Development of a policy evaluation framework to monitor and evaluate DSM projects: A theoretical underpinning of the proposal

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Introduction

The aim of this brief is to provide an in-depth, theoretically-underpinned discussion on why a focus on behavioural change on the micro-level (small-scale users such as households, offices, schools, SME's) is imperative for future policy and programme development. We do so by introducing main challenges that policymakers and implementers face when developing and supporting DSM projects aimed at changing energy-related behaviours. In addition, we discuss various solutions for each of these challenges.

Why focus on behavioural change?

Energy efficiency and energy conservation have gained renewed interest due to climate convention commitments and the rising concerns about prices and security of supply of imported fuels. They are the cheapest, fastest and most feasible way to meet climate change mitigation targets (as well as many other environmental objectives). Concern for security of supply and 'peak oil' and other resource shortages have added to the urgency of energy conservation[i]. If one considers that, on average, European Member States households and other small-scale users consume about 26% of total energy used[ii], the potential of these small-scale users to tackle the issues of climate change, security of supply and the energy-efficiency gap is high. However, a significant proportion of energy efficiency improvement potential is not realised in these small-scale user sectors. This is often called the "energy efficiency gap", i.e. the difference between the actual energy efficiency and the higher level of efficiency that would still be cost-effective and relatively easy to implement. A focus on better understanding what drives behavioural change could close this gap. It is estimated that energy-related behavioural change, facilitated and/or induced by DSM programmes (e.g. feedback strategies that are improved to go beyond the traditional metering and billing) can trigger up to 20% electricity savings[iii]. All in all, it is estimated that 'negajoules', i.e. energy saved compared with a 'no-policy scenario', have become the largest single energy source in Europe[iv]. Recently, DSM programmes are increasingly acknowledging the untapped potential of changing the patterns of energy consumption by focusing on end-user energy demand reduction through behavioural changes. The potential of behavioural change (peak-load shifting) is, for example, one of the important elements of the business case for an economically viable roll-out of smart meters.[v]

There are a lot of recent, excellent reports that recommend behaviour change methodology as superior public policy tools[vi]. An excerpt from the UK's Dept of Transport report on Behaviour Change in Transport and Public Health outlines the main issues clearly:

'The main modelling tools used for transport forecasting and appraisal stem from neoclassical economics in which individuals are assumed to make choices which are

rational, consistent, perfectly informed and which maximise their economic utility by trading off between costs and benefits.

Research in behavioural sciences, especially psychology, indicates that individuals' choices in a wide range of contexts in fact deviate from the predictions of the simpler forms of economic theory. Some of these deviations are systematic, consistent, robust and largely predictable, but only by including wider considerations than are normally allowed for. Evidence on systematic deviations from rational models have emerged from studies on financial behaviour, consumer behaviour, health behaviour and more recently – travel behaviour. Behavioural economics is an emerging body of work seeking to understand behaviour by incorporating insights from behavioural sciences into economics. The approach differs from conventional economics mainly by giving more weight to what are sometimes called 'irrational' motives and behaviours. The robustness of the findings from behavioural economics led to a growing recognition that the model of 'unbounded' rationality is of limited value as a predictor of human behaviour in complex social situations. Moreover, the "predicted irrationality" of individuals could (and some argue should) play a role in the design of behavioural change interventions. In their recently published book Thaler & Sunstein advocate the use of 'nudges' to influence behavioural change. 'Nudges', small features designed in the environment of choice making, could help individuals to overcome cognitive biases, and to highlight the better choices for them – without restricting their freedom of choice.

Applying 'nudges' in a context of government policy is a rather new concept; until now much of the evidence base supporting the 'nudge' approach is rather eclectic, including experimental observations and small scale interventions. The approach claims merit partly from the attractiveness of its insights, and partly from its ability to find some ideologically and politically 'easy' policy actions. Following are some examples of nudges applied to different contexts.

The power of Defaults: People are influenced by 'defaults' set to them by authorities. It is often impossible for private and public institutions to avoid picking some option as the default. Well-chosen default rules are examples of helpful "choice architecture." Organ donation policies that make use of opt-in defaults and presume consent are more successful than others.

Framing and "Loss Aversion": People tend to feel and behave differently when information is presented (or 'framed') in terms of gains or losses. The emotion of loss is stronger than that of gain. The framing of choice outcomes as gains or losses could be applied as a 'nudge' to encourage travellers towards a specific choice.

Salience: Without feedback, a behavioural change is less likely. Where individuals do not associate their behaviour with the relevant costs and this slows down the process of behavioural change. Direct feedback on energy consumption (e.g. meter-reading; interactive feedback via a PC) was found to have an impact ranged from 5% to a 15% reduction in energy use. Many drivers have already experienced nudges; the high-pitch sound alert when driving over the speed limit or when leaving a lane serves as a nudge to provide the driver feedback.

People are motivated to 'do the right thing': the assumption made in classical economics that individuals act exclusively in their own self-interest, is increasingly challenged by behavioural economics. In many cases people are naturally motivated to 'do the right thing'; they exhibit pro-environmental, pro-social, and even altruistic behaviours. Many "soft" measures have a strong social dimension, and their degree of effectiveness might well be influenced by the extent to which people can interact with one another and feel motivated to make pro-social travel choices.

<u>Financial (dis)incentives might send the wrong message</u>. The use of financial incentives to motivate behavioural change is advocated by economists. However, recent findings from behavioural economics suggest otherwise. For example, introducing a penalty for parents who are late picking up their children from nursery increased the frequency of late arrivals. Generally, studies showed that when prices are not mentioned people apply social norms to determine their choices and effort. Financial incentives can crowd out feelings of civic responsibility and may actually discourage the kinds of behaviours needed to solve collective social problems such as climate change.

<u>Grass roots</u>: Individuals are influenced by 'significant others', people in their social networks, people who have geographical and social proximity (neighbours, work colleagues, class colleagues) and sometimes even by strangers with whom they share social identity. For example, energy bills that provide information on how energy efficient their neighbours are encouraged them to use less energy. Many of the behavioural insights emphasized in behavioural economics confirm the importance of self-regulatory mechanisms rather than traditional top-down command-and-control regulation. The small- scale group-based approach applied in the EcoTeams case study provided supportive social context that is accounted as one of its major success factors. Workplace and school travel plans also operate within a community which is limited in size and may encourage pro- social behaviour using 'bottom-up' approaches.'

Challenges when focusing on behavioural change

In practice, DSM projects focusing on behavioural change face the following four main challenges:

1. Targeting only the individual and his/her behaviour results only in short-term changes.

    a. Solution: The broader environment that makes people behave the way they do also needs to be targeted

2. Even if DSM projects do result in lasting changes these often occur on a very local level only and do not become the 'social norm'

    a. Solution: organising support from policymakers and other relevant stakeholders in overcoming barriers in the broader environment such as laws and regulations, knowledge gaps, lack of economic incentives, missing skills, lack of influence, lack of technologies, etc

3. Policymakers and other relevant stakeholders only fund and/or support DSM programmes on an ad-hoc basis because they lack the means of evaluating and assessing their impact on contributing to a more economically, socially and environmentally sustainable energy system

    a. Solution: Developing indicators that are relevant to the diversity of relevant stakeholders, particularly policymakers to support them and other funders in better prioritising which DSM programmes to fund

4. Because DSM projects demonstrate great diversity of goals, scope, participants, resources etc to meet the diversity of implementing

environments, developing a generic evaluation and monitoring tool is problematic

      a. Solution: Developing an evaluation and monitoring framework that is widely applicable yet does justice to the diversity of DSM projects

In the next section we will discuss these 4 challenges in more detail.

Challenge 1

Diverse social scientific disciplines have provided useful insights into the question of how to change behaviours towards more energy-efficient outcomes.[vii] Economists have proposed instruments that correct market failures (e.g. information provision, new institutions, incentives) so that individuals will become less hesitant in taking up more efficient energy behaviours like e.g. investing in insulation. Psychologists have emphasised that it is difficult for end users to track and understand their own energy consumption, and that energy experts often do not succeed in making things more understandable or meaningful. Providing understandable information, and feedback in combination with (both social and economic) incentives, are suggested as useful interventions. Sociological approaches stress the importance of understanding end users' needs and drivers and creating benefits of DSM that resonate with the target group, for example they do not only concentrate on economic benefits but also on identifying increased levels of comfort, health and safety. Engaging relevant stakeholders in the design and implementation of these programmes is essential to achieving successful outcomes and uptake. Already, very little R&D funding is spent on researching these issues compared with technology, renewable and fossil fuel extraction R&D budgets. In addition, too few programmes develop pilots and action research projects that are tested with the research end users and focus groups, and evaluated over a period of time to ensure ongoing behaviour change has been achieved.

Both economics and psychology focus mainly on the individual and his/her attitude, motivation, and the resulting behaviour. Although these perspectives and their approach to changing behaviour may work out well when adopted for the duration of DSM projects, once these projects are terminated (and the information & incentives stop), the participants to such programmes usually relapse into their old habits[viii]. One of the biggest challenges is to sustain the changed behaviour after the DSM intervention has stopped. In other words, people may respond to incentives and encouragement in the short-term and behave more energy efficiently, but in the longer run they easily revert to their old behaviours, habits and routines.

To meet this challenge, approaches that point out the importance of the direct and wider context or environment in which DSM efforts are situated, have been developed. If this environment is not supportive of changing behaviour towards more efficient energy use, then it is very difficult (sometimes even impossible) for individuals to uphold these new behaviours after the support of a DSM programme has terminated. As a result, more and more social psychologists and sociologists have pointed out the importance of the influence of the broader social and societal environment on influencing energy-related behaviours. Their conclusion is that, to

achieve ongoing, effective DSM outcomes, individuals as well as their social, institutional, physical, technological, economic and cultural context need to be targeted.

This brings us to an approach that has gained influence in recent years because it provides a very helpful conceptualisation of energy consumption behaviours. It is called 'practice theory'[ix] and is based on two premises: First, energy is 'invisible' in everyday life: we do not consume energy consciously, but this consumption is a side-effect of other activities and drivers such as the need for warmth, comfort, entertainment, mobility, hygience etc. Second, and in line with this, we need to better understand these other activities as practices or 'ways of doing', e.g. cooking, washing, showering, working, commuting, watching TV, socialising, travelling. Instead of targeting people's energy consumption, practice theory proposes to target people's 'ways of doing'. Much of these practices are habitual and many of the energy-use routines implicated in these practices are consolidated as social conventions or norms: for instance, socially-shaped expectations about appropriate levels of cleanliness (showering, bathing and washing), comfort (use of air-conditioning and heating) and convenience (using the car for leisure, having multiple telephones, TVs and computers per household). These socially-shaped expectations translate into norms and rules that people mostly conform to to avoid the risk of being 'expelled' from a social group. Hence, peers can be an important barrier to behavioural change, but they can also become a catalyst, when they are involved in changes in practices and behaviours. In addition, these norms and rules become embedded in a broader system encompassing technologies, infrastructures, social and cultural norms, policies, economy, politics and institutions. In the remainder of this document we refer to this system as "context" when discussing the physical, social, cultural, economic and political-institutional environment and all the stakeholders relevant to the DSM project. For a clarification of the relevant different context-factors to consider, see Appendix 1.

To conclude, energy behaviour is more than the result of an individual's awareness, attitude and motivation. Therefore, when trying to accomplish lasting changes in energy behaviours and practices, it is not enough to target only individual people, but we also need to target their context. In addition, to have a significant (economic) impact, the new behavioural practices need to become regarded as normal and thus become mainstreamed.

Challenge 2
A second challenge in DSM is not only achieve lasting behavioural change, but also to mainstream, or institutionalise these changes. In other words, reproducing the success of an individual DSM project from a pilot involving a hundred households and expanding it to a programme on social innovation that involves thousands of households, is a huge challenge. Mainstreaming depends on the successfulness of best practice to diffuse from the micro-contextual level of households to the meso level of society, facilitated by (changes in) the macro level. To achieve lasting and mainstreamed changes in behaviours we need to understand what is happening on

all levels, from individual to systemic; from micro to macro level and all the various interconnections. The table below clarifies the different levels to consider.

Micro-level	DSM interventions can trigger behavioural changes and social innovation that are still niches or experiments, in the early stages. New rules and norms are not yet institutionalised, but flexible and unstable. However, the 'old' ways of doing have partially been replaced by 'new practices'.
Meso-level	The meso-level constitutes the context of 'normal' practices. Thus, the challenge is to accomplish that 'new practices' become normal in the course of time. This level entails systems of provision, which enable and constrain choices and behaviours. They are built up over a longer period of time, and they do not change overnight.
Macro-level	The macro-level is the wider background setting for social innovation, enabling and constraining opportunities for meso-level change (socio-economic, demographic, political and international developments; e.g. wars or environmental disasters). This layer is difficult to influence and usually changes quite slowly.

When attempting to mainstream a DSM best practice, a variety of actors and stakeholders needs to be considered. In addition to the energy end-users (consumers targeted in energy DSM projects) other relevant stakeholders need to support DSM projects and thus influence their successfulness: e.g. researchers, policymakers (on all levels and relevant sectors), utilities, regulators, energy agencies, installers, building managers, financial specialists, municipalities, energy companies, Distribution System Operators (DSO's), Transmission System Operators (TSO's), traders, DSM technology developers (of enabling software and hardware), energy auditing specialists, manufacturers of energy-efficient products, practitioners designing and implementing DSM projects (e.g. consultants, ESCO's, CSO's, municipalities, utilities etcetera) and consumers or consumer associations. These will be called 'research end users' or intermediaries, not to be confused with the 'energy end users' or consumers. An important task is aligning competing interests between a multitude of stakeholders, so that they become supportive of the changes in practices and outcomes that are aimed for. Interaction, engagement and learning between al levels of the context are crucial, because each level and each setting is different and for each different setting the DSM approach should be tailored to reach the best results: namely improving our practices without losing out on quality of life and equity issues.

Challenge 3

In practice, organising support and or funding from not only policymakers but some of the other relevant stakeholders mentioned above, is crucial to address the different context factors and different context levels that influence a DSM project. However, obtaining that support and or funding is a key challenge for implementers. Firstly, there is only limited interaction between implementers and policymakers and/or between implementers and researchers and policymakers. Secondly, if support from policymakers and funders is obtained, at best it is ad-hoc. This ad-

hoc character of the support inhibits the mainstreaming of best practice DSM projects because it makes it difficult for the implementers to work on longer-term programmes and successive DSM projects. The biggest issue is that DSM projects usually get terminated at the achievement of outputs, such as a research report or publications, rather than continuing to evaluate the ongoing outcomes, which would validate the research. This limits their ability to create new supportive contexts to spread new behavioural practices beyond the single project level. The reason for support being ad-hoc is that projects often do not show explicit qualitative and quantitative indicators to monitor the effectiveness and impact of the intervention in contributing to a more sustainable energy system. Hence, potential supportive stakeholders have difficulties in assessing the value of the intervention ex-ante, but it also inhibits their ability to assess the impact of their support ex-durante and ex-post. Different stakeholders will also value different indicators and outcomes differently. Aligning these interests is not as yet sufficiently part of the design of most interventions and DSM projects. The solution lies in developing indicators that are relevant to the diversity of relevant stakeholders (not in the least policymakers) to support them and other funders in making decisions about what DSM programme to support or continue. In practice, the ranking of most important indicators will vary per project. See Table 3 in Appendix 2 for a brief set-up of the type of stakeholders necessary to support DSM interventions and the type of outcomes and process-related indicators that could be relevant to them.

Challenge 4

Because DSM projects demonstrate great diversity of goals, scope, participants, resources etc (necessary to meet the diversity of implementing environments), developing a generic evaluation and monitoring framework is problematic. There is an enormous diversity in terms of aims, goals, scale, scope, sort of participants involved, modes of involvement/engagement, management structures, involvement of other stakeholders, availability of locally committed participants with relevant skills (e.g. social, technical, political). Many energy DSM projects include goals relevant to different stakeholders, for example goals for both policymakers (energy-related goals i.e. energy savings and carbon reduction) and end-users (e.g. improved health, comfort, financial savings, social cohesion). This diversity enables the tailoring of projects to the particular contexts in which they are implemented. In addition, to ensure the success of the project and increase its potential for mainstreaming, criteria for success for different stakeholders need to be met to gain the essential support from these stakeholders. However, this diversity makes it difficult for policy and funding actors to decide on funding a project or not, also because they would have to assess and monitor the achievement of indicators relevant to other stakeholders than themselves. Furthermore, ex ante and ex-post evaluations present several difficulties that relate both to the lack of standardised measuring systems (to asses energy/carbon performance), the lack of access to reliable data, and a lack of skillfulness in doing such measurements.[x] This is regarded as a global problem, when talking to researchers, research end users and research funders. In addition to establishing quantitative indicators for success in project evaluations, qualitative and process-related elements also need to be addressed. Finally, DSM projects are implemented in environments that are not

static, but that change. Hence, in response to changing circumstances, goals and objectives of a project may be adapted. This flexibility may be good for the effectiveness and efficiency of the DSM project, but it does not make evaluation and monitoring easier. More insight into how the diffusion of social innovation takes place across projects and levels, can help policymakers and funders to better understand the contributions of these projects to a more sustainable future energy system. More knowledge on how to provide good assessment criteria, indicators and methods that capture quantitative, qualitative and process-related elements can help policy and funders to pick the best projects.

Figure 1 is a framework for project monitoring and evaluation from the World Bank technical paper: Monitoring and Evaluating Urban Development Programs, A Handbook for Program Managers and Researchers. It breaks down the process into several levels of evaluation and can be applied in the behaviour change area as well.
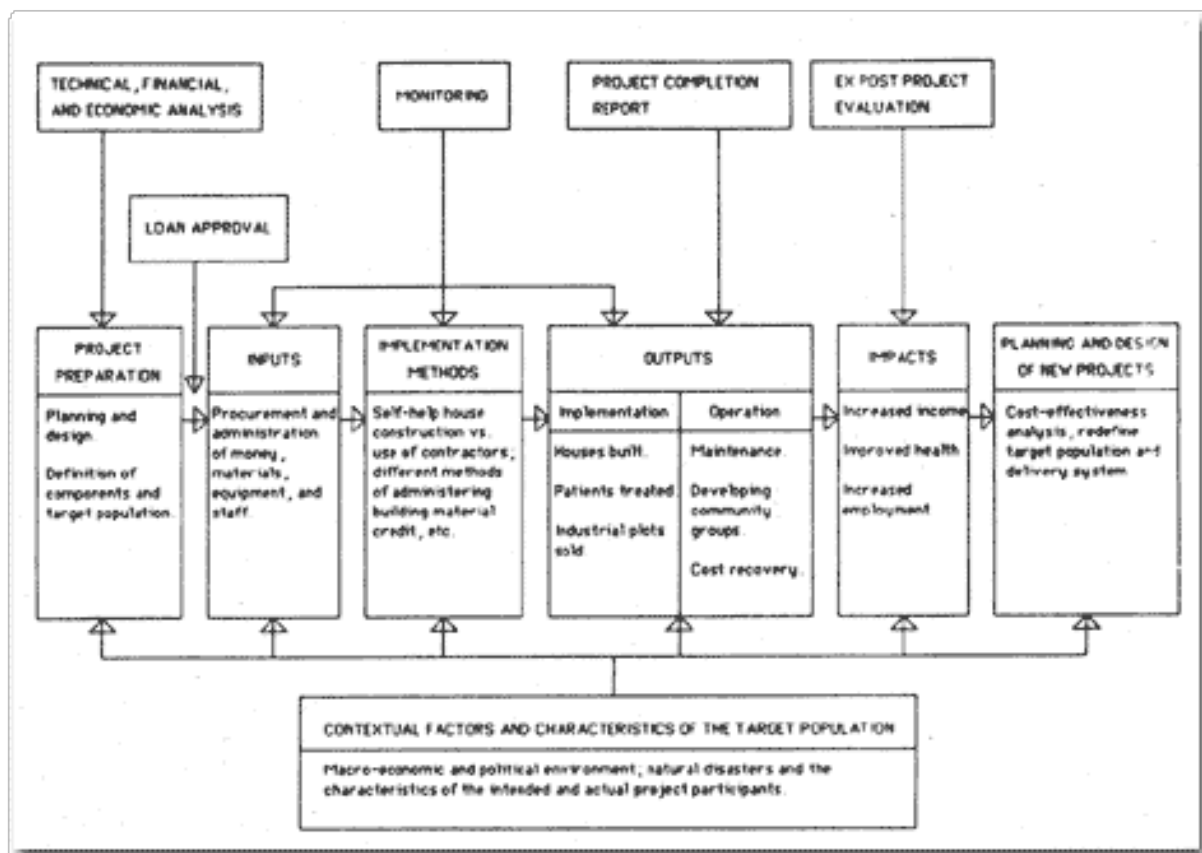
Because of these issues, and because implementers insufficiently interact with policymakers and researchers to share experiences and best practice examples, DSM energy projects on a local level have had a hard time proving their added value in conventional terms (quantified). They had an even harder time in getting acknowledged as important sites of social innovation which need consistent support over time in order to be able to actually contribute to more systemic changes. While for technological innovation, longer-term policy support is an accepted strategy, for social innovations such as behavioural-focused DSM this acknowledgement is not widely shared. However, without social innovation the demand side of energy is unlikely to change significantly and we will continue to waste 20-30% of easily, cheaply-implemented energy savings that have added co-benefits such as security

of supply, productivity and health improvements and meeting our international climate change obligations.

Appendix 1: contextual factors pertaining to successful energy-related behavioural change

Context 'factors'	How they affect opportunities towards lasting behavioural change
People:	Practices and behaviours are affected by the people around us: direct peers like family, friends, neighbours, colleagues. In order to reach long-lasting behavioural changes, it is important that peers also support or take up these new behaviours. Moreover, people learn best from other people so building social networks is important in DSM interventions. Stakeholders on a more distant level are important as well, e.g. policy actors who facilitate or inhibit change through policy support; or banks providing finance to new initiatives; energy companies.
Norms & Values, Culture	Practices are underpinned by norms which are socially-shared among smaller or larger groups of people. Changes in practices need to be supported by changes in social norms which provide the changed behaviours' legitimacy. Opportunities for change are affected by (local, regional, national) cultures, but cultures can of course also change due to changes in practices (over longer periods of time).
Physical infrastructure:	Urban and spatial infrastructure can inspire, encourage, constrain or even inhibit the uptake of more sustainable lifestyles. In cities, the uptake of healthier travel behaviour is not always supported by pedestrian-friendly or bike-friendly infrastructure. Physical infrastructure refers to all sorts of technologies, applications and products that are part of our daily lives and ways of doing (e.g. the short lifecycle of products limits possibilities to use these products sustainably).
Geography:	Options to behave more energy efficiently are constrained by climate, land availability etc
Economy	The overall economic situation affects peoples' daily lives, and ways of doing – and hence also opportunities for behavioural change (e.g. the need to save money may be a first trigger to change practices)
Policy	Policy support is crucial and can either support or inhibit DSM interventions in several ways and on several levels.

Appendix 2

stakeholder indicators	Outcome indicators				Process indicators
	economic	social	environmental	technological	
Policymakers (on all levels and relevant sectors)	Competitiveness New business Use of local entrepreneurs Re-invigorate local economies Energy security	Cohesion Energy poverty Local identity	Emmission reduction Energy savings	New business development around innovative applications	Empowerment
Utilities	(sustainable) business models Improve capacity to develop target group-sensitive, cost-effective DSM products and services Improved understanding of their potential role in the design and implementation of DSM, e.g. act as aggregators of Demand Response	Trust in industry CSR/image building	increased energy savings on the micro level	Acceptance of technology Increased adoption rate (commodification and utilisation of DSM).	
Regulators					
Energy agencies	Energy security Local entrepreneurship	Energy poverty	Increased energy savings on the micro level	New business development around innovative applications	Local involvement in addressing energy problems
Installers	New business opportunities			Learning about new applications related to energy saving	
Building managers	Saving money by saving energy	Energy poverty Cohesion Commitment from residents		Improved quality of buildings resulting from new appliances	Improving the life-span of buildings

Financial specialists	New opportunities to offer advice				
Municipalities	Opportunities for local entrepreneurs Local competitiveness	Social cohesion Energy poverty Local social networks	Meeting climate and energy saving targets	New local business around new applications	Local empowerment Improving quality and life span of building stock
DSO's/ TSO's	Increased effective balancing of the system, Increased prevention of black-outs, increased load management capability, Increased effective use of network capacity			More readily available products and programmes to be used and implemented	
DSM technology developers/manufactu rers	New business opportunities Competitiveness	Co-creation with end users and other relevant stakeholders	Increased energy savings on the micro level	Increased adoption rate	
Investors	New investment opportunities	CSR/image building			
Researchers	Increased co-funding of industry	Understanding needs of potential end users of research Building up of database capacity building	Learning more about conditions for energy saving trough behavioural changes	Learning more about interaction social and technical innovation. Learning more about diffusion of social innovation	Becoming more acquainted with/working together with relevant stakeholders (action research; pilots)
Implementers(e.g. consultants, ESCO's, CSO's, municipalities, utilities etcetera)	Efficient program (cost to serve)	Cohesion Energy poverty Local active commitment and social innovation Etc…	Energy and carbon saving	Innovation, learning, adoption of new behaviours and technologie	Empowerment Mutual learning

End-users (housing corporations, consumers or consumer associations)	Decreasing costs energy bill	Self-sufficiency improved health, comfort, financial savings, social cohesion Creation of new 'social norms' Increased understand of their role in the global and market system	More effective change of energy consumption pattern	Increased development of end user-driven DSM programmes	Empowerment Learning
Local entrepreneurs	New business opportunities			New business development around innovative applications	

ENDNOTES

[i] Geller and Attali (2005); The Green Paper on Energy Efficiency (2005); Directive 2006/32/EC

[ii] ODYSSEE-MURE (2007)

[iii] Wilhite et al (1993); Darby (2010); Mourik (2011)

[iv] Action Plan for Energy Efficiency (2006)

[v] Faruqui et al (2010)

[vi] eg UK Department for Transport Contract PPRO 04/06/33 (Nov 2009). Individual Behaviour Change: Evidence in transport and public health.

OECD/IEA (2011). Energy efficiency policy and carbon pricing: Barriers to Energy Efficiency.

[vi] UK House of Lords. Science and Technology Select Committee. Behaviour Change Report. July 2011. 111pp

[vii] Breukers, Mourik, Heiskanen et al (2009)

[viii] ibid

[ix] Reckwitz (2002); Shove (2003); Warde (2005)

[x] Seyfang and Smith (2007); Breukers, Mourik, Heiskanen et al (2009).