the Oulu guidance model is considered to be a unique and exemplary way of how city officials can offer services to citizens and professionals and support creating energy efficient built environment. The model also contributes to implementing the energy efficiency agreement made by the city and reaching its energy saving objectives (as a part of the national energy efficiency agreement scheme). The activity is financed by the city of Oulu with a 100,000 € yearly budget. The activity is targeted at citizens, building sector professionals and companies. The case has been ongoing since year 2000.

When offered right kind of guidance, information and tools, people are willing to build more energy efficient and better quality houses than the regulation demands. Monetary savings and payback times are important. The results have to measured so that the success can be identified and communicated to the city organization and stakeholders. The will of the city leaders (officials and politicians) is important in order to get the needed budget and mandate to offer the service.

The intervention is a very interesting combination of building supervising and energy advising. Crucial is to which extent the responsible officers pick up these two roles simultaneously. Considering the 50 year lifetime of houses, one year of guidance service produces 20M€ of energy cost savings. Compared to the cost of producing the service (100,000 €/a), the cost efficiency is very good.

Although an exemplary model of providing effective energy saving guidance, because of cities’ budget and resource constraints, not many have managed to follow the example. Also, many building supervision officials see that their function is only to ensure that buildings fulfill the requirements of law and regulations, not to offer extensive guidance that seeks to go beyond the minimum requirements.
Tartu Regional Energy Agency (TREA) was founded in 2009 in cooperation of city of Tartu and Tartu Science Park to promote sustainable energy and energy management in the region. The agency concentrates on promoting energy management and relieving the key problems of modern energy management: energy efficiency, sustainable transport and renewable energy.

Four areas that the agency concentrates on are: energy management in local governments, increasing the efficiency of energy use in public sector and households, developing cooperation between public and private sector and supporting local community in energy efficiency issues.

The agency employs a number of independent construction and energy specialists that provide free consultation for the public. The agency acts as an independent consultant that has no financial interests in offering a service or a technical solution. The consultations are mainly for free and the agency is financially supported by the City of Tartu. So far the services are well received by the public and interest in TREA is growing.

TREA also acts as an energy consultant for the Tartu City Government. TREA has created a municipal property energy consumption database. The data gathered has been valuable in investment decisions. TREA has also conducted analysis on different energy related subjects like overview of public opinion and behaviour on sustainable energy in Tartu region and overview of sustainable energy in Tartu region.

The TREA activities address the attitudes and knowledge of energy end-users in the area, as well as potential barriers to energy saving behaviour. These are achieved by improving energy management in local governments and increasing the efficiency of energy use in public sector and households via consultations. Local communities are supported in energy management. Cooperation between the public and private sectors is deemed an important mission of TREA.
The objectives of the energy agency have partially been achieved. The agency provides assistance to the private sector, but not as much as was expected. Also, the agency has provided energy consumption analysis to the municipality, but keeps missing deadlines. Reasons for this are unclear and can only be speculated to be a combination of internal management errors and fact that many of TREA's employees are involved with other assignments.

TREA offered consultancy of 720 hours/year, in approx. 80 consultations. TREA also calculated energy performance indicators for 38 public buildings (2014). An energy management program for one public building was created. Energy consumption data for 89 public buildings has been collected.

TREA activities are not systematically evaluated. However, it is a NGO and has its own board. The activities and results of TREA are evaluated by the board twice or three times a year. Even with results being delivered later than expected, the results are beneficial to Tartu city government and especially for the department of municipal property. Buying the type of services from the open market would mean much higher cost to the city government. The interaction between two organizations is much closer than number suggest and this could not be reached with a private consulting company without great financial cost.

As TREA is involved in a number of EU financed projects, it is dependent on the success of the applications it presents or is involved in as a partner. The year or two between two EU financial periods are difficult to maintain its employees, keeping them in action and guaranteeing financial income.

Electricity prices in Estonia are equal to Finland thanks to the open electricity market. Tartu is covered by district heating system that provides one of the cheapest services in Estonia. Low energy costs are a reason that investing in energy efficiency is not financially efficient. This means lower interest in specific solutions and fine tuning energy performance.

Upcoming reform in CO2 emission taxing might result in an increase of locally produced electricity price that might increase interest in TREA services. Any increase in rising energy prices will give TREA an opportunity to receive more requests from the public. But it is also up to TREA to do a better job of promoting its services.
Eco support is an operating model to promote environmental awareness and sustainable development in workplaces. Initiated in 2006 by the City of Helsinki, the model has expanded to 10 Finnish cities and a couple of Estonian cities. The model is about to have one or more eco-supporters in the workplace who are appointed and trained to promote sustainable development and give guidance about resource and energy efficiency in everyday operations. The objective also is to enhance the implementation and concretisation of already produced environmental action plans in organisations.

The work of eco-supporters include energy audits, producing recycling instructions for individual workplaces, disseminating information, raising environmental issues at meetings and giving tips about sustainability and energy issues to their work mates in their everyday activities. The aim is that employees recognise the environmental effects of their activities and take into operation environmentally sound procedures.

The cities involved in the program form a network sharing good practices through joint web pages. A virtual model office has been designed to introduce tips for recycling and energy efficiency measures in work places.

The operations in a working place begin with a survey of the overall situation, which can then be used as a basis for action plan and goals for eco support activities. The eco-supporters may also assist in formulating and implementing environmental plans. Eco support operations are aimed to become an integral part of planning and environmental management in the working place.

The operations and their impacts should be evaluated and developed. In order to maintain good motivation, good achievements in the workin place could be celebrated jointly.

Peer support is a vital part of the eco support model. Eco-supporters will hold regular departmental or city meetings. These may include further training, excursions, or networking events that focus on exchanging experiences and good practices.

All in all, the eco support program has been a success. About 1–3% of the city employees have been trained to act as eco supporters. The initial goal of having at least one eco supporter per city department was not met, however. According to a questionnaire conducted in 2013 amongst the eco-supporters, the great majority (over 80%) of the respondents were motivated and satisfied with the eco- support program. Most of the eco support persons in Turku (67%) evaluated the program to have an effect in every day work in the offices.

Due to the program also reductions in energy use have been measured in city organisations. For example, in the educational sector in Turku 2% reduction (569 MWh) in energy use has been reached with a financial incentive of 200–300 € given to units depending on the reduction. Similar reductions have been reported also from other cities involved.
The support of the working community and the superiors especially, is crucial to the success of the program. Managers should be trained as well to include the eco support themes in the planning processes.

The time allocated for the eco-supporter has an effect, too. In order to maintain motivation, peer support and regular meetings of eco-supporters within the organisation or city are needed.

Especially in larger organisations it is important to coordinate the activities.
In 2009, the project “Energy efficient companies in Eskilstuna” was implemented with the purpose of reducing energy use in industrial companies in Eskilstuna. The project was based on a working model for collaboration in networks between the city of Eskilstuna, energy experts and nine industrial companies. Within the network, participants were offered training, tools and support to jointly perform an energy audit. In this way the companies raised their knowledge and awareness on energy. They also discovered energy efficient tools and methods that are profitable for them to implement. The nine companies have reduced their idling use of electricity by an average of 33 percent.

The project was initiated and coordinated by the City of Eskilstuna and nine local industrial companies. Funding for the project was received from the county administration, the foundation of Rekarne and the participation fees from the companies with an overall budget of 14,000 €.

As mentioned, the project targeted industrial companies in Eskilstuna. The overall goal was to strengthen the companies’ competitiveness by streamlining and reducing their electricity and energy use. The intervention therefore targeted the key fields of production and consumption and energy supply. The participating companies should streamline and reduce the electricity and energy use by at least 30% and 12 companies should participate in the project.

The project addressed both the motivation and knowledge of the participant companies on energy efficiency. Potential barriers to energy saving behaviour were also addressed, capacities for energy saving explored.

The intervention was essentially an information campaign which utilized public or private investment and procurement as means to achieve its goals. Cooperation of different actors was of essential value in the implementation.

The implementation was realized in four blocks:
- Initiation
- Education, mapping and analysis
- Development of Action Plans
- In-depth skills and experience.

Between the blocks everyone worked at home with the tools they had learned about. The first block included commercial recruitment and a kickoff seminar. Block 2 included two full days of education by energy professionals, after which the companies would be able to make their own analysis of the potential for energy efficiency. In block 3, each company should make an action plan for energy efficiency (Energy Plan) with the earlier energy efficiency analysis as starting point. Block 4 included five half-day meetings, each with a specific education and an exchange of experiences in the major energy consumers as ventilation, heating, lighting and how to engage the entire staff in a change process.
A total of 136 efficiency measures were identified in the nine participating companies. Of these, 72 were completed during the project time span. This has meant that energy consumption has decreased by an average of 33% per company. Unfortunately three companies didn’t complete the project. Two of the three were bankrupted during the time for the project and one chose to step aside. The major reasons for the bankruptcy was the recession in 2009.

The project had experienced project managers with different backgrounds. The project leader was well grounded in the industry and therefore the companies didn’t see it as just another new public project. The leaders had been involved in the project, which helped to ensure that people with both expertise and mandate could work with the tools and measures that were discovered during the project.

The project had access to a qualified support network consisting of Eskilstuna Energy & Environment’s (the local energy company) department for energy services, researchers from Mälardalen University and the regional business community. Both large and small companies were involved, which meant that small businesses could learn from the ones that had greater resources and competence.

Eskilstuna Energy & Environment loaned instruments so that all companies had the opportunity to measure their electricity consumption.

The project was deemed fairly cost-effective. One of the reasons for the cost-effectiveness is that the companies themselves have been responsible for the work done on their respective companies. All in all, cooperation between the city and industrial companies was deemed a very beneficial manner of promoting energy efficiency in the industrial sector.

The project builds on collaboration in networks of industrial companies. The network serves for common education and exchange of experience, in order to make local action plan for energy use reductions. The results of the project are very good and the cost-effectiveness high for the participating companies. With minor funding, good results were attained. The smaller companies in the network learned much from the larger and more experienced ones. One idea to even improve the project would be to oblige the companies to return the public invested money, i.e. by inspiring other companies to do the same energy audit and action plan development. In any case, a motivating project leader is probably crucial for the success of this type of project.

As companies are responsible directly or indirectly for a large share of any given city’s energy consumption, addressing the companies’ energy saving measures is essential in improving energy efficiency in cities.
Senate Properties is a government owned enterprise managing 11,500 buildings owned by the Finnish government. These buildings serve as working premises for tens of thousands government employees in Finland. As buildings are coming increasingly energy efficient, the electricity use of users commands an ever larger share of buildings’ energy consumption and saving potential. As much as half of a modern office building’s energy consumption can come from users’ electricity consumption.

In its buildings, Senate every year implements electricity saving projects that seek to engage people to save electricity in their workplaces. Central methods in this are communication affecting people’s conceptions and attitudes, and stimulating personal involvement so that people can see the effects of their behaviour, receive energy saving tips and discuss on issues related to energy use. The measures include information events, dedicated website and information displays, and follow-up meetings. The core of the intervention is offering timely consumption information, information if the consumption has decreased or increased and comparisons between different workplaces. The dedicated website also includes saving tips, blog, expert articles, user polls, energy quiz and news. As a part of this, Senate has introduced a comic figure “Iceman” to educate people on the level and effect of their consumption and give energy saving tips. The project currently includes over 100 buildings around Finland.

The aim of the projects is that people working at the Senate Properties buildings pay attention to their behaviour and change their everyday routines, enabling permanent change towards lower electricity consumption. Simultaneously, proper maintenance of the buildings is ensured as it significantly affects the electricity use.

The overall goal is to save electricity used by in their buildings. Raising awareness, educating and involving building users to save electricity in their workplaces are essential objectives, as well as creating a positive image for Senaatti properties and workplaces. Success of the intervention is measured by saved energy, money and reduced CO2 emissions and visits on the dedicated website.
The intervention addresses the motivation, attitude, knowledge of employees as well as potential barriers to energy saving. Sensitivity for social influence is also addressed as well as the effect of organizational culture on energy efficiency measures. The intervention applies different means to save energy via behavioural adjustments of employees working at Senate owned buildings. These instruments range from information and lobbying campaigns to the education of the employees.

Senate Properties monitors their buildings and through that receives feedback on energy consumption as well as indoor environment in its buildings. The information is shared to the building users and maintenance personnel.

It has been observed that informing building users can lead to significant electricity savings in workplaces. Electricity consumption in the buildings covered by the project has decreased 5–7% (in other Senate buildings around 2%). The resulting potential monetary savings are roughly 400,000 euros per year. Total savings from the beginning of the project (2010) accounts approximately one million euros. Also heat and water consumptions have decreased. An important result is that the specific electricity consumption (kWh per m²) that has been creeping up since the 1970’s has finally started to decline.

Also, the www.senergia.fi website has gathered tens of thousands visitors and received good feedback from the users.

Energy costs and environmental issues have become very important factors in real estate management, and also people in workplaces are increasingly interested in these. When extended to a large volume of buildings, savings brought by activities applied by Senate Properties are large and cost-effectiveness good. As energy efficient behaviour applied at the home does not always transfer to the workplace, paying special attention to energy saving at the workplace can prove very effective in decreasing overall energy consumption.

Senate Properties aims to act as a forerunner for publicly owned properties in terms of energy saving. As such, it has succeeded well. Electricity saving in government buildings is of course relevant for cities in general. The project is a good example of how reductions in electricity consumption can be obtained with few economic investments. It also shows that other resource consumption practices (heat, water) are interrelated and their reductions are side-effects when consumers’ awareness is raised. Also, the cost-effectiveness of a project goes up if it includes many participants. This intervention is an inspiring example of how a well coordinated action shows good effect in quite a tangible way. Saving money for electricity use in government owned buildings could be applicable for private companies as well.
033Energy is a consortium of organisations, which operate under a trust whose board consists of contractors, building advisors, installers, a marketing bureau, a bank and a university of applied sciences. The consortium tries to invite homeowners to carry out energy investments in their homes. This is done by several means, for example by so-called 'energy ambassadors', people that stimulate energy investments by households in their own neighbourhood.

The municipality has a facilitating role for the consortium; it has stimulated the parties to form a consortium and has agreed to support the consortium, but it is not represented in the trust’s board.

The main goal of the intervention has been to improve the energy efficiency of the housing stock in the city of Amersfoort. During the three years of the subsidy of the housing ministry, the goals were to improve 2,000 dwellings to energy label B or at least two label bands more energy-efficient and to realise 20 energy neutral dwellings.

033Energy as a consortium of private parties regularly tries to collect new funding. Subsidies have been granted by e.g. the housing ministry (€500,000 for 3 years), the association of Dutch municipalities and the city of Amersfoort. These subsidies are always temporary.

All in all, it is difficult to persuade homeowners to carry out energy saving investments. Large-scale improvement in the social housing stock is possible. However among homeowners, despite many efforts that have been made, such achievements are challenging. A personal approach to different household owners is very important, a uniform approach does not work.

A main challenge in similar efforts is to find a project leader that is able to motivate the parties or persons involved to cooperate in and with the consortium, and to unite people in their joint interests. The activities of 033Energy in different neighbourhoods have shown some good and, unfortunately, also less flourishing examples.

The project has explored the difficulties in making homeowners do energy investments and has not been a success. However, it had been evaluated with other projects on energy saving investments in housing and has thus contributed to providing useful insights on methods and approaches to manage energy investments.
Watt work party is an energy guidance model where active citizens act as energy advisors to other households. The project was launched in Turku in 2011 with a pilot phase. About 20 persons took part in the pilot project. The goal was to test the concept in the field, including people living in detached and apartment houses. The general aim was to have a league of forerunners, example households for others. An indicator tool, called “Sähkötohtori” (“Electricity Doctor”) was also tested and promoted to encourage the households to follow and analyze their energy consumption.

The aims of the pilot project were twofold: first, to gather feedback on how useful the existing materials are in practice; and second, to find out how well peer groups function in practice.

**INTERVENTION DESIGN**

The pilot project started with the recruitment of volunteers, using contacts to house owners’ organisations, ads and articles in the local media, and a leaflet delivered to mailboxes. Despite the intensive marketing campaign, only 21 citizens/households entered as volunteers.

During the project, volunteers acting as energy advisors in their neighborhoods attended training sessions where tips for energy saving were discussed and shared. In addition, they estimated their energy use patterns using the “Electricity Doctor” service tool.

**RESULTS**

The goal of the pilot project was to achieve 100–150 people, but instead only 21 volunteers announced their interest.

A pilot version of “Sähkötohtori” (“Electricity Doctor”) web tool was tested but not completed when the project ended. The web tool has been designed using national energy use statistics, and gives tips for energy savings based on the estimation of the current situation.

**WATT WORK PARTY**

**PRODUCTION & CONSUMPTION**

*Country:* Finland

*Implementing parties:* Turku Energy Ltd., Valonia, Adato Energy

*Budget:* 15,000 €

*Domain:* Intervention type: Procurement, Information, Education, Cooperation of different actors

*Contact details:* http://bit.ly/1yYQTAO
The Energy Neighbourhoods project is about the organization of a climate bet between the public authorities and their citizens. Groups of households, the “Energy Neighbourhoods”, have to save as much heat and electricity as they can by changing their behaviour. If they save at least 8% of energy compared to the previous heating period, the municipality awards them a prize.

Energy Neighbourhoods are made up of 8–12 households with common interests. They can be real neighbours or members of tenant associations, sports clubs, trade unions, NGOs etc. With an Energy Neighbourhood they develop to become “energy soul-mates” as well.

The neighbours will be supported by volunteer “Energy Masters” who will be specially trained to accompany and support them throughout their efforts to save energy. This support will be backed up by a Tool Kit (incl. small scale energy audit, energy saving calculation and communication tools, campaign materials) and constant exchange of experience between the Energy Neighbourhoods.

In parallel, a Local Climate Debate will be institutionalised where the participants can challenge the authorities in their energy saving efforts and policies. This will guarantee the sustainability of the process of bringing the ‘Kyoto Protocol’ into people’s living rooms as well as strengthening local climate policies.

Energy neighborhoods is an Intelligent Energy Europe project which won the ManagEnergy Local Energy Action Award 2010. The project’s main aims were to:

- Develop a user friendly energy monitoring webtool,
- Make households aware of their carbon footprint,
- Raise awareness of energy efficient products and climate protection policies,
- Save at least 9% energy in each neighbourhood,
- Include an evaluation phase resulting in improved strategies and tools for new regions, and
- Provide information on CO2 friendly consumer choices.
INTERVENTION DESIGN

The intervention aimed to address energy saving behaviour principally via peer pressure with the climate bet between neighbourhoods. The goal is to work against the lack of motivation of tenants and home-owners and to bridge the gap between theoretical knowledge and practical implementation. The households’ energy awareness is increased and the communication and cooperation between the municipality and its citizens improved.

The approach combined a competition on local, national and EU level with other measures, such as training for households and municipalities, consumption monitoring and local climate campaigns. Throughout the project, expert knowledge was provided to all participating households and information events were organised. Participating households were be supported by specially trained “Energy Masters”, volunteers from the neighbourhood to motivate their team, supervise data monitoring and provide project material.

RESULTS

At a time when energy prices are rising at an alarming rate, the Energy Neighborhoods project helped households to understand the connection between their energy use, its cost and its impact on the environment. They realized, with the energy efficiency advice given to them that small changes in behaviour, in the way they do things at home, really can reduce their energy consumption and make genuine carbon savings.

Overall, the Energy Neighborhoods project reached significant effects. Almost 600 Energy Neighborhoods, representing more than 5,000 households from nine countries took up the Energy Neighborhoods challenge. On average, teams achieved energy savings of 10 per cent through simple and cost-effective measures from using energy saving lamps to disabling the standby function on electric appliances and changing their heating habits by reducing thermostat settings and making better use of the time clocks on their heating systems.

LESSONS LEARNT

The concept of the Energy Neighborhoods worked in all participating countries and has been transferable. Cultural differences should not be ignored, however. The rules of such a competition or bet should therefore be clear and transparent. Overall, a matter of concern is that such a competition probably appeals especially to households who are already motivated to save energy, and even then it is debatable if they stay motivated to continue the competition.

The intervention in any case aptly demonstrated the applicability of competitions as a stimulus to behaviour change. Participation was made easy and there were incentives in the form of prizes. Team spirit and social feedback were instrumental in achieving the goals. The online tool for energy use that was applied presented visualized information on the participants’ energy use that was easily understandable.

This is an example that can be best organised locally and, in this sense, is relevant for the cities. The long-term effect of this kind of actions is a point of concern. Competitions of different kinds may be an effective tool in creating enthusiasm to save energy as well as raising general awareness to these issues. It is however unclear whether competitions are valid in achieving sustainable behaviour changes.
Central Finland Energy Agency, as a part of the national scheme funded by the Ministry of Employment and the Economy and local municipalities, offers fair and unbiased energy advice to citizens free of charge, covering the whole Central Finland region. The service was launched as a pilot project in 2010–2011. Enduring energy advice funding was established in 2012 and has continued since, with the ministry funding available up until 2016. The national level scheme is coordinated by the national energy agency Motiva. Also, Central Finland municipalities and the regional union have significantly participated in funding the services.

Services provided include advising through telephone, email, meetings, various sorts of events, as well as internet information pages (both regional and national level pages available) and Facebook. The subjects of advice are energy efficient construction and renovation of houses, related regulation, methods of heating, as well as energy efficient living and building maintenance. Advice and training is also offered to municipalities’ personnel who work with citizens in energy issues (such as construction and renovation regulation and permits). To reach the citizens and other important actors, an extensive cooperative network has been created including municipalities, associations and companies, who help in delivering the message to citizens and cooperate in events and other activities. As a result, citizens in Central Finland are better informed to make energy efficient and environmentally friendly decisions. Also, a lot of experience and know-how has been gained on different activities to advice and educate citizens.

The primary target group of the intervention are citizens, but also municipalities, associations and companies acting as an important “gatekeeper” to reach citizens and affect their behaviour. The activity is financed by the Ministry of Employment and the Economy, local municipalities and the regional union, with an annual budget of around 100,000 €.

The overall goal of this activity is to offer fair and unbiased energy advice to citizens free of charge covering the whole Central Finland region. By this, citizens are better equipped to make energy efficient and environmentally friendly solutions. Also, arranging the funding and resources to secure the continuation of services to citizens is one of the main goals.
INTERVENTION DESIGN

The intervention addresses the motivation, attitude, knowledge of consumers as well as potential barriers and capacities to energy saving. The intervention applies different means to save energy via behavioural adjustments. These instruments range from information and education campaigns to advice services and enhancing cooperation between different stakeholders.

LESSONS LEARNT

Defining the best methods to offer advice and creating the needed cooperation network and visibility among citizens has required a lot of work. A lot of different kinds of activities and events have been tried, and learning from the experiences has been done. The most important lessons have been that events do not effectively gather people without the right timing, place, marketing and cooperation, and interesting themes considering the target group(s). Advice has to be actively marketed through media and events, and brought to events where people go, preferably of the same theme (building, home, energy, etc.). Visibility among citizens grows gradually, and needs long-term consistent work and marketing.

The service has proven a rather cost-effective manner of reaching citizens. Resources have been quite small considering that the advisory services are targeted to cover the whole central Finland region. The circumstances have forced to be efficient. Weighing by the amount of events, consumers reached and media hits, the activity has been quite efficient.

Offering the advisory services will continue at least up until the governmental funding is available (until 2016). Funding has always been quite scarce. When the need for energy advice was recognized at the national level funding became available, but has been decreasing during the last years because the government and municipalities are cutting their budgets.

It takes time to create a cooperating network and to become visible to house-owners. The project is continuously developed and adjusted in order to gain experience on most efficient marketing of the service. It has funding until 2016 and hopefully it has created a staying practice for energy efficiency in construction and renovation of houses. The project started as a pilot but had received more funding and the possibility to continue for a longer time which is crucial for the embedding of the capacity building (the advisory services) that is the core of the project. The intervention has no explicit success criteria but is well evaluated and appears to be quite successful and low cost.

This intervention is a good example of a project that makes capacity building in order to transgress the boundaries to achieve the right information in order to change the key decisions that will affect energy consumption of households in the long term. The project seems to be a success in order to address all key actors for changing practices for renovation and construction of houses. Although this is a regional case, it could also be applicable for cities, either to participate in a regional organisation or to establish an organisational structure on their own. The economic aspects of the changed practice could be addressed in order to identify the projects potentials as a BAP outside Finland.
“Smart living with energy” (SLIM) is an association, consisting of consortia of companies for energy saving measures (around 100 companies in the three initiating provinces). Each consortium is able to offer a one-stop shop solution to homeowners. Municipalities have a facilitating role.

SLIM has been initiated by three provinces, which played a directive role in 2011–2013. The province of Groningen was lead partner among these provinces. Since 2014, the main responsibility is in the hands of the above-mentioned association consisting of consortia. This association currently employs two persons: a lobbyist and a manager.

For 2014 and 2015, a onetime budget of €125,000 has been granted to the association of consortia. In the period 2011–2013 €62,500 was granted annually. SLIM is funded by three provinces and the three capital cities of these provinces, and it receives funding from the EU funded INTERREG program.

The general goal is the promotion of energy saving investments by homeowners. SLIM is part of an overarching policy to improve the energy performance of the housing stock in the three participating provinces. Until 2012, the ambition was to improve 100,000 homes, but this objective was abandoned because it turned out to be unrealistic.

The association aspires after sustainable transformation of the market for energy saving by reducing the segmentation of the building sector. The objective is to form 6 to 9 consortia of building parties and consulting companies that develop innovative energy saving concepts and offer these concepts to individual homeowners, eventually ‘seducing’ them to invest in energy saving.

A condition for consortia to be eligible for subvention was that they succeeded in improving at least 20 homes with two label bands within the subsidy period. In reality, 780 homes have been improved, of which 414 homes with two or more label bands.

Unfortunately most of the contacts between the consortia and potential customers (homeowners considering improving their homes) did not result in a commission. Homeowners turn out to be hesitant in this respect.

The participating companies were generally satisfied with SLIM, but at the end of the project there were several complaints about the EU accountancy rules, especially from companies that had not complied with these rules. Relevant in this respect is that the subsidy largely originated from an EU funded project.

One could argue, rightly or not, that the subsidization of consortia is an inappropriate government intervention in the market and, moreover, a violation of European norms on government support, but in the project this issue has never caused a problem. A positive unexpected outcome of the project was the involvement in a recent (September 2013) national agreement on energy efficiency, which created new possibilities for the market.
Confidence and belief in the concept at hand was a key factor in the success of SLIM. Companies that had this belief were willing to communicate and to collaborate with parties that could otherwise sometimes be their competitors. Municipalities have embraced the project and continue to support it. There are still new consortia formed. Communication with both building parties and potential consumers is essential for success. Although many efforts on this were made in the past, this could even be intensified.

The project is a good example of how to reduce segmentation of the building sector through collaboration. Even if the quantitative goals of the project were very unrealistic, it has provided important knowledge regarding with whom to create well working consortia and what does not work in order to motivate private house-owners.
The EcoHome project addressed the challenges in household energy consumption and sustainable consumption choices. The aim of the EcoHome project was to monitor consumption practices of households in the South-West of Finland in 16 pilot homes, and to map out in detail the environmental impacts of daily household activities. Selected methods, such as monitoring consumption and versatile advisory services were used to guide the households to reduce these impacts. With measurements, information and follow-up, the households were able to assess their environmental impacts and the needed improvements.

Personalized advice was utilized to demonstrate what type of improvements can be made and how. The know-how of consumers to make sustainable choices was improved. Based on the pilots, alternative methods of action were created for environmental advisory service. During the project, the following aspects were explored:

- What type of consumers are the customers of advisory services?
- What type of service could the advisors offer to households?
- Who or what kind of company would be the most natural provider of environmental advice?
- What is the market potential of advisory services?

Altogether 16 households took part in the pilot. These households volunteered for the pilots, so it can be stated that they are both motivated and willing to change. The advisors visited each household at least twice during the project, most of them three or even four times. Each visit lasted for about two hours. During the first visit, the households were interviewed to gain a comprehensive view on the families’ consumption habits. An Envir smart meter was installed that sends data automatically to the ESCdata system. Advice was given on how to monitor water consumption, amount of firewood, amount of waste and transport.

Measurements were made on electricity and water consumption at each household for at least a month. The amount of waste generated was monitored for two weeks. Some tests on electricity consumption and CO2 reduction were performed by the families.

During the second visit, the results of measurements and tests were scrutinized with the families. The advisor gave the families concrete suggestions on areas of development. Later on, measurements were renewed and discussions were conducted with the families on the already conducted and possible future improvements. The main tools for EcoHome project were the following:

- Online test “Sähkötohtori” on the sectors household energy consumption
- Self-monitoring of energy consumption via smart meters
- Activation of participants to sustainable activities via monthly provided tips
- Recording one’s efforts for a better environment to a designated website “Pleniä tekoja – Suuria vaikutuksia”, which calculates their environmental effects
- Follow-up of one’s CO2 emissions and potentials for reduction via a designated tool “Ilmastodieetti”
- Joint meetings on special issues of energy consumption for all participants

Communication with the families was carried out mainly via emails and monthly newsletters. A Facebook group was established for the participants, through which tips and current news for a more eco-friendly lifestyle could be shared. The Facebook group also served as a communication channel on the project events and other current measures. Some joint meetings were arranged for the households throughout the project.

The project received its funding from the Finnish Ministry of the Environment sustainable consumption and production programme “KULTU”. 
The project addressed both the motivation, attitudes and knowledge of households in making sustainable lifestyle choices. Potential barriers to energy saving behaviour were also addressed and capacities for energy saving explored. Creating models for effective means to promote sustainable behaviour on household level was an important goal of the project. Ecohome project was part of wider programme aiming to explore and develop sustainable consumption and production.

Throughout the piloting, the opinions of the participating families regarding all aspects of piloting were mapped out. Three questionnaires were prepared for this purpose. Feedback was continuously gathered throughout the project from direct contact with the families. Some methods of service design were also applied to evaluate the piloting materials. Family-specific summary reports, hypothetical client profiles and this abstract of pilot results were based on the collected data.

Based on the piloting feedback, the main advisory needs of households were the following:

The big decisions related to living and housing, e.g.
- How much energy could one save with installing an air source heat pump?
- What would be the most sensible choice of a new car in terms of fuel consumption and emissions?

Household maintenance, e.g.
- The flow rate adjustment of water taps
- The needed know-how for adjusting the house heating system

Daily household choices, e.g.
- Which one is more environmentally friendly choice: Norwegian salmon or domestic commercially farmed salmon?
- What are the best practices for efficient laundering?
- Mobility management in terms of promoting public transport

Some challenges were encountered during the piloting, most of them having to do with problems in the house itself, lack of time, life phases, lack of commitment, attitudes and a lack of know-how of the participants. Some problems also incurred with the functioning of the smart meters and their monitoring programmes.

All in all, the main outcomes of advisory services were as follows:
- Changes in thinking were reflected in consumption choices
- A positive attitude towards taking environmental impacts into account was accomplished
- Choosing to alter the heating system from oil to geothermal heating
- Choosing green electricity

Most of the households signed up for the pilot because the wanted to learn how to reduce the family’s environmental effects. Energy saving was also an important motivator for many families. As most of the participants were already more or less motivated to reduce the environmental effects of their daily activities, the pilot does not give an altogether realistic impression on the variety of consumers that form the target group of environmental advisory services.

In any case, measuring household consumption is an effective method to provide concrete information on the environmental effects of everyday chores and activities. Being able to compare one’s own consumption to those of others helps to clarify the need for a change. Prior to the pilot, most households had no idea how much they were consuming per se, or compared to other households of same size. Being able to perceive one’s own consumption more clearly was considered the best result of the project by many participants.

Combining the monitoring of electricity and water consumption as well as amounts of waste generated with individual advice was found to be an effective manner to alter the consumption habits of households. Monitoring consumption alone does not suffice – expert advice is often needed to interpret data and plan actions.

Advisory services aim to achieve permanent behavioural changes. Therefore multiple advisory visits are needed during a longer time span. The advisor also needs to have the skill to turn the conversation from problems to solutions as well as plan actions both in the short and in the long run.

The business potentials of advisory services were also explored. It was found that already now there is a commercial market for energy consultancy services as they bring concrete savings. Advisory services on mobility or food choices is not yet considered enough beneficial as to pay for an advisory service. When planning advisory services, the financial benefits of sustainable mobility and food choices should therefore be stressed.
The Energy Supply Key Field includes the domains of “Fossil and nuclear energy” and “Renewable energy”.

The EU has set a target to decrease the share of fossil-based energy and to increase the share of renewable energy to at least 20% by 2020. This means considerable changes to energy structures in all European countries. To reach the target, the barriers hindering the adoption of renewable energy technologies must be overcome and new commercially viable renewable energy technologies must be developed. We also need to significantly increase the energy efficiency of existing energy structures by introducing smarter power grids and other technological innovations.

**Understanding how people make choices and change their behaviour** is one of the key issues in reaching the 2020 targets. According to the 2 case studies gathered by the PLEEC project, there is a growing interest in renewable energy among households, but people desperately need more information on the available options and how to efficiently utilize their existing energy structures. The case studies clearly point to 3 solutions, which should be focused on to increase motivation in making the necessary changes in domestic settings. These are:

- Increasing the availability of non-biased practical information.
- Increasing new affordable technologies.
- Introducing basic financial incentives supporting adoption of renewable energy solutions.
Advisory evenings have been organised to homeowners in South-West Finland since 2005 to inform them about different heating options, focusing on renovations of old systems. The activities have been financed by the Ministry of Employment and the Economy. The main aim of the advisory evenings was to give independent and neutral information to those who are thinking about changing their heating system. One theme in the evenings was to give information about how to operate one’s wood heating system efficiently and optimally.

INTERVENTION DESIGN

The events were arranged in cooperation with city officials and had free admission for all. For wood heating system events experts such as fire officers and chimney sweepers gave a lecture about the optimal use of fireplaces.

RESULTS

Each event reached 25–95 participants. The feedback has been positive. Most people said they would from then on start the fire differently. After the event participants were convinced that starting the fire top-down is worthwhile. Most people also promised to decrease the amount of wood in the furnace. Nearly all respondents would recommend the event to other homeowners.

Events were all in all very cost-effective as most of the lecturers required no fee for their services and the cities offered their premises free of charge. Also, as long as the marketing of the RES evenings is the responsibility of local home owner’s associations, the cost effectiveness of the events is good.

LESSONS LEARNT

One of the most important things to consider in arranging advisory evenings is that the information is easily understandable even for those who are not so technique-oriented. It is important that the information is neutral and presented in such a way that laymen understand the pros and cons of the different heating systems. Even if the house owner has already decided what energy source he is going to use, information about different energy sources and what has to be taken into account when renovating an old system is very important for making sound decisions.

Feedback on the events was very positive and there is clearly a need for advisory services. In the RES evenings there is usually a lot of discussion and people were anxious to tell about their experiences, but also their problems with their current heating systems. Costs of investment and energy, and also payback times are important issues for house owners.

The interest of participating these evenings depends a lot on the age of the district, i.e. how old the houses in the target area are. And also the price of heating oil has a great impact on the interest towards new heating systems.