LEARNING ABOUT AND INVOLVING USERS IN ENERGY SAVING ON THE LOCAL LEVEL

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Abstract

European energy policy aims to shift the energy market toward an increased focus on energy services based on end-user needs. This requires a close understanding of the role of end-users and their needs and practices. Based on a European project called CHANGING BEHAVIOUR, we examine the interaction between energy users and energy efficiency practitioners. Using previous cases and our own pilots as data, we uncover the main difficulties in understanding and working with energy users. We argue that formal user research and interaction methods are helpful, yet insufficient for project success or even genuine user responsiveness. Additionally, methods and skills are needed for interacting with broader networks of stakeholders in the user context. Moreover, user responsiveness requires informal interaction with energy users, interpersonal skills and human judgment, which are difficult to develop merely by using better methods.

Keywords

Energy conservation, energy efficiency, local, energy end-users, user interaction

1. Introduction

Europe has ambitious goals for reducing energy consumption and greenhouse gas emissions (EC, 2011). The aim is to shift the energy market toward an increased focus on energy services based on end-user needs (e.g., light and warmth rather than electricity). Such a shift requires a close understanding of the role of end-users in adopting new solutions and changing energy use patterns. This has been a central focus in the CHANGING BEHAVIOUR project [1] which developed a model of end-user behaviour and stakeholder interaction based on previous research and experience and tested and developed the model in pilot projects in different parts of Europe in order to create practical tools. Our particular focus was on local agencies, companies and NGOs promoting climate action and energy saving in their own region in households and small organizations.

The present paper focuses on interaction between energy end-users and energy practitioners. For energy experts, energy efficiency is often the most logical thing in the world. It saves money, saves the environment and reduces carbon emissions. Unfortunately, energy end-users rarely see the world in the same way. For energy end-users, energy use in the home or at the workplace is often 'invisible' and rarely the subject of conscious decision (Wilhite et al., 2000). Thus, getting to know the end-users and their context, and finding the best ways to interact with them are key issues for energy efficiency practitioners.

The problem of understanding users is not exclusive to energy efficiency projects. User orientation is a key focus in the innovation and design literatures (von Hippel, 2005; Hoffmann 2012), and we draw on these discussions to conceptualize how energy efficiency practitioners learn about energy end-users and involve them in their projects. Our research questions are as follows: Is one way of gaining knowledge about energy end-users better than another? And, if this is not the case, then why? The first question can be answered

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through analysis of secondary data, but we need to draw on personal experience in our pilot projects to answer the second question.

In this article, we first outline existing research on the interaction between energy experts and end-users. We then analyse 27 previous cases to identify current ways of learning about energy end-users and the strengths and weaknesses of different approaches, building on our own cases and the innovation and design literature. We then turn to issues that are less well conceptualized in the innovation and design literatures, i.e., the need to address the broader user context and the human challenges for energy efficiency practitioners in designing and operating user-inclusive projects. Here, we draw on our own pilot projects for in-depth insights. We conclude with implications for practice, policy and research.

2 The difficulties of understanding the end-user

Energy means different things to different people. Studies have found that people do not know much about how and where energy is used. While such findings suggest that more public education is necessary, they disregard the energy end-users' perspective (Guy and Shove, 2000). Many argue that rather than disseminating the energy experts' worldviews to energy users, energy experts should try to understand how users (i.e., lay people) frame energy use in the home or at the workplace (Wilhite et al. 2000; Parnell and Popovic-Larsen, 2005).

The exchange of energy efficiency knowledge among experts and lay people reflects a fundamental problem in innovation. Von Hippel (1988) has termed this a problem of "sticky information": information about users' needs and manufacturers' capabilities is highly contextual, tacit and difficult to transfer from one site to another (von Hippel 2005). This problem hinders the uptake of innovative solutions – many rounds of information exchange are needed in order to establish facts and clarify perspectives. For example, energy efficient building solutions often fail to address users' concerns and practices, leading to limited uptake and effectiveness (Rohracher 2001; Heiskanen and Lovio 2010).

The product design and innovation literature offers several approaches to solving the problems of 'sticky' information and helping designers and users to understand each other better (Greenbaum & Kyng, 1991; Beyer & Holtzblatt, 1998; Maase & Dorst, 2006). These methods involve intensified interaction between the world of designers and the world of users. Designers can visit the users at home, at their workplace or in their communities and use ethnographic observation to understand the users' worlds (Leonard 1995; Koskinen, et al. 2003). Or users can join designers ‘at the drawing board’ in co-design exercises, workshops or by contributing their own inventions (Jégou and Manzini, 2008; Kristensson et al. 2004; Franke & Shah, 2003; von Hippel, 2005).

There is also a stream of research in the energy conservation literature that aims to understand energy end-users better. Sociological research on energy use has shown that people do not actively consume energy: energy use is a consequence of action with some other purpose, such as raising a family or running a business (Lutzenhiser 1993; Wilhite et al. 2000). As energy provision has historically become based on centralized systems, energy end-users have less involvement and responsibility in how they consume energy (van Vliet et al. 2005). While there are certain groups of people who do monitor their energy consumption closely due to restricted budgets or concern for climate change, energy use is still mostly ‘socially invisible’ (Lutzenhiser 1993) and is driven by evolving expectations and standards of normal everyday life (Shove 2003). When energy experts want people to become aware of their energy consumption and related behaviour, they are thus asking them to do something unusual. Hence, there is indeed a need to bring the energy end-users’ and energy experts’ worlds closer to each other.

Some recent energy projects have adopted ideas from user involvement in product design and innovation. For example, within the UK Low Carbon Communities Challenge, ethnographic research has been used to understand how householders interact with new ideas to save energy (DECC 2010). Designers have also developed an interest in emerging user demands for more sustainable solutions, as in the EMUDE project (Manzini and Jégou, 2006; 2008). Yet such examples are still rare. In the following, we examine how 27 recent energy projects in European countries have addressed the challenge of learning about users.

3 Approaches to learning about end-users: findings from an analysis of previous European projects

3.1 Data and methods

Our data and methods consist of (1) an analysis of previous cases, drawing on (2) a theoretically developed categorization of the cases. In order to gain more in-depth understanding of problems in learning about users and including them in project design and implementation, we also draw on (3) our own experiences from pilot projects carried out in CHANGING BEHAVIOUR.

In the CHANGING BEHAVIOUR project, we collected several databases on previous experiences in promoting energy efficiency and saving. From a large database of 100 energy conservation and efficiency projects, we selected a smaller sample of 27 more and less successful projects for in-depth analysis (Mourik et al. 2009). Our prime concern in case selection was to include cases that were not completely successful, which are difficult to find in the published literature. Another concern was to include cases from different parts of Europe, including new member states. For these reasons, we were forced to draw on the project partners' own experiences and networks to gain access to such cases. Nonetheless, we only managed to gain data from five cases that more or less failed to reach their goals. The cases were also selected to represent different target groups, with at least three cases from different countries targeted at households, offices, schools and municipalities (Table1).

Table 1: Selection of cases analysed in terms of user interaction

Country	Programme	Aim of the programme	Type of project manager
Europe	Eco n'Home	Provision of home energy audits to promote efficiency investments and behaviour change	Energy agencies, consultancies
Denmark	Samsø Renewable Energy Island	Creation of a renewable, energy self-sufficient island municipality	Local municipality
Estonia	Energy Saving Competence Centre	Promotion and knowledge networking on energy saving measures in apartment buildings	Public agency
Finland	Energy Efficiency Agreements	Negotiated agreement to promote energy audits and investments in municipalities	Ministry/Public energy agency
Finland	Energy expert programme	Training of volunteer residents promoting energy efficiency in housing associations	Public energy agency, housing company
Finland	Green Office programme	Certification and management scheme to reduce CO_2 and resource consumption in offices	NGO established by individuals
Finland	Climate Change Campaign for Schools	School climate change awareness campaign implemented by environmental and youth NGOs	NGOs
Germany	SANIT	On-site advice service for energy efficiency renovations provided by consumer NGO	NGO
Germany	Standby	State-wide campaign to create awareness of standby energy among consumers and retailers	Public energy agency
Germany	EcoTopTen initiative	Nation-wide information and rating service for energy efficient products	Research institute
Germany	Contracting Rommerskirchen	Implementation of energy performance contracting for municipal buildings	Municipality/small for-profit company
Greece	Active Learning	Education for schoolchildren for saving energy at school and at home	Research institute
Hungary	Carbonarium Association	Produce information on participants' personal climate change impacts and promote public awareness	NGO established by individuals
Hungary	Social Housing Energy Efficiency	Implement energy renovations in apartment blocks	Small for-profit company
Hungary	Climate Watch	Educational and award programme for school groups to reduce CO_2 emissions	NGO established by environmental NGOs
Hungary	Energy Trophy	Competition for saving energy in offices through change in employee behaviour	Public agency / NGO
Latvia	Building energy audits	Energy audits of apartment blocks	Small for-profit company (consultancy)
Latvia	EnERLIn - Efficient Residential Lighting Initiative	Increase residential lighting efficiency by 50% increase in CFL penetration via promotion campaign and quality charter	University / small for-profit company
Lithuania	Taupukas residential awareness campaign	Communicate the benefits of energy and water consumption efficiency and stimulate energy and water saving	Public energy agency
Lithuania	Multi-apartment buildings modernization programme	Promote energy modernisation of multiapartment buildings via demonstrations and subsidies	Ministry of environment
Netherlands	Green Energy Train, The Hague	Reduce the energy, heat and water use in apartment houses by 5% through a specific education and communication approach	NGO/ Small for-profit company
Netherlands	Green Energy Train Leidsche Rijn	Reduce the energy, heat and water use in apartment houses by 5% through a specific education and communication approach	NGO/ Small for-profit company
UK	Metropolitan Police Energy Efficiency Programme	Improve energy efficiency in existing buildings and practices of the Metropolitan Police Service	Public agency
UK	CIS Co-operative Insurance Society Solar Tower	Renovate a landmark building using solar panels	Consumer cooperative
UK	Manchester is My Planet (MiMP) programme	Increase policy development/implementation on Climate Change among Greater Manchester local authorities	Small non-profit company
UK	MiMP Climate Change Pledge	Attract citizens in Greater Manchester to sign up to a Climate Change Pledge and encourage a switch to less carbon-intensive lifestyles.	Small non-profit company
UK	Kirklees WarmZone	Municipal support for household insulation and other energy saving measures	Local energy agency

In the following, we focus on the interactions between the project managers and the targeted energy end-users. We first present the ways in which the case projects gained information on end-users and their needs, circumstances and ways of thinking about energy. We then examine whether particular ways of learning about end-users are related to the success, scale and planning style of a project. Finally, we identify pros and cons of the various approaches, and highlight limitations of focusing merely on energy end-users.

3.2 How did the projects learn about their end-users?

The literature on user involvement in design and innovation suggests that different ways of learning about and involving users are coupled with distinctive ways of representing the end-users (Muller et al. 2001, Stewart & Williams 2005). We used this literature to develop some major categories for classifying the way in which projects learned about users, which were then elaborated on after a first analysis of the data (see Table 2).

- Surveys represent a fairly ‘distant’ way of approaching users *en masse* (Akrich, 1995; Johnson, 2010). Survey design requires preconceptions of what questions should be asked, as well as of what the major differences between respondents might be.
- Interviews, focus group discussions or group meetings serve some of the same purpose as surveys, but usually address a more limited set of the target group, yet offer more situated, face-to-face interaction (cf. Johnson, 2010).
- The use of prior research and particular theoretical perspectives embodies the assumption that human behaviour exhibits certain universal invariables, i.e., is relatively context-independent, and that knowledge can be fairly unproblematically transferred from research to practice (Pawson and Tilley 1997).
- Personal experience is often cited as a problematic source of user knowledge (Akrich, 1995; Oudschoorn and Pinch 2003), as this assumes that the users are similar to the designers. Yet in certain situations the designers’ own experience as users can be a valuable resource for making designers sensitive to input from other, different users (Kotro, 2007).
- User-driven projects build on the notion of lead users (von Hippel, 2005), i.e., users who face needs that have not yet emerged in the market and make or modify products to meet those needs.
- While some projects were not user-driven, they could be classified as user-inclusive (Heiskanen et al. 2010a). Even though formal methods of user-inclusive design were not applied, the project managers built on project ideas gained from users, or improved their

project based on feedback. Because of the lack of formal methods, we termed this category "familiarity and informal interaction".

Table 2. Approaches to learning about end-users applied in the case projects

Approach to learning about end-users	Number of cases applying this approach*
Surveys	5
Interviews, focus group discussions, group meetings	5
Prior research, particular theoretical perspectives	11
Personal experience	6
User-driven project (or pilot project)	8
Familiarity and informal interaction	8

* The number of cases is larger than the total number of cases analysed: some projects used multiple approaches

Surveys were applied by five of the projects to assess the needs, attitudes and knowledge of the target group. In some cases, the surveys were quite sophisticated and they were used extensively and thoughtfully in the design of the project. For example, the EcoTopTen campaign in Germany (Bürger and Bern 2009) built on a thorough survey of current consumer lifestyles and interests, and organized focus groups to gain more user input into the project development. In some of the other projects, the main purpose of the surveys was to identify a baseline for evaluation. Often, the surveys data did not feed into the project design, which was set before the research was conducted.

Hence, timing of data collection for surveys can also be an issue. More generally, a lack of time was frequently mentioned in the project cases as a reason for not doing research, or not being able to integrate research findings or other feedback from users into project design.

Five of the projects drew on interviews, focus group discussions, or group meetings to gain an understanding of end-users' concerns. For example, the Social Housing Energy Efficiency project in Hungary conducted interviews with residents in social housing blocks. They found that energy costs are a heavy burden for people with low wages and obsolete and inefficient equipment. Also, it was found that the target group was quite amenable to make renovations, but lacked the necessary resources.

Eleven of the projects built on prior research or particular theoretical perspectives. In some cases, a particular theory of human behaviour and behaviour change was very dominant, e.g., the Green Energy Train projects in the Netherlands (Feenstra 2009) built on a concept called ‘Long Live Energy’, which aimed to fundamentally challenge end-users’ world-views. In other cases, less specific social science perspectives were used (e.g., active learning, social marketing). In the UK cases, The *Rules of the Game* guideline published by Defra, which combines both theoretical insights and empirical findings, was mentioned as a key resource for understanding end-users (Robinson 2009).

Some of the case projects built strongly on personal experience. Most often, the project manager had been working previously with the same end-users and had thus accumulated experience or even formal research and statistics. For example, in the Hungarian Climate Watch Programme for climate education in schools (Vadovics 2009a), the National Society of Conservationists (NSC) had implemented numerous projects in environmental education, had been working with teachers and schoolchildren for a long time, and was familiar with pupils’ knowledge levels and the general context of schoolwork.

Eight of the cases were completely or partly initiated and designed by end-users. In three of these cases, these end-users were members of organizations (municipality, municipal department, company). In one case, Carbonarium – a Hungarian climate action club to reduce members’ carbon footprints – the project was designed and implemented completely by private citizens (Vadovics 2009b). In the remaining cases, end-users were involved at an initial stage, but later the programme grew to address other end-users not originally involved. For example, in the Finnish Energy Expert case – a volunteer-based energy monitoring and advice programme – the initiative came from active residents in the housing association that first implemented the programme. However, the programme has since extended far beyond its initial context (Anttonen 2009). In Samsø, Denmark, the initiative to become an energy self-sufficient island came from the municipality, though most inhabitants who were later involved were not consulted at this stage (Saastamoinen 2009). In some cases, early user involvement was explicitly used to pilot programmes that were later expanded to a broader user base. For example, the Finnish Green Office programme – promoting climate-friendly practices at the workplace – was built up after a two-year pilot with eight customer companies (Heiskanen 2009). Similarly, the Finnish Municipal Energy Efficiency Agreements were partly based on pilot experiences in one city (Salminen 2009).

Even where the end-users themselves were not the initiators of the programme, and no formal pilot phase was organised, user experience could influence design in more informal ways. Some of the projects modified their design as a result of feedback and experiences gained during the course of the project, as was the case in the German SANIT project (Maier 2009). This project, providing on-site advice for energy efficiency renovations, specified its target group as a result of initial interest seen in contacts from advice-seekers. In some of the cases, programme design elements were discussed with stakeholders representing various user groups, as was done, for example, in the Manchester is My Planet pledge campaign (Robinson 2009). In some cases, the project managers and delivery staff had prior personal experience of being 'one of the users': for example, the Finnish Ilmari climate change campaign for schools was run by young people, very recently out of school themselves (Rask 2009).

We noticed that none of the case projects applied observational or ethnographic methods (cf. Leonard 1997; Beyer & Holzblatt 1998) to learn about end-users and their contexts. Literature on the importance of the everyday routines and shared cultural conventions in shaping energy use highlights the need to learn about end-users' contexts and energy routines on-site (Parnell and Popovics-Larsen 2005; Bell and Summerville 2006). However, ethnographic research can produce large amounts of data, which can be overwhelming for designers – even in well-resourced design teams. For small organizations, personal experience, familiarity and informal interaction seem to serve somewhat similar purposes as formal ethnographic research.

3.3 Which approaches to learn about end-users lead to success?

It might be tempting to say that one approach is best. Some authors argue that it is imperative to build programmes on dedicated research into the target group's attitudes and barriers to change and on pilot projects (McKenzie-Mohr 2000). Others make a case for building programmes on existing theories (Dahlbom et al. 2009). Similarly, some argue that it is crucial to build programmes on end-users' needs and capacities (Parnell and Popovic-Larsen 2005).

Our analysis shows, however, that none of the approaches, in themselves, provided a 'silver bullet' for success (successful projects are here defined as ones that reached all or most of their overall goals and targets). Successful projects could be based on any of the methods. The only 'method' *not* used in any of the *un*successful projects was "familiarity and informal interaction". However, this 'method' was used in combination with other methods in seven of the eight cases. In general, the use of a combination of methods appears to increase the project's chances for success (cf. Stern 1999; 2000): of the 16 projects that made use of a variety of approaches, only two failed to reach its goals, whereas of the 11 projects that used only one approach, there were three that did not reach their goals. This is not conclusive evidence, considering the small number of cases and, in particular, the small number of unsuccessful cases, but it suggests that a combination of methods can help, and would be worth studying in more detail.

The approaches selected also partly reflect the needs and resources of the projects. Large-scale projects or programmes addressing heterogeneous target groups need to gain representative data on end-users, whereas smaller, more 'local' projects can build on more informal experiences – and in fact, must often do so due to resource constrains. There are also differences in terms of how much the intervention can be tailored or customized to various user groups. Yet the different approaches also reflect underlying planning philosophies. The projects building on more 'distant' resources, such as surveys, prior theoretical concepts and previous research are designed more from 'top down'. This type of planning approach implies a clear separation between research, design, implementation and evaluation. Other projects build more on practical experiences, informal contacts and initiatives taken by the end-users. Here, the planning approach is usually more 'bottom up' and iterative. Small pilots or feedback and ideas gained from stakeholders can change the course of the project. Research, design, implementation and evaluation occur concurrently.

3.4 Pros and cons of various approaches

The previous observations suggest that different approaches are more suitable for particular types of projects and particular problems. In the following, we summarize the pros and cons of different approaches based on a combination of our analysis of the cases and viewpoints from the literature on user involvement in design and energy efficiency projects (Table 3).

Formal, dedicated research involving surveys and interviews is obviously useful. Representative samples of end-users can be studied and thus there is at least a chance of learning the views of 'less enthusiastic' members of the population. At best, surveys and interviews can bring up new knowledge that challenges the designers' preconceptions. However, our analysis shows that surveys do not always feed into project design, for example because they are conducted at a relatively late stage. Surveys can be designed to confirm existing preconceptions, or they can be read tactically (Akrich 1995). Conducting high-quality surveys or interviews requires specialized skills that are expensive. Moreover, sociological research on energy use (Wilhite et al. 2000) suggests that surveys fail to capture the particularities of how energy use is embedded in everyday life.

There is also obvious merit in building one's project on a **sound theoretical base** of prior research. The behavioural and social science literature can provide useful concepts for making sense of seemingly irrational user behaviour (e.g. Kempton et al. 1992; Stern 2000). For example, prior research can help understand the factors underlying users' short payback time expectations for energy efficiency investments (e.g. Golove and Eto 1996). Concepts like "descriptive social norms" (i.e., knowledge of what others are doing and hence what is normal behaviour in a certain community) can help project designers to utilize social dynamics in promoting energy-saving practices (e.g. Goldstein et al. 2008). Yet there are many competing and contradictory theoretical perspectives on energy-related end-user behaviour (Wilhite et al. 2000). Social science theories are "middle-range theories" that apply in certain contexts and not in others (Pawson and Tilley 1997). Disciplinary research highlights certain aspects of human behaviour and downplays others, while real-life problems cut across disciplines (Fourez 1997). Our data revealed that overly theory-driven projects sometimes disregard issues that are important for end-users (e.g. Feenstra 2009). In real life, it can be difficult to implement a design that is based on, e.g., controlled laboratory experiments, because project managers cannot control the total user environment.

Previous experience, especially with the same end-user group, is obviously useful and speeds up the learning phase. This is evidenced in our data, for example, by the professional way in which the Hungarian NGO, NSC, organized the Climate Watch programme, building on previous experience in environmental education, including knowledge about pupils' background knowledge about energy issues and climate change, and experience in organizing experiential, hands-on, action-based learning events. Their success is also partly due to the fact that their local member organizations took part in project implementation, contributing their local knowledge. A sound experience base also creates confidence and provides practical skills and solutions that are difficult to learn in any other way. Yet there can be drawbacks in relying too much on prior experience, especially in the long term and in changing environments. Management scholars use the term 'competence trap' (Levinthal and March 1993), which means that an excessive focus on core competencies and well-established skills can deter organizations from learning new skills. Previous experience may thus be insufficient when conditions or people change.

User-driven projects are ideal in many ways. It is much easier to work with end-users who are willing to invest their own efforts in designing a project that can help them save energy. User-driven projects can also serve as pilots to refine broader programme designs (cf. MacKenzie-Mohr 2000). End-users know about their needs and circumstances and can contribute to context-tailored and user-friendly designs (Stern 1999; 2000). On the other hand, energy-related behaviour is often habitual and not subject to conscious reflection (Abrahamse et al. 2005). Hence, end-users may not always be aware of their needs, behaviours or all the factors influencing them. Moreover, end-users who are eager to participate in designing energy saving projects only constitute a small segment of the entire population. So the projects in our dataset that were user-driven were usually small, or started out small. Scaling up and 'growing' the project into a large programme involving 'ordinary' end-users can be difficult. Some of our case projects accomplished the upscaling process successfully, e.g. the Finnish Green Office programme, whereas others like the Carbonarium Association remained small. Upscaling requires new resources and more structured ways of organizing, so our cases also include ones that had difficulties in growing beyond their original user base.

End-user interaction and learning about end-users can also be informal, based on face-to-face contacts or membership in the user community. Informal interaction allows for a rich exchange of information (including non-verbal information), and familiarity creates trust. This is evidenced, for example, in the case of the Danish Samsø renewable energy island, where the entire project built on close interaction within a tight-knit rural community (yet also employed more organized events to ensure participation by the islanders). Familiarity and immersion in the user community allow project managers to access the end-users' everyday routines and the meanings attached to them (Parnell and Popovics-Larsen 2005). However, it can take significant time, commitment and interaction to build up the necessary level of familiarity. Moreover, programme managers' personal contacts are not always representative of the target group as a whole. They usually center on the active and positive people, and may thus obscure more marginal and critical voices (see Heiskanen et al. 2007).

Table 3. Pros and cons of particular approaches to user interaction in energy demand-side programmes

Approach to learning about end-users	**Pros**	**Cons**
Surveys and interviews	Systematic approach to data collection Surveys provide the possibility to poll representative samples	Do not always feed into programme design Surveys may be designed to confirm existing preconceptions, may fail to bring up new insights Conducting good research is expensive and requires specialized skills
Prior research, particular theoretical perspectives	Sound theoretical base can guide observations and help to make sense of energy-related behaviour	Commitment to prior findings or theories may lead to overlooking contextual particularities Overly theoretical background can lead to complex and confusing designs
Experience from prior projects	Sound experience-base creates confidence and practical skills that are difficult to codify	'Competence trap': overconfidence and failure to learn new skills in new contexts
User-driven project (or pilot project)	End-users know their needs and circumstances and can contribute to context-tailored designs End-users are motivated and engaged from the start and do part of the work	End-users may not be fully aware of their behaviour and all the factors underlying it 'Upscaling' from small user-driven pilots to broader groups of end-users can be difficult
Familiarity and informal interaction with the target group	Informal interactions allow for a rich exchange of information Immersion in the user community helps to understand users' everyday routines Familiarity creates trust	Much time and commitment are needed to build up the necessary level of familiarity Contacts can be biased: some end-users are more familiar than others

4 Beyond methods for learning about users

The inconclusiveness of our findings suggests that merely improving methods for learning about users is not a sufficient condition for creating user-responsive energy saving projects. We draw on our observations from the case studies to identify a "missing factor", i.e., the user context and the role of "secondary users". We then turn to our own pilot projects to uncover another set of "missing factors", which relate to the necessary interpersonal skills for managing user interaction.

4.1 The role of the user context and “secondary users”

It is widely acknowledged in the literature that energy end-users are not the only parties influencing their energy usage behaviour. Sociologists have argued that energy consumption is always a result of social processes on the family, community and institutional level (Lutzenhiser 1993; Wilhite et al. 2000). Individual choice is limited by the way cities, energy supply systems, housing designs, service networks and products are configured (Wilhite et al. 2000). Thus, change in energy-related behaviour is part of a larger change in the socio-technical organization of ‘systems of provision’ (Rohracher 2001).

What can individual projects, especially small-scale ones, do about socio-technical systems of provision? There are obviously issues in which project managers are fairly powerless. Yet our analysis of previous cases (Mourik et al. 2009) revealed that the ability of projects to reach their goals was often dependent on the engagement of not only end-users, but other relevant stakeholders in the end-user context. These stakeholders can be viewed as ‘secondary users’ or ‘indirect target groups’ (Oudshoorn & Pinch 2003).

Table 4 shows some examples of parties influencing the success of energy conservation interventions in our case studies (see also Neves et al. 2009). Many of our cases dealt with energy use in multi-apartment dwellings. Here, households were usually the target group for behavioural interventions and more technical interventions were addressed to facility managers. Problematically, these two types of interventions were often separate. For example, in the Finnish Energy Expert case, the resident “energy expert” volunteers were tasked merely to influence usage patterns, and were rarely involved in building maintenance and renovation plans (Anttonen 2009). Moreover, larger energy related decisions require concerted action by residents, making residents’ and tenants’ boards important decision forums. Informal interaction between residents (especially ‘opinion leaders’) was also found to be important. The ability to change energy-related practices could also depend on service providers (e.g., banks, contractors, retailers and suppliers).

Another example can be taken from cases dealing with energy use at the workplace. The possibility to change energy-related practices depends on the relations and responsibilities of management and employees: successful programmes need to engage employees and empower them to act. There are also particular groups of staff (e.g., IT managers in offices) who make decisions that influence others’ possibilities to save energy. The availability of positive feedback also depends on how the organisations’ clients value energy efficiency. Co-operation with facility owners and managers is needed to change business premises to accommodate energy-conserving practices, and suppliers and service providers are crucial for access to energy-efficient equipment and services.

Table 4. Examples of stakeholders potentially influencing changes in energy use

Multi-apartment dwellings	Offices
Households (tenants, owner-occupiers) Resident boards and committees, informal groups Facility owners and managers Banks Contractors, technology suppliers Government (national and local)	Management Employees Staff in charge of particular functions (e.g. IT) Trade, labour and professional organisations Clients Facility owners and managers Suppliers and service providers Government (national and local)

The ability to engage diverse stakeholders and align their interests was a critical factor for success in many of the case studies we analysed (Mourik et al. 2009). Understanding existing stakeholder networks and building on them was crucial for gaining access to the different parties whose participation and resources was needed for completion of the change programme. Understanding the user context and the role of "secondary users" is also stressed in the literature on user involvement in design (e.g., Beyer and Holzblatt 1998), but few practical methods or guidelines are offered for working with secondary users. Our analysis of the cases revealed that energy efficiency practitioners struggled to engage "secondary users", i.e., stakeholders, and to manage the complex network of interests emerging in multi-stakeholder co-operation.

4.2 Human factors in engaging with end-users

In CHANGING BEHAVIOUR, we applied the lessons learned from our analysis of success and failure in previous cases in six pilot projects, through which we developed a 'toolkit' for energy project managers. Each of these projects was closely followed by a research partner, who documented all attempts to use the tools in the toolkit, many of which related to learning about and involving energy end-users in the project (see Bürger et al. 2010). Here, we focus on illustrating how methods for enhanced user interaction need to be complemented with insight and judgment by energy efficiency practitioners. We focus on three topics: the importance of combining formal research with informal observations, the challenge of aligning diverse interests in user-inclusive projects, and the interpersonal skills needed to manage flexible, user-responsive projects. We illustrate these through insights gain in two of the pilot projects, Micro-ESCOs, which aimed to promote heating systems upgrades in a semi-rural residential area in Finland, and Energy Efficient Renovations in Cēsis, which aimed to promote renovations in multi-apartment buildings in Latvia (see Bürger et al. 2010; Heiskanen et al. 2011; Backhaus et al. 2010; Breukers et al. 2010). Heating system upgrades and energy renovations are expensive investments. People will not make them unless they are confident that the promised benefits will be achieved. The project managers recognized the importance of planning this type of project flexibly and in close co-operation with members of the target group.

The importance of combining formal research with informal observations: Several types of formal research were applied in the Micro-ESCOs project. Previous literature was surveyed on homeowners' willingness to invest and problems in implementing heating system upgrades. A survey was made of residents' problems with heating systems, their interest in new solutions, as well as of building characteristics and energy consumption. Moreover, a focus group was organized with "friendly users" (i.e., familiar people similar to the target group) in order to test and develop the project proposition to residents.

Nonetheless, much more was learned in informal interactions with residents, which occurred via attendance at community events, at meetings organized by the project, and in informal discussions during small energy audits done at residents' homes. One example of an important observation concerned elderly homeowners. They frequently mentioned their adult children (many living outside the region) when discussing heating systems upgrades. Many thought their children should be involved in the decision about investing in the house. Some were uncertain about their children's plans concerning "the old house" once they inherit it, but were reluctant to broach the subject with them. Hence, a new group of "secondary users" was identified: the future owners of the house. Another observation helped to explain the seemingly irrational practice of using expensive consumer credit to finance home improvements, when low-interest mortgage was also available. It turned out that re-mortgaging was fairly complex for the residents. Moreover, the informal discussions revealed that some people are reluctant to visit a bank and discuss their financial issues. Thus, the seemingly straightforward issue of obtaining low-interest credit for cost-effective improvements was not so straightforward for the residents.

Another example of the importance of informal observations can be taken from the Energy Efficient Renovations in Cēsis case, dealing with renovations in multiapartment buildings (see Breukers et al. 2010). The project managers had previously identified cost-effective energy renovation options using energy audits and now focused on getting residents to agree to make the necessary investments. Even though there are generous grants available in Latvia, the renovations imply significant up-front costs for residents, and at least 51% need to agree to the proposed renovation. Many residents were still hesitant. The project managers conducted a survey of the residents' main motives and barriers to investing in energy renovations, as well as on their sources of information. This was helpful in deciding which arguments to use in promoting the renovations and in identifying which personal contacts were important in swaying residents' decisions.

However, there are limits to what you can learn in a survey, and the project managers also learned a lot by spending time with the residents in Cēsis and getting to know them. One example of the importance of informal interaction and familiarity in this pilot project was in solving the problem of getting residents to attend the information meetings organized by the project managers. These were held in a nice hotel nearby, but few people showed up. The project managers had observed that residents usually meet and discuss important common issues in the stairwell of the building, and they decided to move their meetings there. Residents merely had to open their apartment doors to join the meeting. It was an unusual experience for the project managers, but resulted in a much better turnout.

The challenge of aligning diverse interests: Returning to our Micro-ESCOs case and the detached homeowners, we examine how user involvement feeds into common decisions. In order to design a project that meets the residents' needs, the project managers from Enespa engaged the residents in the design of the project at various stages. Initial ideas were collected at public meetings organized for the residents. The project managers attended a number of events organized by the residents or the local municipality to gain input on the project plans. These meetings gauged the residents' interest in heating systems upgrades and alternative solutions (including a common residential-scale heating system) and collected their concerns and ideas. Project details were planned at smaller meetings with actively participating residents (this group changed in composition over time). Here, decisions were made on implementation of the heating system upgrade. The project changed greatly at this final stage. Instead of a common heating system, participants decided to opt for individual ground source heat pumps, but ask for and evaluate the suppliers' bids collectively.

This pilot highlighted some of the problems in developing a project in such a flexible way. Users came up with many ideas and needs – not all of which could be fulfilled in a single project. The project managers had to make suggestions for fair and equitable solutions. Moreover, as the project changed significantly during the long planning stage, and the same people did not show up at each meeting, intermittently participating users were often confused by the "sudden" turns taken by the project. A round of interviews conducted after the completion of the project revealed that some of the participants were confused by the outcome and disappointed because their ideas had not been implemented.

The interpersonal skills needed to manage flexible, user-responsive projects: The account in the previous section already suggests some of the emotional challenges for project managers in the flexible and user-responsive kinds of projects represented by Micro-ESCOs. When plans are continually contested and changed, this challenges the professional identity of project managers. Principles of project planning had to be thrown overboard at times. Plans had to be continually redrafted. Moreover, it required significant effort from project managers to muster enthusiasm for each new plan.

Simply managing the social dynamics of a continuously changing group of residents planning an important investment was exhausting for the project managers. Snap decisions had to be made at meetings in response to ideas or concerns raised by residents. Some people's ideas were selected for implementation and others' ideas had to be dropped, and this had to be communicated politely but clearly to participants. Significant time was also needed for 'debriefing' and discussing the project among the project team in order make sense of what was going on and what should be done next (see also Breukers et al. 2010).

5. Conclusions and implications for practice, policy and research

While our data are based on a limited number of observations, they suggest propositions for further research. Our analysis suggests that diverse energy efficiency projects need diverse methods for learning about energy end-users. Our observations also suggest the need to involve stakeholders and anchor projects in the social context of the users. On the basis of our analysis, it is reasonable to suggest that energy experts' user responsiveness can enhanced by providing project managers with a variety of methods to explore the user context and to engage end-users and other stakeholders in project planning, implementation and evaluation. However, the practical implications of our experiences and analysis go beyond this need for 'methods'.

User involvement is not merely a matter of applying certain methods (Stewart and Williams 2005). This is because energy end-users are not merely passive recipients of approved solutions, simply in need of methods to fit the solutions to their needs (see Guy and Shove 2000). Hence, energy experts also need to develop sensitivity to the end-users' everyday practices. The literature on user involvement and design proposes ethnographic research for this purpose (Leonard 1997; Beyer & Holzblatt 1998). Our study suggests that small local projects can gain at least part of the same information via extensive informal interaction with users, i.e., spending time with them and keeping in touch throughout the project. One practical implication of our analysis is thus that informal interaction and immersion in the user community can be important complements to formal methods (see Hyysalo 2010).

Our analysis of user interaction in energy projects has implications for research and development. It provides new material for a discussion within the user involvement in design literature that questions the concept of “users”, until now primarily in the development of IT and medical equipment (Stewart and Williams 2005; Hyysalo et al. 2007; Hyysalo 2010). There are many different “users” of such products, including retailers and maintenance staff (for IT), or various healthcare providers, patients and their families (for medical equipment). The same applies to energy saving projects – many different stakeholders influence the end-users’ capacities and opportunities to save energy. This is not fully recognized in the existing methods for learning about and involving users, which mostly focus on individual users and offer limited guidelines for analysing groups, communities and networks (e.g., Rohracher 2005; Heiskanen et al. 2010b). More research and guidance is needed on the role of and appropriate means for stakeholder collaboration in energy efficiency and related projects.

Additionally, formal methods for learning about and involving energy end-users rarely address the interpersonal skills needed when working with users. User involvement and user-inclusive design are forms of interpersonal interaction, which raise conflicting feelings, require human judgment and challenge the project manager’s entire personality. We thus suggest that project managers should pay attention to the personal toll that interacting with users can take on them, and devote sufficient time for ‘de-briefing’ and reflecting on the project together with colleagues.

A final practical implication concerns funding bodies, which often set the framework for projects promoting energy efficiency, conservation or climate action on a local level. Funding for projects to change energy use should include time for research on the particular group of end-users targeted prior to project design. Moreover, user involvement and co-design require flexibility in project planning. Yet many government-funded projects require detailed plans, which cannot be changed easily in response to new information or user feedback gained during the project. If funding bodies want their projects to really make a difference, they should allow time for understanding the end-users’ perspective and flexibility to change project plans.

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