

# Chapter 1 Voluntary consumption reduction - experience from three consecutive residential programmes in Hungary

*Residential energy master as a new carrier?*

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## 1 Introduction

Our paper presents the process and the results of voluntary residential energy consumption reduction efforts through introducing and analyzing three programmes in Hungary that had different origins, but are related and connected due to the same methodology and underlying theoretical assumptions and because they build on each other.

We focus on voluntary residential energy consumption reduction through behaviour change (and not, for example, investment) for several reasons.

1. First of all, if society is to move towards low-carbon lifestyles, an imperative both from the point of view of climate change and resource scarcity issues, individuals, households as well as communities need to recognize and understand their responsibility and act upon this recognition.
2. Then, individuals and households need to know as well as experience that it is indeed possible to achieve energy use reduction through modified everyday behaviour and use patterns in order to realize the considerable saving potential available (Novikova and Ürge-Vorsatz, 2008; EEA, 2013). People tend to believe that energy saving can only be achieved through investment, and then are prone to blaming their lack of financial resources for not taking any concrete steps.
3. Individuals and households also need to know where exactly they stand in terms of everyday energy efficient practices, and how they can move forward. Research in Hungary revealed (OTP, 2012) that people tend to believe that they do everything they can and they could not possibly save any more through behaviour change when 64% of them do not even monitor their consumption, and when asked to list what exactly they do in order to save energy they only mention defrosting the fridge and unplugging mobile phone batteries. GreenDependent's several years of work with households supports this conclusion, and households, when asked to talk about their experience, often mention how surprised they were to discover new ways of saving energy and further reducing their monthly bills<sup>1</sup>.

<sup>1</sup> See participant presentations at [this link](#) (last accessed 5 May 2013)

4. Furthermore, our experience – supported by participant case studies and presentations – shows that once individuals and households manage to save energy through changing everyday behaviour, they tend to look for opportunities to move forward. As a result, they become more open to engaging in energy efficient community solutions (e.g. car sharing, small-scale and community owned renewable energy production), and also to invest in energy efficiency focused home improvement, often to utilize their savings achieved earlier.
5. Finally, as an additional and very positive outcome that, we argue, needs to be taken advantage more in the future, some of the people who engage in residential behaviour change oriented energy saving programmes will be motivated to become voluntary energy masters to help others change behaviour and realize energy savings.

The three programmes our paper is based on can be described as follows (and please refer to Table 1 for a summary).

The **Gödöllő Climate Club**<sup>2</sup> is a small, voluntary, grassroots group initiated in 2009 by GreenDependent in the town of Gödöllő in Hungary, with the primary goal of reducing the carbon footprint of its members. The Club was initiated as a pilot project within an EU FP7 research project (Changing Behaviour) which investigated how to induce long-term behaviour change related to energy use.

The Club meets monthly and members discuss climate change and energy-related issues, ideas and concerns in an informal setting. Club members keep track of their consumption and emissions with the help of a carbon calculator developed by GreenDependent. They also calculate the footprints of Club events and occasionally plant fruit trees in a local community garden to offset the emissions. The Club also organizes community events like seed swaps, earth day programmes, etc. More recently, Club members have decided to become more active in the local community in order to raise awareness of what they do, attract more members, and motivate community level change.

The overall aim of the **Small Footprint (SF) campaigns**<sup>3</sup> was to initiate long-lasting behaviour change in household energy use behaviour. The objectives were to raise the energy and climate change awareness of households, to draw attention to and provide information on energy saving possible without investment, and to reduce consumption. As it is well-known that simply providing more information will not result in changed behaviour, the SF campaigns used a variety of ways and means (see details in section 3) to reach the target group and bring about the desired behaviour and change.

**EnergyNeighbourhoods<sub>2</sub> (EN2)**<sup>4</sup> has been a European campaign in 16 countries, one of them Hungary. The overall aim of the EN project was to ensure that a clear connection is made between climate change and everyday life, and to realize energy savings without reducing the quality of life. EnergyNeighbourhoods (ENs) – groups of 5-12 households led by one of the participants, a so-called energy master – were formed. ENs entered in a competition to save at least 9% energy without making investments. All through the programme and competition, ENs were offered expert advice and assistance in addition to having their own group to provide support and encouragement.

The EnergyNeighbourhoods methodology was originally developed in Belgium. The first campaign, conducted between 2007-2009 in 9 European countries (not including Hungary) won the ManagEnergy Local Energy Action Award in 2010<sup>5</sup> (see also EEB, 2011).

<sup>2</sup> See more at [www.klimaklub.greendependent.org](http://www.klimaklub.greendependent.org) and at [www.energychange.info](http://www.energychange.info).

<sup>3</sup> See more at [www.kislabnyom.hu](http://www.kislabnyom.hu) and [www.greendependent.org](http://www.greendependent.org).

<sup>4</sup> See more at [www.energiakozossegek.eu](http://www.energiakozossegek.eu) (Please note that the English language website contains information only on EN2 in the UK and Ireland. This can be used as a general guideline, but there have been some differences in how the campaign was conducted in the 16 countries.)

<sup>5</sup> <http://www.managenergy.net/resources/1257> (last accessed 10 May 2013)

Table 1: Introducing the three Hungarian voluntary residential energy consumption reduction programmes

	Main focus	When?	Where?	How many participants? (people, households, groups)	Were there any energy masters/group coordinators?	Was consumption monitored (meter reading) and carbon footprint calculated?
<b>Gödöllő Climate Club</b>	(1) raise awareness of <ul style="list-style-type: none"> <li>households' responsibility relating to climate change,</li> <li>potential and practice of energy saving through behaviour change; and</li> </ul> (2) create a supportive community	2009 – still ongoing	In the town of Gödöllő in Central Hungary (started as a pilot project in FP7, but voluntary since 2010)	core group of 25-30 people, but cc. 250 on mailing list	no (but Club members volunteered to be energy masters in SF and EN2)	yes, but optional, focus on carbon footprint (calculated based on meter readings)
<b>Small Footprint (SF)</b>	(1) raise awareness of <ul style="list-style-type: none"> <li>households' responsibility relating to climate change,</li> <li>potential and practice of energy saving through behaviour change; and</li> </ul> (2) organize competition for households			<i>focus placed on households</i>		yes, compulsory, focus on carbon footprint (calculated based on meter readings)
• Large Family – Small Footprint campaign		2010-2011	national (HU)	cc. 4000 households reached by campaign, around 500 participating in competition	yes, 7 people	
• Small Footprint campaign		2011-2012 (parallel to EN2, Season1)	national (HU), but focus on Central Hungary	cc. 3000 households reached by campaign, more than 500 participating in competition	yes, 20 people	
<b>EnergyNeighbourhoods<sub>2</sub> (EN2)</b>	(1) raise awareness of <ul style="list-style-type: none"> <li>households' responsibility relating to climate change,</li> <li>potential and practice of energy saving through behaviour change;</li> </ul> (2) create supportive communities; and (3) organize competition for them		national (HU), but part of international (IEE) campaign with 16 countries participating	<i>focus placed on groups</i>		yes, focus on energy saving measured in kWh (compulsory), use of carbon footprint calculator optional
• Season 1		2011-2012 (parallel to Small Footprint)		24 <b>groups</b> started, 18 completed, 140 <b>households</b>	yes, 24 people	
• Season 2		2012-2013		25 <b>groups</b> started, 17 completed, 120 <b>households</b>	yes, 25 people	

## **2 Demand side energy saving**

### **2.1 Households' share in energy consumption and CO<sub>2</sub> emission**

Buildings form the largest energy consumer sector in Europe, with a 41% share of total final energy consumption in 2010. Disappointingly, the final energy consumption of buildings has been constantly increasing by 1%/year at EU level since 1990, and electricity demand by 2.4%/year. (Lapillone et al., 2012)

On average households are responsible for larger part of buildings' energy use, which represent 26% of total final energy consumption at EU level (EC, 2007); however, the figure for Hungary is significantly higher, where the share of households in total energy consumption is 34%, and 30% of CO<sub>2</sub> emissions are attributed to them (Novikova and Ürge-Vorsatz, 2008; HCSO n.d.a.; Lapillone, 2012).

### **2.2 The role of users in influencing building energy demand**

#### **2.2.1 Occupants' impacts**

The energy demand of buildings is influenced both by the installed building and appliance technology and by user behaviour and decisions. Classic sociological studies in the 1970s at Princeton University showed energy use variations of more than a factor of two between houses that were technologically identical but had different occupants (Socolow, 1978). This was confirmed by a number of similar results during the 1980s in Europe (Aune et al., 1995). Current research also suggests that up to a 40-70% difference in the energy demand of similar buildings could be attributed to the occupants' behaviour (Yua et al., 2011). Similar differences were shown by Emery and Kippenhan (2006) in a longitudinal study of identical houses. The impact of tenants was largest in the case of hot water and electricity use, and was less substantial in the case of space heating. Interestingly, they also found that the contribution of the occupants was higher in technologically less efficient buildings than in renovated ones.

#### **2.2.2 The energy performance of residential buildings in Hungary**

In the European Union construction rate has drastically dropped due to the financial crisis. In Hungary the value of construction activities in the residential sector has more than halved between 2006 and 2011 (HCSO n.d.b.). From an energy performance point of view this means that the energy quality of the building stock is deteriorating continuously.

The same trend can be observed for appliance ownership. People have been delaying purchases and appliance exchanges, which causes the – already old – appliance stock in Hungary to slowly get more obsolete. Compared to the situation in 2009, the ratio of appliances older than 8 years has grown in all categories, in average from 43% to 46% in 2009 and 2013, respectively. This translates into a change from a total consumption of 2,673,589 MWh to 3,009,362 MWh and emission increase from 1,663,450 to 1,942,346 tCO<sub>2</sub> (CECED, 2013).

#### **2.2.3 Occupants' motivation and planned energy efficiency actions**

Regarding appliances, only about 6-10% of owners plan to replace their washing machines or fridges and freezers in the near future, despite the fact that the stock is so old. This ratio is slightly higher in the case of owners of products that are at least 10 years old.

Decisions are influenced primarily by the price, and much less by the energy performance of appliances (CECED, 2013).

At the same time, Energy Club, a local think-tank, found that 24% of the population plans to renovate their homes within the next 3 years, the most popular measure being the insulation of homes. 40% of those planning to invest, aim at reducing their bills through energy efficiency improvement and expect an average of 30% savings. (Energy Club, 2013)

Hungarians do not use expert advice extensively. 47% of home owners use the internet as the primary source of information, 24% rely on friends and relatives for advice, and only 15% seek professional advice. (Energy Club, 2013)

### 2.3 Strong need to increase the energy saving capacity of households

Based on the above, it is clear that major effort should be made to influence energy-use-related knowledge, behaviour as well as motivation to save. While technological solutions are successfully mandated through regulations, improving energy use behaviour requires a non-traditional policy approach (Boza-Kiss et al., 2013). Motivating bottom-up initiatives is likely to yield better results (Linden et al., 2006), especially when building on the growing willingness of people to actively save energy and to transform to a more sustainable 'small footprint', low-carbon lifestyle.

The availability of incentives has seriously decreased in Hungary in recent years (Energy Club, 2013), while the motivation of the population – driven by saving money – has increased and could be used as a vehicle to ensure economy-wide energy savings. While there is a huge energy saving potential in renovating residential houses and replacing obsolete appliances, increasing and supporting the capacity of households is also needed, especially in the light of the uniquely high rate (80%) of energy poverty in the country (Tirado and Urge-Vorsatz, 2010).

## 3 The methodology used in the three residential programmes

Although the three residential programmes discussed in this paper are very different in size and scope, they were organized in a way that they could successfully build on one another. This was made possible because they share a common methodology and theoretical framework.

The methodology was first developed and piloted during the Changing Behaviour FP7 project<sup>6</sup>, between 2008-2010, when the Gödöllő Climate Club was started. When its success could already be seen – along with parts of the methodology that needed to be improved as well as elements that had to be newly added –, the first Small Footprint campaign was conceived and funding secured for it. The European EnergyNeighbourhoods methodology was very similar to that of the Climate Club and SF campaigns, so provided an excellent continuation and extension of the two programmes.

The common framework and methodology has three very important elements, all meant to contribute to achieving long-term change in energy use behaviour and overall reduction in carbon emissions. They are the following:

1. using a variety of tools, enablers and motivators within the same programme;
2. creating and sustaining groups to provide context and support for behaviour change; and
3. supporting individuals and groups to become role models and trend setters (in other words, helping the low-carbon practice to move from niche to mainstream).

<sup>6</sup> Please refer to <http://www.energychange.info> for more details on the Changing Behaviour project and its outputs.

### 3.1 Using a variety of tools, enablers and motivators

In the Changing (Energy Use) Behaviour FP7 project a consortium of researchers and practitioners studied the literature as well as successful and less successful demand-side management programmes in an effort to establish general success factors (Mourik et al., 2009; Heiskanen and Rask, 2008). Although, obviously, there is no ‘silver bullet’ for success, an attempt was made to plan the methodology for the Gödöllő Climate Club and later the Small Footprint campaigns to incorporate many of the success factors in order to create lasting change. The main elements of this methodology and concrete tools used are shown in Figure 1.

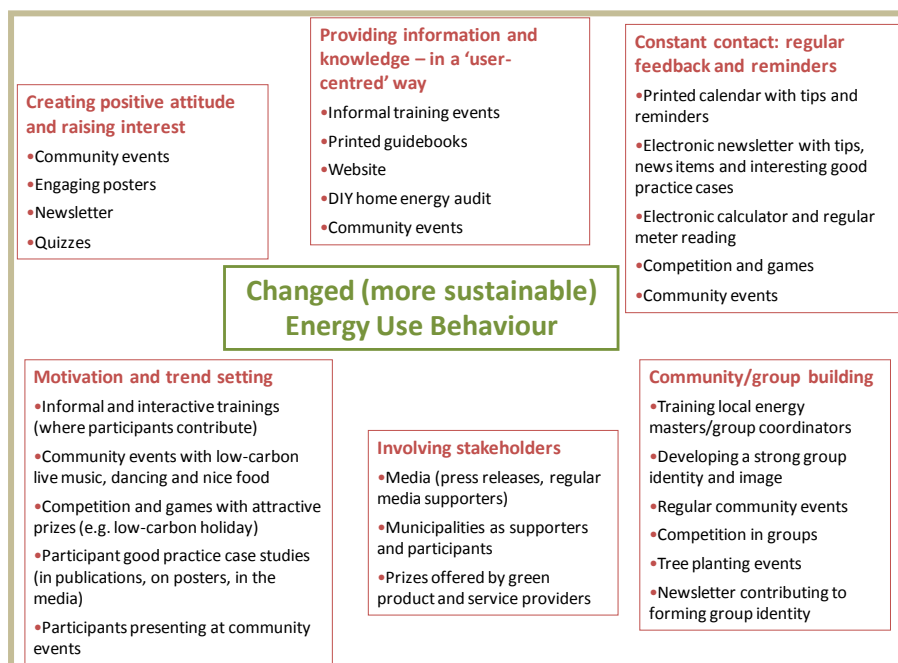
As a first step, all three programmes attempt to help people understand how their everyday energy use behaviour is part of a global system and how what they do in their everyday life impacts global processes like climate change. This was done in a user-centred way meaning that an effort was made to first assess how much people already know and do about climate change and sustainable energy use through using knowledge assessment questionnaires. The outcomes of these questionnaires were then used to influence the content of information input.

As people’s knowledge and experience is at a different level, and they are motivated by a variety of factors, methods and tools were developed to allow for flexibility and for household-specific assessment, action plan and progress. This was made possible through providing a great variety of tools and methods for participants as well as using different types of communication channels (e.g. electronic, printed, face-to-face meeting, informal training, community events, etc.). This way, each household could select their preferred way and speed of change. At the same time, they were reminded regularly and in lots of different ways about low-carbon living.

The competition element in the SF and EN2 campaigns helped provide an overall framework for the change, and it ensured that feedback was regularly given on progress in a variety of ways (e.g. through the calculator, the evaluation of competition tasks). However, it is important to mention that each household – and in the case of EN2, each group – was assessed in terms of its own progress and achievements, compared to their own ‘baseline’ consumption and/or home energy audit results.

The fact that there was an opportunity to repeat the competitions (both SF and EN2) provided a chance for households to enter again in the same type or even a different type of challenge (e.g. first as an individual household then as a household part of an EN2 group) – and quite a few of them did indeed take advantage of this opportunity.

Figure 1: Summary of the methodology and tools used in the three programmes





### 3.2 Creating and sustaining groups to provide context and support for behaviour change

Most of the behavioural change programmes to reduce energy consumption, and more recently to reduce the carbon-intensity of our lifestyles, have focused on individual behaviour and individual households. Thus, many of them suffer from a conceptual problem: methodological individualism. By drawing on purely economic or psychological representations of behaviour, they fail to recognize the socially grounded nature of human behaviour and the fact that energy consumption behaviour occurs in a layered context. (Jackson, 2005; Heiskanen and Rask, 2008; Heiskanen et al., 2009a)

The ways in which groups can help overcome barriers to sustainable energy use behaviour and increase people's capacity to change is summarized in Table 2 with the specific example of the Gödöllő Climate Club.

Table 2: Ways in which small groups can help overcome barriers to behaviour change  
(based on Middlemiss, Parrish, 2009, Heiskanen et al., 2009b and c; Vadovics, Heiskanen, 2010)

Capacities	Description	Barrier to behaviour change	How the Gödöllő Climate Club can help overcome barrier
<b>Personal</b>	Individuals understanding of the issue, their willingness and ability to act, their values skills and enthusiasm	Lack of knowledge and understanding, lack of willingness and skills, helplessness	Sharing and creating knowledge Providing advice, skills, motivation and encouragement Members can see that 'others are doing their bit' Assurance that being 'green' is normal
<b>Infrastructural</b>	Facilities and structures enabling sustainable living available in the community	Current socio-technical infrastructures	Creating knowledge network on the carbon intensity of lifestyles and the low-carbon solutions available in the community Limited impact on 'hard' infrastructure at the moment
<b>Organizational</b>	Values held by formal organizations in the community	Social conventions, helplessness	Challenging existing institutions Changing taken-for-granted beliefs about modern life and creating a supportive environment for problematizing current lifestyles
<b>Cultural</b>	Legitimacy of sustainability and low-carbon living in the community	Social dilemmas, helplessness	Creating a community of individuals prepared to change their lifestyle and promote these changes to others and by doing so creating legitimacy for sustainable and low-carbon values and living

To overcome the above-mentioned challenges, the methodology of the three programmes discussed here applies a socio-technical approach and makes a conscious attempt to actively involve stakeholders who have an impact on household energy use behaviour. Furthermore, the formation of small, local groups as well as the development of a 'small (carbon) footprint' group identity is strongly promoted through various means (training of energy masters or group coordinators, developing a strong group identity and image, community events, etc., see Figure 1).

### 3.3 Moving from niche to mainstream: supporting individuals and groups to become role models and trend setters

In the sustainable consumption literature it is recognized that for more sustainable, low-carbon lifestyles to become a norm, there is need for systemic change. This was already noted in Agenda 21, but was reinforced by the more recent conclusions of the SCORE! research project<sup>7</sup> (Tukker, 2008). The system innovation view postulates that there are three levels on which change can, and for the transition to a more sustainable, low-carbon society, needs to happen: at the micro or niche level, at the meso or regime level, and finally, at the macro, or landscape level (Andersen, 2008; Tukker, 2008).

<sup>7</sup> SCORE stands for Sustainable Consumption Research Exchange. More information on the project is available at [http://www.score-network.org/score/score\\_module/index.php](http://www.score-network.org/score/score_module/index.php).

All three programmes targeted the niche level. However, one of their aims was to facilitate the transfer sustainable everyday energy use behaviour from niches to the mainstream. This is not only important in order for low-carbon everyday behaviour to spread but also for motivating early-adopter individuals and households to persist in as well as be proud of their good practice. Thus, the methodology includes elements that facilitate the transfer of the niche practice to mainstream society.

First of all, an active cooperation with various media (electronic, printed as well as TV and radio) was sought. Media sponsors were found as well as regular press releases issued. Participating and well-performing households were asked to take part in radio and TV interviews.

Then, participating household best practice case studies were written and widely disseminated through printed publications, electronic newsletters and the project websites. Furthermore, with the involvement of designers, posters were prepared and exhibited at community events and press conferences. Finally, case study owner households and groups were asked to present their best practice, success stories as well as any challenges they needed to overcome.

## 4 Results and Discussion

In this section we provide details about the participants profile, their motivations and reasons for participating in the programmes, the information and personal development they have achieved. We discuss participants' actual knowledge about climate change and personal responsibility, as well as resulting actions that were taken by them.

Furthermore, we highlight some of the quantifiable results of the programmes, such as the amount of energy saved (in kWh) and carbon footprints. Finally, we discuss the role of involving local energy masters or group coordinators in household behaviour change programmes.

Table 3 provides a summary of the information and data sources used for the analysis of results and outcomes presented in this paper.

Table 3: Summary of information and data sources

	Information and data sources used for this paper
<b>Gödöllő Climate Club</b>	1. Evaluation questionnaires
<b>SF</b>	<ol style="list-style-type: none"> <li>1. Initial (start-of-project) knowledge and awareness survey</li> <li>2. DIY home energy audit completed by households and then each of them evaluated by 2 experts independently</li> <li>3. Carbon footprint calculation based on monthly or bi-weekly meter readings and lifestyle questions (e.g. how much meat is eaten, holiday destinations, etc.)</li> <li>4. Participant case studies presented in published books available in electronic format from the programme website</li> </ol>
<b>EN2</b>	<ol style="list-style-type: none"> <li>1. Baseline attitude and energy use behaviour survey</li> <li>2. End-of-project attitude and energy use behaviour survey</li> <li>3. Energy consumption calculator data (based on monthly or bi-weekly meter readings) and historical reference consumption data (based on invoices)</li> <li>4. Participant presentations of own case studies at campaign closing events available from the programme website</li> </ol>

### 4.1 Participants' profile and motivation

All three programmes are built on **voluntary participation** which is achieved by the promise of energy (and cost) saving as well as the opportunity to get involved in something



that is beneficial for the environment and future generations. The internal motivation to join a group of like-minded individuals or households has also been strong.

The programmes organised by GreenDependent developed in terms of the type of participants, from individuals to households and finally to groups of households. This indicates the search for the most appropriate level of intervention and motivation. While individuals can act successfully against climate change at the personal level, most decisions and changes in behaviour naturally involve whole households, of which all members must be engaged. By extending the focus to groups, the EN2 programme ensured a more self-sustaining system of information dissemination and involvement.

Table 4: Typology of participants and groups in the three analysed programmes.  
Source: own analysis.

	Type of participants	Type of participation, payments	Distribution of tasks
<b>Gödöllő Climate Club</b>	individuals (all ages are welcome)	individuals, voluntary (but often several members of a household attend)	led by GD experts, but gradually transforming into a self-sustaining and self-organising group
<b>Small Footprint (SF)</b>			
• Large Family – Small Footprint campaign	focus on large households (3+ children), but all households are welcome	• households: voluntary • coordinators: voluntary, symbolic payment offered	• led by GD experts, organisation of the overall programme, preparation of supporting materials, national level promotion, training of coordinators, etc. • <b>coordinators</b> promote the programme, and organize, motivate and assist participants locally
• Small Footprint campaign	all households		
<b>EnergyNeighbourhoods<sub>2</sub> (EN2)</b>			
• Season 1	groups of 5-10 households	• households: voluntary • coordinators: voluntary	• led by GD experts, organisation of the overall program, preparation of supporting materials, national level promotion, training of coordinators, etc. • <b>coordinators</b> promote the programme locally, organize, motivate and coordinate groups
• Season 2			

In two of the programmes (Gödöllő Climate Club and EN2), participant surveys were carried out to understand their reasons for joining them. Their answers reflect the aims of the programmes and the types of participants sought.

Table 5: Motivation to join the Climate Club and EN2 campaigns. Source: own analysis.

	Reasons for joining the programme (people were asked to indicate their 3 most important reasons)
<b>Gödöllő Climate Club</b>	<ul style="list-style-type: none"> <li>• The topic is interesting: 50%</li> <li>• To meet people with similar interests: 35%</li> <li>• To act together to save the environment: 35%</li> <li>• To get help for actions in the close neighbourhood: 25%</li> </ul>
<b>EnergyNeighbourhoods<sub>2</sub> (EN2)</b> • Season 1	<ul style="list-style-type: none"> <li>• To reduce energy bills: 73%</li> <li>• To do something for climate protection: 69%</li> <li>• To understand energy use &amp; how to save energy: 67%</li> <li>• To support climate protection activities of the city 50%</li> <li>• To win the prize for the best Energy Neighbourhoods: 40%</li> <li>• Friend or neighbours asked me to participate: 38%</li> <li>• To do something social with friends &amp; neighbours: 27%</li> </ul>

<b>EnergyNeighbourhoods<sub>2</sub> (EN2)</b> <ul style="list-style-type: none"> <li>Season 2</li> </ul>	<ul style="list-style-type: none"> <li>To continue participation from season 1: 68%</li> <li>To do something for climate protection: 78%</li> <li>To reduce energy bills: 76%</li> <li>To understand energy use &amp; how to save energy: 67%</li> <li>To support climate protection activities of the city 51%</li> <li>Friend or neighbours asked me to participate: 32%</li> <li>To win the prize for the best EnergyNeighbourhood: 18%</li> <li>To do something social with friends &amp; neighbours: 13%</li> </ul>
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The Climate Club is a small group of dedicated individuals who already know quite a lot about energy saving and sustainable lifestyles. Thus, they appreciate the additional knowledge and the sense of community as a primary value provided by the monthly meetings. It is also clear that most members feel closely associated with the group, and have a feeling of ownership, which seems to be increasing with time.

In the EN2 campaign households reported different motivations and attitude to the programme, more typical of the general public. This did not change between the two seasons. The majority of participating households were motivated by the opportunity to reduce energy bills as well as doing something good for the environment (climate). A great number of them also wanted to learn more about energy use and energy reduction possibilities. To a limited extent, they were also motivated by joining others. Interestingly, they were not so much motivated by winning the competition. From participant case studies presented at the closing event of both seasons it appears that it was clear for participants that the competition setting would help them move ahead, but the largest gain they would get will be the knowledge and actual savings.

## 4.2 Carbon literacy and carbon capability

The three aims of the initiatives have proven to be achieved in all three programmes:

- to increase knowledge and awareness of the participants, improve availability of appropriate information;
- to increase readiness to save energy through behaviour change and thus lead a more sustainable ‘small footprint’ life; and
- to engage households in actual behaviour change and achieve savings.

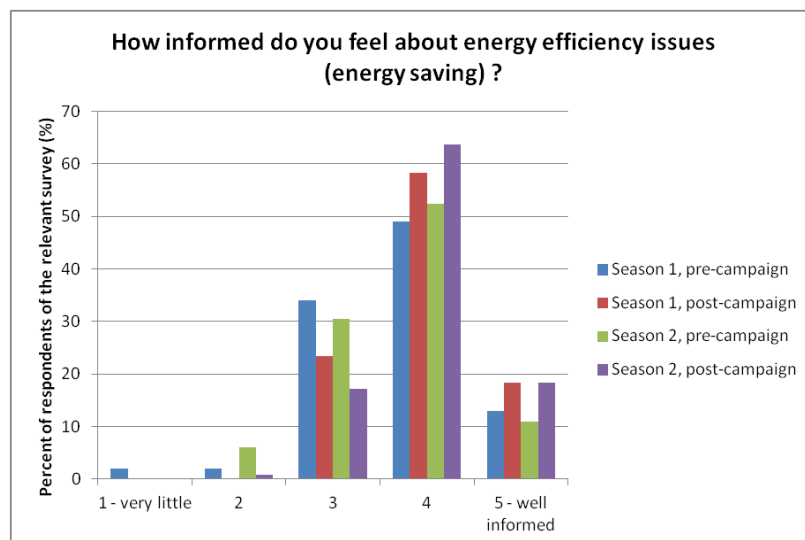
### 4.2.1 Change in awareness and knowledge due to the programmes

All three programs increased the knowledge of the participants about climate change, energy efficiency and the link to personal responsibility. We tested these changes attributable to the programmes through participant surveys.

Everyone in the Climate Club participant survey stated that they have gained more information about sustainability. One member noted that “*I finally found a place to meet with like-minded people. I wish there were more places like this!*” and another person said “*I learnt a huge amount from the newsletters, which always had new information for me, even if I am very much involved in the subject due to my profession.*” Indeed, the particularity of the Club is that it helps continuous development of knowledge even for ‘advanced’ members.

In the evaluation surveys of the EN2 campaigns, we asked participants to self-evaluate their knowledge. Most people feel moderately informed about energy efficiency issues (see Figure 2), which slightly improved between the start and the end of each season.

Figure 2: Knowledge of the EN2 participants about energy efficiency based on the evaluation surveys before and after the campaigns. Source: own analysis.



In the scope of the SF campaigns a series of more detailed knowledge and awareness surveys were conducted at the start of the programmes (baseline survey) and at the end of the competition (closing survey). In general, we concluded that factual knowledge, understanding one's (personal and country level) role in climate change, and awareness about the ways and the level of the potential of energy savings at home have all increased during the SF campaigns. This must be due to the very intensive education and training of both the coordinators and participants that were integral part of the programme (see Figure 1).

Excerpts from the results:

- In the baseline survey, only 40% of the respondents evaluated Hungary's relative carbon footprint (compared to other countries) correctly, while this was 99% in the closing survey;
- Four out of five people (80%) could identify greenhouse gases correctly after the programme, as opposed to 23% in the baseline survey;
- 45% and 83% knew correctly the atmospheric residence time of a CO<sub>2</sub> molecule in the baseline and closing survey respectively;
- The level of knowledge in respect to the share of end-uses in energy consumption in the home also increased significantly, from 20% to 84% selecting the right answer;
- The awareness about the energy certification of buildings was also proven in the closing survey, with 60% of the respondents knowing that category "C" refers to current technical requirements prescribed by legislation.

#### 4.2.2 Enabling the self-evaluation of own saving potential: home energy audits

Do-it-yourself (DIY) home energy audit forms were prepared and made available for people in all three programmes to assist them in evaluating their current energy use patterns as well as in selecting the best saving options. The audit is comprised of a set of questions relating to the energy efficiency status of the home (e.g. location and siting, insulation levels, types of doors and windows, heating technology, renewable energy use), and how energy is used in the home. Following these questions, people were guided with further questions to evaluate their strengths and weaknesses, and then asked to select at least three energy saving measures that they wanted undertake both for the short (i.e. during the programme) and the long run. The DIY audit was first developed for people participating in the Gödöllő Climate

Club<sup>8</sup>, but was later improved for the two consecutive campaigns based on both participant and expert feedback<sup>9</sup>.

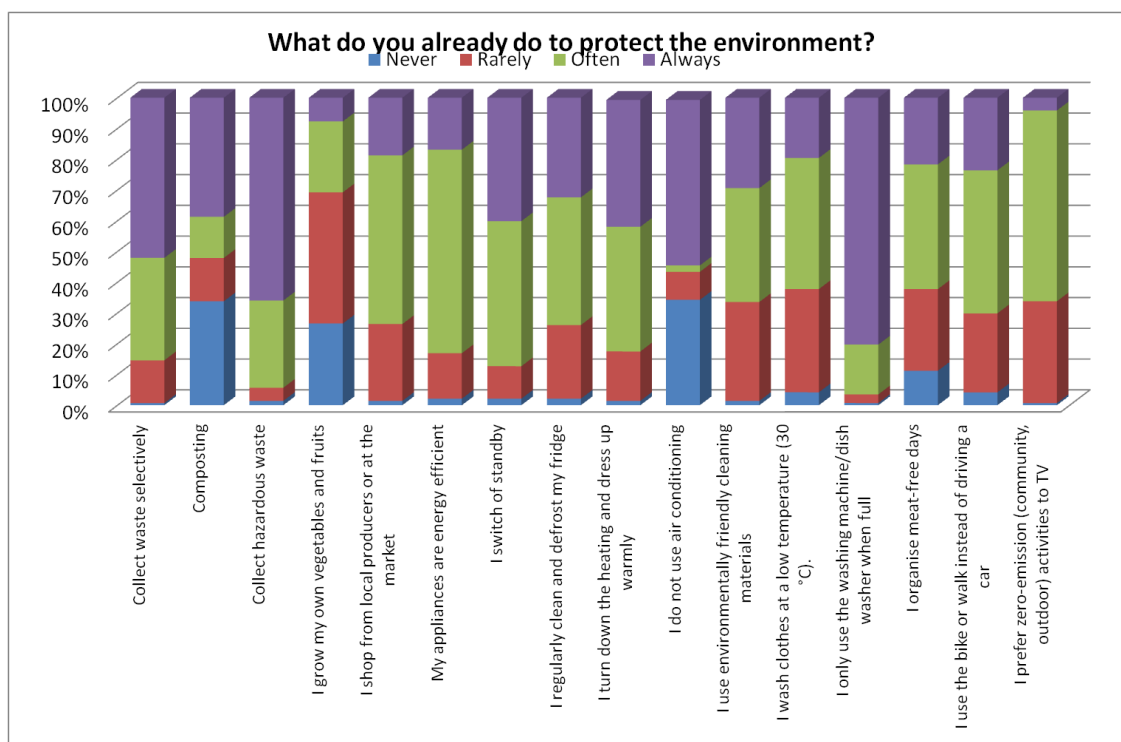
The DIY home energy audits were used in slightly different ways in the three programmes. In all three of them, all participants were presented with the opportunity to use the audit form. In addition to this, in the Gödöllő Climate Club, members have been offered free expert advice to support the preparation of their audits, and at times Club members sat down to discuss their audits together and gave each other feedback and assistance. In the SF campaigns the use of the energy audit form was strongly suggested for households taking part in the competition. In both of the SF campaigns audit forms filled in by households were collected and evaluated by two experts independently. It is the result of this evaluation that we base our conclusions relating to the ability of people to evaluate their own energy use and saving options.

We found that about half of the households (64% and 46%, respectively, in the two SF campaigns) were able to evaluate correctly their strengths and weaknesses in terms every day energy use practices and the potential of their home in terms of energy efficiency and facilitating low-carbon living. Furthermore, they were also able to select the most effective ways of changing their behaviour to increase their energy efficiency.

#### 4.2.3 Participants' energy saving practices

As part of the baseline surveys, we asked the respondents to indicate what pro-environmental behaviour they were bringing into the programme within the SF campaigns. The following graph (Figure 3) shows the result of the collection.

Figure 3: Actions that SF campaign participants were already doing prior to the campaign.  
Source: own analysis



<sup>8</sup> Please refer to <http://klimaklub.greendependent.org/en/documents/climate-calculator-and-audit.html> for the first version of the DIY home energy audit (last accessed 11 May 2013).

<sup>9</sup> Please refer to [http://www.energyneighbourhoods.eu/sites/default/files/Haztartasi%20klima-audit\\_0.pdf](http://www.energyneighbourhoods.eu/sites/default/files/Haztartasi%20klima-audit_0.pdf) for the current version of the DIY home energy audit (last accessed 11 May 2013). Please note that the Hungarian audit form is different from the one used in other countries.

The two SF campaigns involved a self-audit (home energy audit, see section 4.2.2) as a first step of the competition, and then, as the final activity, a short report from all households on what they managed to carry out. Table 5 is a selection of the most popular and most interesting or unique actions completed by participants. It is notable that households had to identify these opportunities themselves and select those that are feasible and most beneficial in their particular case. This was because we aimed at increasing their self-evaluation capabilities.

Similar information was collected in the first season of the EN2 data in a less guided manner through surveys (in this programme the use of the DIY home energy audit was optional). These results are also included in the Table 6.

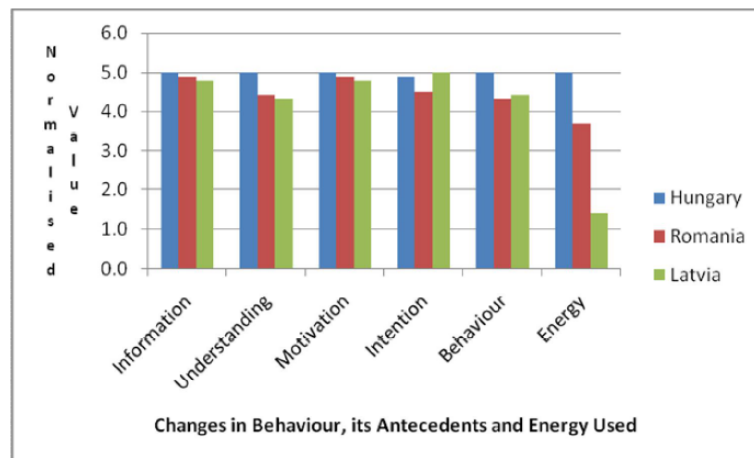
Table 6: Energy saving and pro-environmental behavioural changes during the campaigns.  
Source: own analysis based on the expert evaluation of home audits and the final report by participants

	Most popular actions	Unique/interesting actions
<b>SF campaigns</b>	<ul style="list-style-type: none"> <li>• Changing regular light bulbs to CFL</li> <li>• Switching off lights in unused rooms</li> <li>• Metering the energy use of appliances</li> <li>• Growing own vegetables and fruits</li> <li>• Using washing machine only when it is full, washing less often</li> <li>• Setting the toilet to use less water</li> <li>• Walking more</li> <li>• Installing blinders</li> <li>• Defrosting the fridge regularly</li> <li>• Avoiding standby</li> <li>• Buying used products and offering old or unused ones for charity</li> <li>• Spending most of our time in the colder/warmer rooms of the house</li> <li>• Opening windows in the night in summer</li> <li>• Cooking less, and planning meals better</li> </ul>	<ul style="list-style-type: none"> <li>• Planting trees for shade to reduce need for air conditioning</li> <li>• Purchasing of new energy efficient appliances, with particular attention to water consumption</li> <li>• Rain water collection to enable showers in the garden in the summer</li> <li>• Building a fireplace and other ways to enable switching to wood burning</li> <li>• Going to library</li> <li>• Renting electronic tools (instead of owning them) that are used rarely</li> <li>• Climate-friendly gifts for birthdays and Christmas</li> <li>• Lowering body heat with cold showers or with wet towels in summer (instead of air conditioning)</li> <li>• Having low-carbon days every week (no TV, no internet and experimenting with raw dishes)</li> <li>• Having meat or dairy free days</li> </ul>
<b>EN2</b> • Season 1	<ul style="list-style-type: none"> <li>• Turning down the heating for the night or when not at home</li> <li>• Changing to energy saving lamps/LED</li> <li>• Taking shorter showers</li> <li>• Less use of car, more walking, more public transport</li> <li>• Using switchable power strip</li> <li>• Switching off lights</li> <li>• Collecting bath water and reusing it</li> <li>• Insulating the door, windows, and some of the colder walls</li> <li>• Avoiding stand-by</li> </ul>	<ul style="list-style-type: none"> <li>• Tracking of energy usage</li> <li>• Eating seasonal fruits</li> <li>• Less ironing, hanging out clothes immediately after shaking them well</li> <li>• Shortening ventilation time</li> <li>• Switching off the boiler when we leave the flat for several days</li> <li>• Visiting relatives more often: this results in less energy use at home, and vice versa</li> </ul>

In general it can be concluded that the popular and low-hanging fruits were reaped by the majority of households that participated in the programmes. Furthermore, more advanced 'energy savers' could still find many areas to improve and this has resulted in a large collection of interesting and innovative ideas, including climate-friendly Christmas celebrations, reducing ironing needs, having weekly low-carbon days, etc.

In the EN2 campaign, questions in the survey were designed to allow for an analysis of the background factors of observed behaviour change. These indicators measured the level of knowledge in particular related to understanding logical relationships, motivation levels, intentions and actual behaviours. These indicators show relevant changes on a range between -10 and 10 (see Figure 4).

Figure 4: The relative change of behaviour and its antecedents in the first season of EN2 in 3 participating countries. The normalised value of indicators show a positive change in all areas in all countries during the campaign. Source: EN2 Consortium 2012.



The clear increase of all antecedents and also of energy efficient behaviour support current theories in psychological-behavioural literature. Low-carbon behaviour has certain pre-determinants, which should be influenced at the same time. Information levels, understanding of one's own role and a feeling of responsibility, thus motivation, are essential drivers to improve intention and motivation (EN2 Consortium, 2012).

#### 4.3 Energy saving and carbon emission reduction – can households monitor their consumption?

One of the most important questions to be asked is whether households participating in the three residential programmes managed to reduce their energy consumption and resulting carbon emissions. As indicated in Table 1, all three programmes used calculators to keep track of and monitor both energy consumption and carbon footprints.

Recent research on the general awareness of households of their energy consumption in Hungary revealed that 64% do not keep track of or monitor their consumption (OTP, 2012), with 21% never looking at their energy bills (Bell Research, 2013). Although no specific quantitative survey was carried out in the three programmes in this regard, our experience confirms that a lot of households have difficulty in interpreting their energy bills, providing reliable reference consumption data as well as are reluctant or find it challenging to read meters regularly. Quite often the reason for this is simply to do with the lack of established routines. In fact, one of the objectives of the three programmes was to help households establish such monitoring routines.

Because of its more informal nature, there was no comprehensive study done on the carbon footprint reduction or energy saving achieved by the Gödöllő Climate Club members. However, Club members regularly discuss the savings they have managed to achieve and through which measures. Most members achieved at least 10% reduction in energy use since they joined the Club, and it has become customary among members to say *“since I started coming to the Club, I’ve stopped using... I’ve given up... I’ve saved...”*, so success in saving and being proud of it has become part of the Club identity.

In the SF campaigns those households that participated in the competition were required to monitor their consumption and related carbon footprint. Prizes were not given based on the saving achieved as it had been known by organizers that establishing reliable reference consumption would be difficult. Rather, **the objective was to establish the routine of meter reading, and familiarize households with their consumption and carbon footprint.**



Nevertheless, a great number of households monitored their saving using the calculator provide<sup>10</sup>, and included results in the various tasks completed as part of the competition.

Using the consumption data based on meter readings entered into the carbon calculator developed specifically for the programme, at the end of the SF campaigns organizers calculated the average carbon footprint of the best performing households, and found that they were lower than the average Hungarian and EU carbon footprint (see Table 7).

Table 7: The carbon footprint of winning households in the SF campaigns

SF campaigns average per capita carbon footprint		Average Hungarian per capita carbon footprint*	Average EU per capita carbon footprint*
Large Family – SF, average of 21 winning households	SF, average of 25 winning households		
2 t/yr	2.65 t/yr	5.1 t/yr	7.76 t/yr
* Source: EEA, <a href="http://www.eea.europa.eu/data-and-maps/">http://www.eea.europa.eu/data-and-maps/</a> , data for 2010 Notes: <ul style="list-style-type: none"> <li>• Only CO<sub>2</sub> emission related carbon footprint was considered.</li> <li>• The calculator developed for the SF campaigns only includes emissions related to direct energy use in the home, diet, travel and holidays; however, direct energy use is based on consumption in winter months.</li> </ul>			

In the EN2 programme, as the competition was based on concrete energy saving, all participating households/groups were required to provide reference consumption data, and had to read their meters at least once a month and enter the data into an online calculator<sup>11</sup>. Their savings were calculated by the calculator in both kWh and tons of CO<sub>2</sub> emissions avoided, the latter as a complementary piece of information, as the winning group of the competition was selected based on the savings achieved in kWh in comparison to the reference consumption in kWh. The savings achieved in the two seasons of EN2 are summarized in Table 8.

Table 8: Summary of savings achieved in the EN2 campaigns

Season 1 of EN2		Season 2 of EN2	
Average saving of all participating groups:	9%	Average saving of all participating groups:	8%
Total saving:	221,705 kWh	Total saving:	180,000 kWh
Saving achieved by the top 3 groups:		Saving achieved by the top 3 groups:	
1.	23%	1.	23%
2.	19%	2.	17.4%
3.	16.5%	3.	12%

<sup>10</sup> The calculator developed for the SF campaigns (but available to all interested households) can be accessed at <http://www.karbonkalkulator.hu>.

<sup>11</sup> Please note that this is not the same calculator as the one used in the SF campaigns. It can be accessed on the home page of the programme, and is available for all 16 countries participating in EN2: <http://www.energyneighbourhoods.eu/>.

#### 4.4 Working with energy masters / group coordinators

In order to facilitate the formation and sustenance of small, local groups, and ensure that households and groups joining the programmes from all over Hungary had local contact people to whom they could turn to for advice, working with, training and supporting lay and largely voluntary energy masters (i.e. group coordinators) was an important part of both the SF and EN2 campaigns. People applying for the role of energy masters did not need to have any previous knowledge or experience in environmental work; however, they needed to be open and able to attract people around them to participate in the programmes (e.g. friends, family, colleagues, neighbours, etc.). Energy masters were offered training in climate change and energy saving related knowledge and skills as well as group dynamics, motivation and organization. In addition to face to face training events (which were organized 2 or 3 times during the programmes), they were also given continuous expert assistance.

Although the organizers initially worried that there might not be any people interested in becoming energy masters, it soon became obvious that there were more than enough applicants each time this voluntary position was advertised. Applicants came from all fields and sectors, and were of varied age (from university students to pensioners). Some of them were already part of a group (e.g. a large families' association, Rudolph Steiner communities, employees of the same company, etc.), others applied because they wanted to try their hand at something new and positive, or wanted to start organizing their neighbourhood. Quite a few of them reported wanting to use this opportunity to prepare for something new in their life (e.g. mothers preparing to get back to work, students getting ready for real jobs, people considering a career change, etc.), or were unemployed and wanted to do something that could turn into a job.

It is important to note that being a Gödöllő Climate Club member as well as being a regular – but successful – participant in either of the competitions prepared and motivated people to later become energy masters. 8% of the energy masters trained started as Climate Club members, and 25% of them first simply participated in SF or EN2, but then as they completed either of the competitions successfully, felt ready to start helping and motivating others. It is also worth noting that 16% of the energy masters decided to coordinate and facilitate groups in 3 out of the 4 potential opportunities, and there was 1 person who acted as an energy master in all 4 cases.

## 5 Conclusions

In order for low-carbon lifestyles to become mainstream, individuals and households need to be convinced that the first important step they can take is changing their everyday behaviour, which is challenging, but possible without financial investment. The three programmes introduced in the paper set out to do this, and we can say that participating households now not only learnt, but also experienced that energy saving through behaviour change is possible as well as rewarding. Even those that perceived themselves as highly environmentally-aware households where additional savings could not possibly be made reported considerable savings at the end of the programmes.

Although material reasons (i.e. achieving energy savings and thus a reduction of the monthly bill) are an important motivating factor for people to join behaviour change programmes, many of them mention other reasons as well, such as wanting to do something positive for the environment (climate change) or their own neighbourhood. As a result, it is important to include these in communication materials designed to encourage people to adopt low-carbon behaviour, a conclusion that supported by other studies, too (see e.g. Kasser, 2009; Sheldon et al., 2011). Community events and developing a strong 'small footprint' group identity can also help incorporate these non-material motivators into climate change and energy efficiency related intercourse.

Furthermore, in this particular case in Hungary, having the opportunity to first pilot a methodology in a smaller scale programme (the Climate Club), and then applying it in several larger-scale campaigns proved to be beneficial. On the one hand, it encouraged households to participate in more than one programme and thus continue with their transition to low-carbon everyday routines. On the other, it provided the opportunity for individuals to become energy masters or group coordinators and pass on their knowledge and experience.

However, in order for this to happen on a wider scale, appropriate policies and funding should be available to support successful behaviour change programmes for longer periods of time, allowing for the programme to spread and giving participants the chance to motivate others to join through relating their good experience. As a certain percentage of participants in these programmes will be happy to become voluntary energy masters, it is conceivable that the support necessary for programmes can be progressively reduced as the number of energy masters – local change agents – grow.

Further research would be needed to establish how to encourage and empower people more effectively to become energy masters as well as what kind of frameworks and structures are needed to support them in their work. In our case, a competition with a set timeline and attractive low-carbon prizes, and an expert organization available to provide continued professional support proved to be a useful and effective framework.

It is also worth noting that a lot of the people who volunteered to be energy masters were at some kind of a changing point in their lives, for them becoming an energy master was, in a way, a carrier option. One of them even told us that she believed she achieved quite a **satisfying carrier in energy saving**: she was first a Climate Club member, then decided to participate in one of the SF campaigns where she was a member of one of the winning households, and then, as felt ready, she joined the EN2 programme as an energy master. So, processes designed to provide some form of recognition for these people could contribute to low-carbon lifestyles becoming the norm.

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