Closing the loop between theory, policy and practice: IEA DSM Task 24 on behaviour change

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Keywords

behavioural change, public policy, energy-saving behaviours, collaboration, system analysis, social networks, DSM

Abstract

The International Energy Agency's Demand Side Management (DSM) Implementing Agreement has initiated work to focus on the complexities of human energy-using (behavioural) practices, as they often pose the biggest barriers to successful uptake of DSM policies and programmes. The target audience for this Task is not the energy end user, but the end user of behaviour change research - the so-called intermediaries who design DSM policies, programmes and pilots. Our aim is to help improve policymaking and programme design and evaluation by intermediaries who have the goal of changing end user behavioural practices. This is done by, on the one hand, offering insights into how to turn good theory into practice and, on the other hand, providing researchers better insight into how to frame and undertake research that is being seen as useful by intermediaries. To this end, experts from all 'behaviour change sectors' (policy, industry, technology developers, local government, community groups, NGOs, tradespeople, consultants, researchers and research funders) in the participating (and other interested) countries will collaborate on this Task. We believe that it is imperative to close the knowledge gap between these various actors and take a more systemic and collaborative approach to DSM policy and programme design and implementation.

Introduction

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[1]. They are the cheapest, fastest and most feasible way to meet climate change mitigation targets (as well as many other environmental objectives). If one considers that, on average, European Member States households and other small-scale users consume about 26 % of total energy used[2], the potential of these small-scale users to tackle the issues of climate change, security of supply and the energy-efficiency gap is high. This potential consists of, on the one hand, a change in the intentional behaviour of deciding to implement energy efficiency improvements and capital investment, and, on the other hand, changing the practices of using and consuming energy, which are considered more habitual in nature. A significant proportion of energy efficiency improvement potential is not realised in this sector – according to the IEA, 2/3 of the economic potential to realise energy efficiency remains untapped in the period to 2035[1]. 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. And therein lies the issue, because only an economic perspective is used to assess the gap, not taking into account the non-economic costs experienced by end-users when implementing the energy efficiency options, such as inconvenience, time, loss of comfort etc. A focus on better understanding what drives behavioural change and decision-making processes could close this gap. It is estimated that ener-

1. IEA (2012). World Energy Outlook, particularly Chapter 10.
2. ODYSSEE-MURE (2007). http://www.odyssee-indicators.org/

gy-related behavioural change, including habitual change (the so-called 'behavioural wedge'), 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 30 % ongoing energy savings[3].

WHY FOCUS ON BEHAVIOUR CHANGE?

Incorporating solid behaviour change understanding into policymaking and programme design will result in many co-benefits:

- Increased energy security
- Peak load management
- Reduced need for new generation
- Monetary savings
- Achieving climate change and emission reduction targets
- Improved health and comfort
- Social cohesion and altruism
- Bottom-up community engagement
- Role-modeling personal and corporate responsibility
- Creating a social norm that wasting energy is wrong

DSM programmes are now 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 and overall reduction of demand) is, for example, one of the important elements of the business case for an economically viable roll-out of smart meters.[4] Especially in the UK, behaviour change has become a catch-cry for newer, smarter policymaking, culminating in the Behavioural Insights Team based in the Cabinet Office (for a detailed review, see Chatterton and Wilson's eceee paper 1-513-13, this edition). There is a positive move towards a better understanding of human psychology and rationality (debunking the myth of *Homo economicus*) and the use of behavioural economics, sociology and psychology to improve policymaking and programme design. The IEA has first highlighted the importance of behaviour change in Chapter 16, in the 2010 Energy Technology Perspectives[5]. It has since cautiously moved further[6] towards outlining the importance of human decision-making in achieving the enormous energy efficiency targets needed to meet their ambitious BLUE scenario of halving global greenhouse gas emissions by 2050[7].

THE CHALLENGES

Despite the promising movement by national and international governing bodies towards better understanding the 'human component' in energy use, strongly convincing successes of demand reduction programmes are still largely outstanding[8]. As much as there is no technological 'silver bullet' (despite the billions of Euros spent on chasing it in various forms, e.g. the hydrogen economy, carbon capture and storage or 'cold' fusion), there doesn't seem to be a behavioural silver bullet either, notwithstanding the promises for simple, quick wins in books such as Nudge[9]. 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, if any.
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'.
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.
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.

There are several reasons for these challenges and this Task sets to uncover, unravel and define them in order to provide clear recommendations to policymakers and DSM implementers. Despite some tentative moves towards using behavioural economics and psychology findings to better design policies, humans are usually still regarded as economically-rational actors whose behaviours can be largely influenced by fiscal incentives or regulation targeted at the individual. However, the complexities influencing human behaviour are so vast and manifold that such approaches almost invariably fail. 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 and incentives stop), the participants to such programmes usually relapse into their old habits[10]. 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. It is imperative to uncover the context-specific factors (from infrastructure, capital constraints, values, attitudes, norms, culture, tradition, climate, geography, educa-

3. Dietz et al (2009). Household actions can provide a behavioural wedge to rapidly reduce US carbon emissions. PNAS 106 (44): 18452–18456. http://www.pnas.org/content/106/44/18452.long

4. Faruqui et al (2010). Unlocking the 53 billion savings from smart meters in the EU: How increasing the adoption of dynamic tariffs could make or break the EU's smart grid investment. Energy Policy, 38, 6222–6231.

5. www.iea.org/techno/etp/etp10/English.pdf

6. E.g., the IEA Expert Group on R&D Priority Setting and Evaluation (EGRD) held a whole workshop focused on this topic (Baden, June 2011). http://www.iea.org/newsroomandevents/workshops/workshop/name,30671,en.html

7. www.iea.org/techno/etp/etp_2008_exec_sum_english.pdf

8. E.g. see AECOM (2011). Energy Demand Research Project: Final Analysis. http://www.ofgem.gov.uk/Sustainability/EDRP/Pages/EDRP.aspx

9. Thaler R., Sunstein, C. R., (2008) Nudge: Improving Decisions About Health, Wealth, and Happiness. Yale University Press, New Haven, CT.

10. Breukers et al (2009). Deliverable 5 of Changing Behaviour: Interaction Schemes for Successful Energy and Demand Side Management. Building blocks for a practicable and conceptual framework. http://www.ecn.nl/publications/ECN-O--09-039

Table 1. The 3 levels of mainstreaming behaviour change.

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.

tion, political system, legislature, one's social environment etc.) that influence human behaviour in specific sectors (the factors that influence our transport behaviours often differ from the ones driving our hot water usage, for example).

There are a large variety of research disciplines that endeavour to study human behaviour and its context, each with their own models and frameworks, advantages and disadvantages. Unfortunately, they usually do not communicate well – not with each other and not with the end users of their research – the policymakers, technology developers, and DSM programme designers and implementers. This leads to confusion and lack of context-specific programme or policy design that is based on the behavioural information or models best tailored to the specific task at hand.

Another crucial issue relates to monitoring, understanding, learning about and adapting initiatives in a more systematic manner. There is a real and urgent need for more appropriate and effective monitoring, evaluation and shared learning of successful DSM implementation and, in particular, of the effectiveness in changing the energy-related behaviours of consumers. The fact that there is little robust and concrete evidence on the contribution of DSM to a more sustainable energy system and behavioural change is not helpful when trying to garner support and demonstrate value to investors, policymakers and other relevant actors – especially when different actors are likely to be interested in different contributions and outcomes.

Lastly, a significant challenge in DSM is to not only achieve lasting behavioural change, but also to mainstream, or institutionalise these changes. In other words, reproducing the success of a single DSM project from a pilot involving a hundred households and expanding it to a programme on social innovation that involves thousands or millions of households, is a huge challenge. Mainstreaming depends on the success of a best practice to diffuse from the micro-contextual level of households to the 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 the micro to the macro level and all the various interconnections. Table 1[11] clarifies the different levels to consider.

11. Based on work performed under the Changing Behaviour project www.energychange.info.

When attempting to mainstream a DSM best practice, a variety of actors and stakeholders need to be considered. In addition to the energy end-users (consumers targeted in energy DSM projects), other relevant stakeholders (called 'intermediaries' here) 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 (DSOs), Transmission System Operators (TSOs), 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, ESCOs, CSOs, municipalities, utilities etc.) and consumer associations. 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 all levels of the context are crucial, because each level and each setting is different. 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.

IEA DSM Implementing Agreement Task 24

Task 24 is undertaken under the umbrella of the International Energy Agency (IEA). The IEA acts as energy policy advisor for its 28 member countries in their effort to ensure reliable, affordable and clean energy for their citizens. Founded during the oil crisis of 1973–74, its initial role was to coordinate measures in times of oil supply emergencies. But during the last decades, the energy markets have changed, and so has the IEA. It now focuses well beyond oil crisis management on broader energy issues, including climate change policies, market reform, energy technology collaboration and outreach to the rest of the world. With a staff of around 150, mainly energy experts and statisticians from its 28 member countries, the IEA conducts a broad programme of energy research, data compilation, publications and public dissemination of the latest energy policy analysis and recommendations on good practices.

To support these core issues, the IEA created a contract – the Implementing Agreement – and a system of standard rules and

regulations, that allows interested Member and non-Member governments to pool resources and research the development and deployment of particular technologies.

For almost 40 years, technology collaboration has been a fundamental building block among IEA Member and non-Member countries in facilitating progress of new or improved energy technologies. There are currently 40 Implementing Agreements working in the areas of Fossil Fuels, Renewable Energies and Hydrogen, End-Use (Buildings, Industry and Transport), Fusion and Cross-Sectional Activities. The IEA Committee on Energy Research and Technology (CERT) and its Working Parties review the effectiveness, achievements and strategy of each Implementing Agreement.

IEA DEMAND SIDE MANAGEMENT PROGRAMME

The IEA Demand-Side Management (DSM) Programme, which was initiated in 1993, deals with a variety of strategies to reduce energy demand. 15 member countries and one Sponsor have been working to identify and promote opportunities for DSM during 2012.

The IEA DSM **programme's vision** is to consider and actively incorporate demand side measures into energy policies and business strategies in order to create more reliable and more sustainable energy systems and markets. The **programme's mission** is to deliver useful information and effective guidance for crafting and implementing DSM policies and measures, as well as technologies and applications that facilitate energy system operations or needed market transformations.

The programme's work is organised into two clusters:

- The load-shape cluster
- The load-level cluster

The "load shape" cluster includes Tasks that seek to impact the shape of the load curve over very short (minutes-hours-day) to longer (days-week-season) time periods. The "load level" cluster includes Tasks that seek to shift the load curve to lower demand levels or shift loads from one energy system to another.

A total of 24 projects or "Tasks" have been initiated since the beginning of the DSM Programme. The overall programme is monitored by an Executive Committee consisting of representatives from each contracting party to the Implementing Agreement. The leadership and management of the individual Tasks are the responsibility of Operating Agents. Countries participating in the IEA DSM Implementing Agreement can chose which Tasks to participate in, both financially and by supplying a 'national expert' who collaborates with the Operating Agent/s to fulfil the Task objectives.

TASK 24

Designing the right programmes and policies that can be measured and evaluated to have achieved lasting behavioural and social norm change is difficult. Task 24 was initiated in 2012 and currently has 6 participating countries (with 2 more likely to come on board in 2013). This paper's authors are the two Operating Agents for this Task. Task 24 sets out to unravel, uncover and define the intermediaries' challenges described above; to break down interdisciplinary silos; and to provide clear recommendations for policy and programme improvement and best practice. We rely on many sector-specific experts (researchers, implementers and policymakers) from participating and interested countries to collaborate with us on this Task.

Central to our support for intermediaries are:

- A global expert platform to enable collaboration, shared learning and dissemination of the results;
- An overview of current behavioural theories and models of understanding, frameworks and disciplines and their pros and cons when used in practical applications in various contexts;
- Case material (programmes, projects, pilots and policies already underway) that clarifies the diverse contextual elements to consider when undertaking behaviour change interventions and how research can assist in dealing with these context issues in the four case study themes (SMEs, transport, building retrofits and smart metering) that were selected by investors in this IEA Task to focus on;
- The development of stakeholder-tailored advice on how to evaluate ongoing successful behaviour change outcomes (focusing on indicators and means);
- Country-specific, tailored recommendations arising from the collected insights and careful stakeholder analysis.

The benefits for the participating countries and for the DSM agreement encompass:

- Participation in the IEA DSM Behaviour Change Expert Platform and knowledge exchange with a large variety of international and national stakeholders;
- Maintaining an ongoing platform of shared learning, best practice examples and know-how;
- A database of global knowledge and examples of behaviour change programmes, models and outcomes;
- Mutual feedback, coaching and experience exchange for country- and context- specific issues;
- Reducing the silos in research disciplines and fostering inter- and intradisciplinary sharing and research end user involvement;
- Better ability to get funding and collaborations involving behaviour change programmes and interventions;
- Ability to monitor, evaluate and prove ongoing success of behaviour change outcomes leading to energy and CO_2 savings, health and social benefits, financial savings and community benefits;
- Influence (inter)national policy around demand side management and the importance of the 'human component';
- Contribute to an IEA DSM competence centre.

Some special features of this Task are the large number (currently over 200) of global experts that are drawn on to collaborate and share learnings (going beyond the usual national experts of participating countries to include anyone who is involved in, or has developed behaviour change research projects, policies, programmes or pilots); the wide use of creative techniques such as storytelling, social media tools, videos, podcasts,

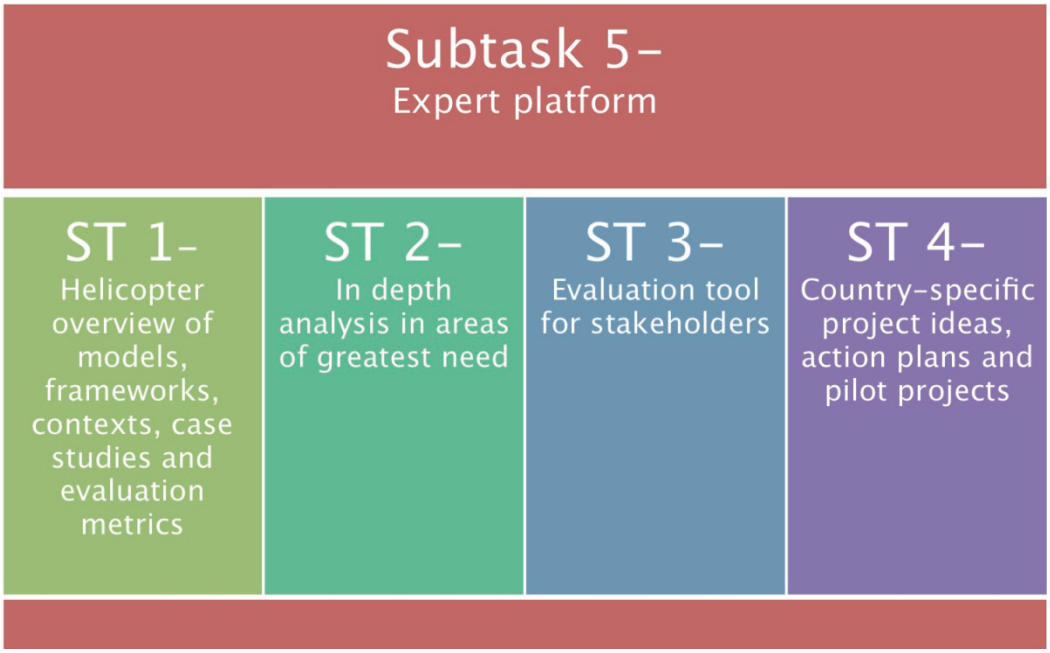

Figure 1. Subtasks of Task 24.

blogs, graphic 'stories' etc. to report and disseminate findings; the intra-disciplinary nature of the Task; and the wide scope encompassing all fuels, SME and household sectors and buildings and transport end uses.

THE SUBTASKS AND DELIVERABLES

Each Task is broken into individual Subtasks, with associated Deliverables. These are outlined in Figure 1 and Table 2.

The work for this Task has only formally commenced in July 2012, thus preliminary findings from only two Subtasks will be described here.

SUBTASK 1 – HELICOPTER OVERVIEW OF MODELS, FRAMEWORKS, CONTEXTS, CASE STUDIES AND EVALUATION METRICS

Introduction

A fundamental challenge is how to understand energy behaviour change processes. There are diverse social scientific models of understanding behaviour[12], but to date there has been little interaction and exchange between the various theories and disciplines. Too little use is being made of existing behavioural change theories by policymakers and DSM implementers. An explicit aim of the Subtask is to **improve and better understand the interaction between theories, projects (pilots, cases) and the impacts/outcomes of these**. As a first step in the challenge of better understanding behaviour change, we will build on the GSR review[12] and outline what the diverse behavioural models and theories of change have to offer both theoretically and empirically. The Subtask is developing this inventory with input from the national and contributing experts. In addition, short (140 characters to be 'tweetable') definitions of each model/theory will be developed and underpinned by a range of empirical (case) studies that used them. Pros and cons of each approach will be discussed.

The inventory is done at the level of conceptual/theoretical frameworks that provide explanations of how behavioural changes come about[13] and specific examples in policy and practice where these behavioural models and theories of change have been implemented. When assessing the their (potential) contribution to better understanding energy DSM and behavioural change, we will also attempt to address underlying key issues and challenges.

Specific outputs and deliverables

The Task's six participating countries have expressed specific needs and Subtask 1 is created around them:

1. An inventory of what the diverse (sub)disciplines have to offer both theoretically and empirically. A structured draft overview of the diverse models of understanding of behavioural change (in relation to Energy DSM) and their context (built upon the GSR review);
2. An overview of the different definitions used in the field by researchers;
3. An overview of relevant experts working on or with different models or theories of understanding;

12. Darnton, A., (2008), Reference Report: An overview of behaviour change models and their uses, Report for GSR Behaviour Change Knowledge Review Centre for Sustainable Development, University of Westminster July 2008 http://www.civilservice.gov.uk/wp-content/uploads/2011/09/Behaviour_change_reference_report_tcm6-9697.pdf

13. Different models and theories rely on different assumptions regarding what sort of knowledge, methods of data collection and interpretation are considered valid. We will not discuss this in-depth for each model but of course need to take it into account when discussing the ways in which insights from different models can be combined.

Table 2. Outline of Subtasks and Deliverables for Task 24

Subtask	Deliverable	Deliverable name	Type of deliverable	Month of completion
0	D0	Advisory committee	Network	8
1	D1	Database/wiki listing collected models, cases	Database	12 but ongoing
1	D2	Final 'report' on work in ST1	Interactive format	12
2	D3	Surveys and post-evaluation of detailed case studies topics of particular interest to participating countries	Report/interactive	12
3	D4	Tool to evaluate 'successful outcomes' of DSM programmes	Interactive	16
4	D5	To do's and not to do's, priority research areas and ideas for pilots and projects for participating countries and stakeholders	Briefs and other formats	24
5	D6	Social platform and meeting place for DSM and behaviour change experts and implementers	Online social media platform	ongoing

4. An inventory of available evaluation metrics and underpinning case studies and examples;
5. A tool to help our target audience navigate the complex landscape of models of understanding DSM behavioural change and select appropriate models for specific projects in the participating countries on one of the four themes central to the Task: SMEs, Smart Metering, Transport and Retrofitting.

The templates

In order to fulfil these challenging objectives, a template was developed to collect the various theories and approaches using examples in policy, programmes and pilots where they have been applied in practice. These templates are currently being filled out by the national experts and other participants of the expert platform, who are known to have specific knowledge on the theories or practices. One of the key learnings from this exercise so far has been that, although in the past, the most commonly used theories and approaches were from economic and psychological disciplines, a change is taking place where more sociological approaches are also used to design DSM interventions[14]. Another emerging hypothesis is that the stakeholders using these sociological approaches are often not policy stakeholders, but intermediaries designing interventions in a more bottom-up fashion. In addition, it is becoming clear that when theories and models have been made actionable, they usually focus on the individual level or households, and in an increasing number of cases, the social environment of friends, family or community. However, there are yet very few approaches focusing on SMEs, schools or offices. Although many approaches do emphasise the context-sensitivity necessary to develop effective approaches, segmentation beyond the traditional socio-demographic and psycho-social segmentation is lacking. This is despite the fact that it has become clear that households with very similar segmentation characteristics can demonstrate a 100 % difference in their energy behaviour. The current approaches are also often insensitive to the different types of behaviour, and target behaviour change as a homogeneous unit of analysis. These are just very preliminary observations but they already indicate the need for more tailored theories and approaches if these are to be taken onboard in the design of better DSM interventions.

We aim to get insights and learnings into the role of the individual, role of social context, role of technology, actors and institutions, behavioural change processes, social change, relevant conditions and factors affecting behaviour change, context particularities and monitoring and evaluation that has been undertaken in real-life examples. To differentiate:

- Policy measure: A specific type of political action or market intervention designed (usually by (national and/or federal) government) to persuade energy consumers to improve energy use and encourage market parties to promote energy-efficient goods and services.
- Programme: An organised set of projects targeted towards defined market parties over a specific time period to achieve increased end-use energy efficiency or reduced use of energy services. A package of selected policy measures is used. This selection is based on a programme theory.
- Project: An organised set of activities to create output(s).
- Pilot: A smaller study (often called feasibility study) conducted in advance of a planned project.

The energy stories

In addition to the templates, personal energy story interviews with dozens of energy professionals were filmed. These interviews demonstrate that, even for the 'dark green' segment of energy professionals who are working in the field of DSM and sustainability, and who are knowledgeable about the issues at hand and the need for behavioural change, it is not easy to al-

14. See also: DEFRA (2011). Habits, Routines and Sustainable Lifestyles. Summary report. 71 pp. Chatterton (2011). An Introduction to Thinking About 'Energy Behaviour': a multi-model approach. Edited by Oliver Anderson (DECC). 39 pp.

ways behave in a way that is energy efficient or that conserves energy. The interviews all highlight various issues that are central to certain theories and models, e.g. the influence of social norms, the interdependency with technological systems, the limited motivational influence of financial incentives, etc. This form of reporting has proven to be an effective way of visualising the limitations of individualistic and economically-based interventions (which are the most common) and opens the mind to approaches that negotiate social norms and system interdependencies. There is something uniquely powerful about hearing professionals' energy stories, in their own words and with their own 'flavour'. The filmed stories prove more memorable, and more emotionally engaging than written scientific reporting ever could.

Definitional issues

Another valuable learning arose during two large Task workshops, in Brussels on September 7, 2012, and at Oxford University on October 9–10, 2012, where it became obvious that commonly used definitions, such as 'behaviour change' and 'DSM' can cause confusion and frustration, as different sectors and intermediaries had very differing interpretations of them. Thus, a set of definitions pertaining to this Task were developed with help of the national experts. The thought processes to arrive at the final definitions can be found here: http://www.slideshare.net/drsea/definitions-for-task-24. The main definitions used for this Task are as follows:

- **Energy behaviour** refers to all human actions that affect the way that fuels and carriers (electricity, gas, petroleum, coal etc.) are used to achieve desired services, including the acquisition or disposal of energy-related technologies and materials, the ways in which they are used, and the mental processes that relate to these actions.
- **Behaviour change** in the context of this Task thus refers to any changes in said human actions which were directly or indirectly influenced by a variety of interventions (e.g. legislation, regulation, incentives, subsidies, information campaigns, peer pressure, infrastructural changes etc.) aimed at achieving specific behaviour change outcomes.
- **Demand Side Management** in this Task refers to interventions (top-down and bottom-up policies, programmes and actions) developed and performed by intermediaries (government agencies, utilities, DSM implementers) that seek to influence the ways end users consume energy at home, at their workplace or whilst traveling. The changes sought by intermediaries may include the quantity of energy consumed for a given service, the patterns of energy consumption or the supply management and type of energy consumed. The intended outcome of DSM will differ with the aspirations of intermediaries but include energy efficiency, energy conservation, sufficiency, reduced greenhouse gas emissions, financial or social gains or (peak) load management. In the short-term, it may not always lead to a total reduction in energy consumption (although this is the medium to long-term goal), but to the most efficient and environmentally friendly use of energy to derive the services that underpin social and economic wellbeing (e.g. comfort, mobility, entertainment, cleanliness, production etc.).
- **Relevant theories and models** include all theoretical approaches and insights to investigating, assessing and measuring energy-using behaviours and theories to change them on the individual and societal level.

The framework to bring it all together

The Operating Agents will, in close cooperation with the national experts, create a framework as a 'lens' to view the various models and theories through. This could potentially build on the '4D' framework as developed by Tim Chatterton and Charlie Wilson (presented at the Oxford workshop and shown in eceee paper 1-513-13 in this edition) that will help categorise the input. This framework will also allow to understand the benefits and limitations of applying different behavioural models and theories of change to different contexts (target group, targeted behaviour, country, scale, technology, timing etc.) and themes, as well as accommodating different stakeholders' needs and perspectives.

The various contexts affecting behaviour

A critical learning of the analysis of different theories and models and practice is that, to meet the complex behaviour change challenge, approaches are necessary that point out the importance of the direct and wider context or environment in which DSM efforts are situated. 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 finished. The use of energy is entirely due to human needs and behaviours. Behaviour is rarely ever due to individual choices and rather driven by complex social interactions[15]. One of the main drivers/barriers for changing behaviour are prevailing social norms. These social norms are strongly affected by our social networks. To achieve ongoing, effective DSM outcomes, individuals as well as their social, institutional, physical, technological, economic and cultural contexts need to be targeted. See Table 3 for a first overview of the importance of context.

Finally, a critical learning on monitoring and evaluation is starting to form and will be further developed in Subtask 3. One of the key challenges facing energy DSM initiatives (and policy in general) is finding the right ways to monitor and evaluate the initiative and its impacts. One first outcome of this Subtask is the appreciation that definitions of success can refer to effectiveness in terms of reaching the set goals in a cost- and resource-efficient way. They can refer to 'outputs' (e.g. number of houses insulated under a government insulation subsidy scheme) or 'outcomes' (e.g. overall health improvements of occupants from insulated homes) and success can also refer to the process itself. Paradoxically, a successful process can lead to bad outcomes in the sense of energy savings. In addition, it has become apparent in the workshops that took place for this Subtask, that different stakeholders hold different definitions of success on outcome, output and process. The current approach to defining success faces two challenges:

15. Mark Earls (2009). HERD – How to change mass behaviour by harnessing our true nature. Wiley, 1st edition, 424 pp.

Table 3. Various context factors and how they affect opportunities towards lasting behaviour change.

Context 'factors'	How they affect opportunities towards lasting behavioural change
People	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). Factors influencing cultural differences: learning culture; tradition and upbringing; risk attitude; prior experience of community engagement with similar projects and/or project developers; social cohesion/interpersonal relations; individual vs. group involvement; community trust; attitudes to new technology; privacy etc.
Political factors	History of civic democratic engagement; types of government policies; stability of national policy; partisanship or collaborative governance (political culture); centralisation or federalisation of national government; tradition of top-down vs bottom-up initiatives; regulation and legislation.
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).
Technology and Material 'Culture'	What technology is available and rolled out; the scale of a DSM project (large or small, centralised or decentralised, radical or incremental); technological flexibility and advancements; how technology fits into existing infrastructure. Also, energy-related materials and technology's direct influence on energy practices, e.g. ability to change heat settings, complexity of its operation, convenience of use.
Geography	Options to behave more energy efficiently are constrained by climate, land availability, rural vs urban locations etc.
Socio-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). Availability of natural resources and social acceptability of their exploitation; energy prices; technology and other input prices; perception of foreign investment; importance of energy independence; security of supply; interest in local employment and job creation; nationally-competing technologies and innovators.
Policy and implementation	Policy support is crucial and can either support or inhibit DSM interventions in several ways and on several levels. How is DSM implemented (community/local, regional or national level); organisational strength and make-up of policymakers and implementers.

- It does not allow for evaluating 'learning' while in fact social learning (potentially leading to a change in 'social norm') might be a crucial criterion to account for the occurrence of behavioural change.
- It does not consider that DSM initiatives may change along the course of time to adapt to changing circumstances ('double loop learning').

In addition to these issues, more generally we are confronted with the following:

- Usually no budget is available to continue evaluation beyond the duration of a DSM initiative – ongoing evaluation (18 months to 3 years) is imperative to be able to see if long-lasting behavioural change has taken place.
- Attributing 'success' to the particular DSM initiative can be problematic because other (changing) circumstances may have affected the outcome as well. It is the interaction of the DSM initiative with the particular context variables that produces a particular outcome.

SUBTASK 5 – EXPERT PLATFORM

Social media has become a prevailing, global tool to engage with our social networks. Hence, this task will utilise the idea of social networks (and social media as a tool to engage them) to disseminate, engage, collaborate and share learnings with the experts and stakeholders from participating or contributing countries.

The online platform includes a wide range of social media tools to foster the greatest ability to interact, share and discuss. Experts can upload blogs, videos, photos, documents, slides and have their own member pages, including their biographies, interests, countries and sectors they come from. They can chat, start groups and discussion fora, invite other experts and tweet or facebook from the site. It is meant to provide a 'matchmaking' service to enable trans-national, inter-disciplinary teams of experts and end users to collaborate and bid for funding. This platform is invite-only and its current web address is www.ieadsmtask24.ning.com.

Participating experts were initially sourced from the Operating Agents' professional networks. The Task has since been widely publicised via social media – from IEA DSM LinkedIn and facebook groups and @IEADSM twitter account, to the weekly online publication of Sea Rotmann's 'Behaviour Change and Energy News', to regular columns on the eceee and EEIP websites, blogs for 'Global Energy Professionals', energynet.de, UKERC or 'Global Energy Insights', as well as traditional IEA DSM flyers and the IEA DSM website. That, coupled with presentations at international conferences, such as the 3rd International Sustainability Conference in Basel or BEhavE in Helsinki, has led to a significant increase in experts from a wide variety of sectors and countries. The highly successful Oxford workshop, kindly sponsored by the UKERC Meeting Place, was attended by 65 of the top behaviour change researchers and implementers (largely from the UK) and is summarised in a short film and graphic 'story'. The interviews and films, together with all other information pertaining to this Task can be found on the invite-only expert platform. To see the film, interviews and graphics, join the expert platform by emailing the authors.

The online expert platform has been highly successful in many ways. In 5 months, it has added 134 experts from 18 countries and is continuously, organically growing. The experts are engaging with the material on the platform: Google Analytics show that the average page view is around 9 minutes, which infers that people are looking closely at the provided material. A major downside of the Ning platform is that it is not designed as a file sharing site – file and content management is thus decidedly clunky, and a Wiki will be developed and integrated into the Ning site to support better online sharing of results. It is interesting how hard it still is to get people to actively engage with social media, even though they are decidedly more likely to use it in their personal lives[16]. Social media issues and specific learnings from this Subtask will hopefully be discussed in a virtual, social media-focussed panel at the 2013 Summer Study.

Conclusions

Task 24 is an exciting development, showing the increasing acknowledgement of the role of human behaviour in solving our complex energy problems and transitioning to a 'sustainable' energy system. The fact that it is part of the International Energy Agency's Implementing Agreements, and that it has generated such widespread, global interest and participation, also marks its special status. In addition to the many participating researchers from a wide variety of disciplines, the Task focuses specifically on the 'intermediaries' of DSM policies, programmes and activities. These come from a very wide range of sectors, generally grouped as 'Government', 'Industry' and 'Community'. The Task's wide focus of all fuels and carriers and all types of behavioural change, as well as the detailed examination of smart metering, SMEs, transport and building retrofits, means that a larger-than-usual scope is addressed. This is made possible only by the collaborative, intra-disciplinal and trans-national nature of the Task. It also stands out amongst Implementing Agreement Tasks as one that focuses on a very human and social problem, and uses very human and social ways of communicating and disseminating the results. Initial results in Subtasks 1 and 5 were discussed and will be further elaborated on during the Summer Study. We hope to attract more interest and participants, both countries and individual experts to the Task, to join our Expert Platform, and to help collect and discuss our findings. Ultimately, an extension of the Task is sought to turn theory into practice, and it is hoped that the Expert Platform will continue to grow and interact organically and form a foundation of future energy policy.

16. See Rotmann et al (2011). Making energy efficiency research relevant: A note on evaluating social media as a tool to engage energy practitioners and consumers. ECEEE Summer Study proceedings.

Acknowledgements

This Task would not have been possible without the strong encouragement and support of the IEA DSM Chair, Rob Kool. Hans Nilsson and Anne Bengtson also deserve special mentions for their support and championing of the Task. Sylvia Breukers and Tomas Mathijsen from DuneWorks are invaluable partners in this Task. In addition, we have to thank our participating countries and their ExCo members and national experts: New Zealand (Paul Atkins/Janet Stephenson), the Netherlands (Harry Vreuls/Ruth Mourik), Sweden (Maria Alm/Cecilia Katzeff), Norway (Even Bjørnstad/Henrik Karlstrøm), Belgium (François Brasseur/Frédéric Klopfert) and Switzerland (Markus Bareit/Vicence Carabias-Hütter), as well as Boris Papousek and Gerhard Lang from the Grazer Energy Agency and Simone Maggiore from R.S.E. The IEA Secretariat, notably Sara Pasquier and Steve Heinen also receive our thanks. Without the 100s of interested and engaged experts, workshop participants and online platform members, this Task would be impossible. We salute you and hope you continue to join us on this journey!