How to change consumers' energy-related behaviour?

Improving demand side management programmes via an action research approach

C.F.J. Feenstra*[1], J. Backhaus[1] and E. Heiskanen[2]

[1]Energy research Centre of the Netherlands (ECN), [2]National Consumer Research Centre, Helsinki

*Corresponding author: feenstra@ecn.nl, phone: +31-224-568262, fax: +31-224568339

Abstract

What factors lead to success of demand side management programmes aiming at changing consumers' energy-related behaviour? This is one of the central questions of the European research project CHANGING BEHAVIOUR. To answer this question our research team carries out several work phases all based on the action research approach. One of the phases involves the analysis of 27 case studies of good and best practices of energy demand side management in Europe.

A broad but comparable set of 27 European demand side management programmes all aiming at saving energy and/or efficient use of energy in households, schools and office buildings are selected and analysed. This analysis provides insights in the internal and external factors influencing the success the programmes, the effects of interaction with and engagement of end-users and stakeholders and the relevance of timing.

The outcomes of the case study analysis are combined with the outcomes of an extended literature research and translated into building blocks for a practical model for demand side management programmes. These building blocks are now further developed into a practical toolkit for practitioners to improve the outcomes of their future projects aiming at changing energy consumption behaviour.

1. Introduction

The European Union as a whole as well as the individual member states want to decrease the end-users' consumption of energy. The European Union aims at 1% reduction per year for nine years starting 2008. To reach these targets the European, national and local governments develop regulations to stimulate consumers to reduce energy use or to use energy more efficiently. One example of these efforts is the recently started phase-out of light bulbs on the European level. Apart from regulations there are also policies that include subsidy frameworks to support *demand side management (DSM) programmes*. These DSM programmes aim at changing consumers' behaviour in relation to energy. They focus on changing curtailment behaviour (i.e. daily repetitive behaviour, for example switching off the lights) or efficiency behaviour (one-shot behaviour, for example buying a car) or a combination of both. Apart from national and/or local governmental support by means of subsidies and policies, these DSM programmes are often also (financially) supported by NGOs, individual companies (for example energy suppliers) or partnerships, researchers or the end-users (consumers) themselves.

DSM programmes are managed by *intermediary organisations*. Different persons or institutions can act as an intermediary organisation, for example NGOs, energy suppliers, energy service companies (ESCOs), agencies sponsored by utilities, consultancies, governmental agencies, municipalities, etc. The functions of intermediary organizations are also diverse, including "provision of energy advice and energy centres; consultancy activities; energy audits; project initiation, management, finance and coordination; demonstrations; technology procurement; installation; promotion; advocacy; lobbying, dissemination and awareness raising; organizing campaigns; education; training and courses; and network-building" (Hodson et al. 2009, p15). Intermediary organisations thus translate and implement policy targets into concrete DSM programmes aiming at changing a specified behaviour of an identified target group within a given timeframe and budget. To put it in general terms: intermediary organisations reconfigure energy systems by their activities related to promoting energy efficiency in buildings, replacement of less energy-efficient products by more efficient ones, raising public awareness and creating visibility of alternative ways of producing and consuming energy, for example in pilot projects (Hodson et al. 2009 and Backhaus 2009)

Despite the differences between DSM programmes in terms of scale, scope, targets, stakeholders involved and process characteristics, these programmes often do not succeed in reaching their own and more general governmental targets. A comparison of the energy efficiency improvement potential and the outcomes of the programmes shows that a significant proportion of the energy efficiency improvement potential and thus lasting behavioural changes are not realised. Apart from the extra emissions this inability to use energy efficiently costs a lot of (public) money that is invested in the DSM programmes. As an indication, on European level, this inefficiency costs the European Union more than 100 billion euros annually until 2020 (European Commission 2006). The difference between the actual energy efficiency and potential efficiency is called the "*energy efficiency gap*". To reach the governmental targets of energy efficiency and energy savings in households this "energy efficiency gap" must thus be overcome.

The CHANGING BEHAVIOUR[1] research project aims to overcome the "energy efficiency gap" by combining practical experiences on with theoretical knowledge of demand side management programmes. This is done by a methodology based on the action research approach in which researchers and intermediaries (practitioners) cooperate intensively together. The aim of this cooperation is to develop a practical toolkit for intermediaries to improve the outcomes of DSM programmes. This paper introduces the action research approach as a methodology and describes how it was applied in the CHANGING BEHAVIOUR project. Secondly, the paper focuses on the use and value of the action research approach in one specific phase of the research project: the analysis of 27 case studies based on selection and success criteria identified in close cooperation by researchers and intermediaries. Thirdly, the outcomes of the case studies are combined with the outcomes of an extensive literature research and translated into recommendations for future DSM programmes. Finally, the action research approach is evaluated based on the experiences within the CHANGING BEHAVIOUR project and recommendations for future users of the methodology are given.

2. The action research approach in CHANGING BEHAVIOUR

2.1 The action research approach

[1] The CHANGING BEHAVIOUR project was funded by the European Community's 7th framework programme under grant agreement no 213 217. More information on the project, the partners, the outcomes and deliverables can be found at www.energychange.info

The problem of how to overcome the "*energy efficiency gap*" has received much attention by many researchers in the academic field since several years. Researchers have been producing a lot of theoretical knowledge, frameworks and models on behavioural change (Jackson 2005; Stern 2000). They often also illustrate their findings with examples from practice or analyse case studies based on theoretical principles[2]. Practitioners or intermediary organisations have tried to tackle the problem in practice and often base their DSM programmes on theories (for example the Dutch Green Energy Train projects are based on the theory of 'Live Energy'). Practice shows however that DSM programmes are not able to overcome the mentioned gap (Kurz 2000; Wilwhite et al. 2000). We can thus conclude that the 'interaction' between researchers and practitioners is not effective (Heiskanen & Rask 2008) neither in the models developed by the researchers nor in the programmes developed by the practioners. Or in other words practitioners and researchers do not learn effectively from each other (Breukers et al. 2009b). To overcome the "energy efficiency gap" another gap must first be overcome: the gap between theoretical knowledge and practice.

To overcome the described gap between researchers and practitioners and improve the learning between the two, the CHANGING BEHAVIOUR project is using an *action research approach*. This approach originates in research on organisational change and learning and has evolved and been applied in many other fields since then (Breukers et al. 2009b; Heiskanen and Rask 2008). This has also led to several definitions of the approach which have in common the following characterising elements: collaborative inquiry between researches and practitioners and leave all with lasting capacity (1); the study and creation of change and effective action (2) and multiple learning cycles including planning, action, observation and reflection (3).

The action research approach in the CHANGING BEHAVIOUR project is firstly illustrated by the project partners of which six are research organisations and seven are intermediary organisations or practitioners[3]. In all phases of the project there is continuous cooperation of all. How this cooperation is set up for the whole research project is described in detail in other papers (Breukers et al. 2009b; Heiskanen and Rask 2008). The focus in this paper is how this approach works in practice in the

---

[2] For example Abrahamse et al. 2005 analyses the effectiveness of 37 interventions aiming to change reduce energy consumption in households described in scientific journals and databases.

[3] The research organisations involved in the CHANGING BEHAVIOUR project are: NCRC (Finland), ECN (the Netherlands), OEKO (Germany), CEU (Hungary), SEI-T (Estonia) and SURF (UK). The practitioner organisations are: M:KC (UK), CRES (Greece), Cowi Baltic (Lithuania), Enespa (Finland); Ekodoma (Latvia) and VZ NRW (Germany). More information on the project partners can be found at www.energychange.info

process of the project. The CHANGING BEHAVIOUR project is divided into several *phases of research*. These phases illustrate the learning circle of the whole project in which we plan, take action, observe and reflect.

Phase 1 focuses on the development of a database of European past and present DSM programmes. This is mainly a planning phase in which we plan the following phases on the basis of existing case study material. In *Phase 2* an extended literature research is carried out on existing knowledge concerning behavioural change. This is combined with the outcomes of elaborate case studies of 27 more and less successful DSM programmes and used to create building blocks for a toolkit of best practices. This phase can be mainly described as observation of theory and practice and reflection. *Phase 3* is facilitating feedback processes on the building blocks for the toolkit from a broad range of stakeholders and practitioners via workshops. Here we reflect upon intermediate results. In *Phase 4* the building blocks are tested in practice in five pilot projects. This is a phase of action and observing what is happening in the pilot projects. *Phase 5* is translating the outcomes of the pilot projects into a set of concrete activities that are helpful for practitioners in the format of a toolkit. The phase can thus be categorized as reflection and taking action based on the observations.

The *learning cycle* of the action research approach is not only present on the level of the five research phases. We also use it at several levels within each phase. This is illustrated in figure 1[4]. In the following paragraphs we illustrate how the learning cycle and other elements of the action research approach are applied in part of one of the research phases of CHANGING BEHAVIOUR: the selection and analysis of 27 case studies.

2.2 Action research approach in practice

Group discussions of project partners (practitioners and researchers) during project meetings led to the development of selection criteria for the case studies (described in detail in the next chapter). In these discussions practitioners described the factors they consider influential for the outcomes of DSM programmes based on their own experiences .Researchers combined these factors with their theoretical knowledge on the subject. Secondly, all the project partners searched for programmes in

[4] All figures and tables are collected at the end of this paper.

their own geographical region suitable for analysis based on the agreed upon selection criteria. This results in a set of 27 programmes that are further analysed as case studies.

27 cases were selected in total and each project partner of CHANGING BEHAVIOUR analysed 1-4 programmes in their geographical region. This analysis is based on the '*case study guide*' of CHANGING BEHAVIOUR. The making of this guide is another example of the action research approach in practice. It is build upon elements that might be relevant for the success and failure of DSM programme and combines theoretical knowledge of the research partners with the practical experiences of the practitioners integrated in working groups during a project meeting. The guide describes how to perform the empirical research in six steps each illustrated by a number of questions that should be answered in the case study reports: national, local and specific context of the project (1), focus of the DSM programme (2), design of the programme (3), process of the programme (4), outcome of the programme (5) and analysis of the 5 most crucial elements in the programme influencing its success. The case study reports based on the analysis guide are also based written sources (programme reports, statistics and other) and practical experiences (gathered in interviews with project managers and other stakeholders involved).

3. The case studies

3.1 Selection of the case studies[5]

As pointed out in the introduction of this article the scale, scope, targets and stakeholders of DSM programmes are very diverse. Some target a whole nation while others focus on the households in one street or apartment building. Some invest millions of euros while others base the investment on money gained by energy saved in the programme. Some aim at multiple specific changes in curtailment and efficiency behaviour while others aim at general awareness raising. Some involve a broad set of stakeholders and partnerships while others are designed and implemented by only one person.

To analyse the elements influencing the outcomes of DSM programmes in practice we performed 27 *case studies*[6]. A lot of attention was given to the selection of these in order to have a set of cases that

[5] All the examples of DSM programmes given in this paper are referring to the 27 case studies analysed in the CHANGING BEHAVIOUR project and are available via www.energychange.info/casestudies.

[6] The reports of the 27 case studies are available online via www.energychange.info/casestudies

represent the diversity of DSM programmes in Europe. Apart from the geographical context, target group, initiator, investors and scale, we also selected our cases on the basis of a focus on behavioural change, intervention instruments used and innovativeness. All these selection criteria are shortly described below.

3.1.1 Geographical context and target group

The partners of the CHANGING BEHAVIOUR project pointed out the relevance of a comparison of DSM programmes throughout the *different countries* where they are implemented. This led to a set of programmes from North, South, West and East Europe, from old and new member states: the Netherlands (2 cases), UK (5 cases), Denmark (1 case), Germany (4 cases), Greece (1 case), Finland (4 cases), Hungary (3 cases), Latvia (2 cases), Lithuania (2 cases) and Estonia (1 case). Additionally also 2 cases were selected that were implemented in different European countries, further called the European cases.

To be able to compare the successfulness of these case studies the partners of the CHANGING BEHAVIOUR project decided to have a minimum of 3-5 similar *target groups* within the case studies. We therefore only focus on DSM programmes that target schools, municipalities, households and offices or small and medium enterprises. In practice however many DSM programmes have a target group that does not exactly fit these categories. Sometimes they target only a part of one of the categories, for example the Energy expert programme in Finland focusses only at consumers living in privately owned houses. In other cases the programmes target several of these categories, for example the Efficient Residential Lighting Initiative (EnERLIn) in Latvia were schools, households and the local community as a whole were targeted. This diversity in focus leads to a categorization of 6 different target groups: (1) tenants / housing associations, (2) house and apartment owners, (3) Privately owned offices and buildings, (4) Schools and other municipal owned buildings, (5) local communities, (6) manufacturers and retailers and (7) consumers and citizens.

Apart from the type of the target group, also the *size of the target group* reached by the programme is one of the selection criteria for the 27 case studies. While some projects only reach a limited amount of people (for example 45 people are reached by the Dutch Green Energy Project in Leidsche Rijn), others aim at reaching the whole population of a city or country. An example of the latter is the

Manchester is my planet Pledge campaign in the UK that targets the Greater Manchester population of 2,6 million people and has collected over 21,000 pledges[7].

3.1.2 Initiator, temporal scale and investors

Although intermediary organisations play a large role in the DSM programmes (as described in the introduction of this paper) they are not in all cases also the *initiators* of the programmes. Individual companies, public private partnerships, local or national governments, end-users or research organisations can also initiate DSM programmes. They may then hire an intermediary organization to manage the programme further on. The initiators largely determine the scope and targets of the programme and thus are also important stakeholders. To analyse the effects of the initiator on the outcomes of the DSM programme, we have used the type of initiator as a selection criterion for the case studies.

Another element of the programmes pointed out as important for the selection of the case studies is the *temporal scale* of the programmes. Some projects like for example the Hungarian Climate Watch programme last for only a couple of months or a year while others last for many years, even decades (for example the Finnish Energy Expert programme that started in 1994 and is still ongoing. Arguably, a complete analysis of the successfulness of a programme can only be made after it is finished and final results and effects on lasting behavioural change can be measured. However, some projects that are still ongoing have elaborate intermediate evaluations that offer good insights in the successfulness of the projects (so far). Additionally, the longevity of programmes, whether they are planned for a longer period of time or are extended after they are officially completed can also count an indication for lasting support and ongoing success of a programme. Nevertheless, only ongoing programmes with sufficient intermediate evaluation results were included in the case study selection.

Apart from those initiating and managing DSM programmes, also the *investors* are important stakeholders that can influence the outcomes of the programme. Investors often determine specific requirements to which the programme should fit in order to get the funding. Most programmes have several investors often including the European, national and or local government. In addition many programmes also receive funds from other project partners as banks, housing associations, NGOs,

[7] See www.manchesterismyplanet.com for the actual amount of pledges.

house owners or other end-users. Because funding structures are often unique for each project, we did not add investors as an additional selection criterion for the case studies.

Table 1 gives an overview of the 27 case studies: a short description of the programmes and the geographical context, the type and size of the target group and the temporal scale of the programmes are summarized in this table.

3.1.3. Behavioural change focus, instruments used and innovativeness

All DSM programmes aim at changing energy consumption behaviour. As described in the introduction a distinction can be made between *curtailment* and *efficiency behaviour*. Some of the programmes selected for the case studies only aim at changing one specific behaviour (for example the Lithuanian apartment modernisation programme only aiming at renovation of apartments and thus efficiency behaviour). Other programmes aim at changing both curtailment and efficiency behaviour, for example the Greek Active Learning programme aiming at reducing energy use in schools and homes by promoting efficient use of energy (curtailment behaviour) and renewable energy systems (RES) (efficiency behaviour). Apart from aiming at changing curtailment and efficiency behaviour, the Active Learning programme also aims at changing attitudes or creating awareness and knowledge. Because many projects have this additional aim we identified it as a third category of behavioural change focus in the programme. In general most of the selected case studies aim at more than one of the categories that were identified: efficiency behaviour (buildings), efficiency behaviour (appliances), curtailment behaviour (actions) and changing attitudes and/or creating awareness and knowledge[8].

To influence behaviour and to achieve the behavioural changes that DSM programmes aim for, several *instruments for intervention* can be used ranging from energy advice to financial instruments. Deliverable 5 (Breukers et all, 2009a) of the CHANGING BEHAVIOUR project describes the basic instruments to influence energy related behavioural change based on an extended literature review of existing guidelines and theories for demand side management programmes. To be able to compare the effects of the instruments in different contexts, we selected the case studies on the basis of the instruments used. In practice however mostly a combination of instruments is used in the same programme, for example in the Warm Zone project in the English borough of Kirklees energy advice

[8] See for a complete overview of the behavioural change focus of all the case studies p10 of Deliverable 2 of the CHANGING BEHAVIOUR project (Mourik et al. 2009a)

and free housing insulation is combined with a general information and education campaign and subsidies to inform citizens of other public services. Our set of 27 case studies therefore incorporates at least 10 cases with one of the following instruments: energy advice; organizational measures (as energy performance contracting/negotiated agreements/commitment and/or voluntary programmes); installation of technologies; metering, feedback and audits; general information and education campaigns and financial instruments[9].

There is a big range between the level of *innovativeness* of DSM programmes. Some are very ambitious in terms of high energy saving targets, using innovative methodologies and instruments and aiming to reach new target groups, like for example the programme aiming at transferring the energy production and consumption of the Danish island of Samsø into a 100% renewable island within 10 years. Other projects are hardly or not at all ambitious in their targets set. The aim of the case studies is to learn about what factors lead to success of DSM programmes. Practice showed that the most innovative cases are also the ones that provide more interesting (and diverse) learning points. We therefore decided to select only case studies that have a medium to high level of innovativeness in terms of their targets, target group and instruments used.

3.2. Defining success

Before we start the analysis of the case studies to identify the factors that influence the success of these DSM programmes, we first have to *define successfulness and failure* in the context of DSM programmes. We selected three criteria for successfulness: effectiveness, efficiency and learning processes.

Effectiveness here refers to the actual success of the programme in reaching the intended targets in a way that is lasting. *Efficiency* refers to the way the goals are achieved (cost-effectively and within the given time-scale and budget). Effectiveness and efficiency are related to each other but practice also shows that effective programmes are not in all cases also efficient and vice versa. For example the Dutch Green Energy Train project in Leidsche Rijn was effective in terms of testing the educational method and measuring the impact on those participants' behaviour (tenants of social housing that moved to newly built houses in Leidsche Rijn) reached by the programme. However, it was not

[9] A complete overview of what instruments are used in the 27 case studies can be found at page 11 of Mourik et al. 2009a.

efficient because only 8% of the actual target group was reached. To learn most about the factors influencing the success and or failure of DSM programmes, we aimed for a selection of successful and less successful practices. Therefore we selected a combination of programmes that score differently in their effectiveness and efficiency.

Identifying the effectiveness and efficiency of a programme is a single loop learning process. Single loop learning processes only relate to learning about the outcomes that were expected at the start of the process. In addition to these singe loop learning processes double loop learning processes are important in DSM programmes. Double loop learning can lead to changes in the process and content of the current or future projects based on reflection on the involvement, role and effect of the intermediary itself, the target group and other stakeholders. Any improvements made to a project based on learning while it is still ongoing is thus the outcome of a double loop learning process. These improvements in general lead to more successful outcomes of the project as a whole. Double loop learning can thus be defined as success criterion. However, it is often difficult to identify these double loop learning processes when analysing historical cases because detailed information about the thought processes and reflections of project implementers and others involved are needed but often not available. To be able to identify the double loop learning processes in the case studies, we have therefore set up a list of indicators that show that double loop learning has most likely taken place. These indicators are divided into process indicators (1-4) and outcome indicators (5-9):

1. Interaction with and / or participation by the target group
2. Interaction with and / or participation by other stakeholders during project or its design
3. Learning as an explicit aim
4. Recording lessons for future use or making use of prior recorded lessons
5. alignment of diverse expectations of stakeholders
6. learning translated into redesign of programme
7. enhancing the capabilities of the person or organization managing the programme
8. Creation of new networks or institutions to support the programme and outcomes
9. Durable changes in behaviour.

The successfulness of the case studies in terms of double loop learning processes was defined by these indicators. The more indicators were identified in a case, the more successful it was in terms of

double loop learning. This analysis shows that the selected case studies differ a lot in terms of successfulness. While some are very successful (all nine indicators were identified in for example the case on the island of Samsø and the Manchester is my planet programme) others can be defined as a failure in terms of the double loop learning processes when only one of the indicators was identified (for example in the Dutch Green Energy Train project in Leidsche Rijn). *Table 2* illustrates the effectiveness, efficiency and learning indicators of the 27 cases studied.

3.3 Analysis of the case studies

The analysis of the case studies shows that there are several factors that have an effect on the outcomes of the selected cases: internal and external factors, the timing of an intervention and the interaction and engagement of end-users and stakeholders (Mourik et al. 2009b). The *internal factors* that often have a positive effect on the outcomes of DSM programmes include a strong financial basis, a clear focus and goals, a sound background in energy and technical data budget, continuity of the project and stakeholders' involvement, good planning and sufficient time. These elements are often known and taken onboard by the intermediaries managing the programmes.

Less known to many intermediaries are the *external factors* influencing the success of DSM programmes. These external factors are identified as political, institutional, cultural, socio-economic and other conditions influencing the outcomes of the DSM programmes in a positive or negative way. They include for example governmental conditions, mixed and irreconcilable policy goals, tradition of active civic engagement and market conditions. Often these external conditions, or context are difficult to change and it is therefore recommended to adapt the programme to the conditions in stead of vice versa. The analysis of the case studies also illustrates that apart from the context of the programme, also the context of the intermediary organisation implementing the programme is influencing the outcomes (Breukers et al. 2009b). This outcome emphasises the fact that every DSM programme is unique. A third element that influences the outcomes of a DSM programme is timing. Related to the context of the programme, the intermediary should aim to make use of windows of opportunity, for example linking to other existing programmes, policies or other regional developments, making use of a (already) motivated target group, etc to improve the outcomes of the DSM programme.

The fourth element that affects the outcomes of the cases studied is the interaction with and engagement of end-users and stakeholders. In general we can state that the more a programme fits the needs and culture of the target group and other stakeholders, the more successful it is. To make this fit, the programme should have a message tailored to the target group and stakeholders and provide multiple benefits for all. When doing so the intermediary should take into account the importance of trust, social pressure and alignment of expectations between the target group and other stakeholders. When the stakeholders have shared problems, norms and values that are tackled by the programme, they feel more engaged and are more willing to cooperate and change behaviour. To create such a programme, the target group and other stakeholders must be actively involved in its design and implementation based on communication and interaction. Apart from the network of the target group and stakeholders within the programme, it is also important to built, use and strengthen other existing networks of stakeholders that are linked to the aims or content of the programme (for example stakeholders involved in other DSM programmes with similar aims). These networks are part of the context of your programme and influence thus the outcomes of your project as well.

4. Evaluation action research approach

In this section we evaluate the action research approach based on the practical experiences with this method within the CHANGING BEHAVIOUR project in general and with respect to the selection and analysis of the case studies in particular. In the conclusing section of this paper this evaluation is translated into recommendations for future users of the action research approach.

In the CHANGING BEHAVIOUR project the 6 research project partners cooperate continuously with 7 practitioner organisations. The 13 project partners are spread over 9 different European countries. In practice this means that in most cases the practitioner and research organisation that are located geographically near to each other cooperate most intensively, for example in the implementation and evaluation of the six pilot projects (phase 4 of the CHANGING BEHAVIOUR project). But also for the selection and analysis of the case studies this ‘region specific’ cooperation took place. Here the project partners experienced that not only speaking the same language (German, English, Hungarian, etc) improved the cooperation (you can both read and understand the written material of the cases in your region), but also knowing and working within the same local culture helps to understand each other better. The DSM programmes within one country for example were often already known (via

local media, etc) by both the practitioner and research partner before the selection. This results in fast understanding (the details of the programme do not need to be explained to the other partner) and therefore fast alignment with the selection criteria. In one of the project couplings cooperates a Dutch research institute with a Latvian intermediary organisation. While the cooperation leads to significant learning experiences and valuable insights on both sides, there are signs showing that geographical (also cultural) and linguistic distance can imper and slow down effective and efficient cooperation. Generally, speaking the same language and having the same cultural background enables a quicker and better understanding and thus cooperation between the research and practitioner organisation.

A second lesson about 'language' in the cooperation between researchers and practitioners was learned. Although there is close cooperation throughout the whole project, most documents, including for example the case study analysis guide, are largely written by the research partners. This implies that they use (unconsciously) their definitions of terms, style and structure while writing. During the discussions and evaluation of these documents misunderstandings between the practitioners and researchers can occur, for example concerning the interpretation of terminology or parts of the text. Finding and solving these differences in interpretations sometimes costs more time and effort than anticipated. We can thus conclude that although being aware of the continuous cooperation, still both researchers and practitioners speak their own language and attention must be given to overcome the 'language barriers'.

A third lesson we can learn from the action research approach in practice in the CHANGING BEHAVIOUR project is related to the differences in 'work' between researchers and practitioners. The work of researchers can be summarized as 'thinking' while the work of the practitioners is 'acting'. This difference is shown for example in describing the different aspects of the DSM programmes in the case studies. One of these aspects was the 'flexibility of the DSM programme' towards changes in the context. Researchers use the term 'flexibility' to summarise the changes in the programme resulting from changes in for example local policies, stakeholders involved, etc. Translating 'changes' into 'flexibility of a project' implies an analysis (or 'thinking') characterising the daily work of researchers. Practitioners are not used to do this 'thinking'. They act and change the programme but hardly reflect upon their actions in summarising terms as 'flexibility'. In other words, they 'act' flexible while often lagging the time to 'think' of and label their actions in terms of flexibility. The translation from 'thought' into 'action' and vice versa entails an appreciation of each other's input. It avoids

neglecting researchers' knowledge and analyses as 'too theoretical' and practitioners' input as 'too straight-forward'. In practice this means that researchers and practitioners should realize this difference between the contents and approaches of their 'work' and translate continuously 'thinking' into 'acting' and vice versa. Doing so entails as a positive side-effect for researchers that this is the only way to come to real changes and improvements based on their theoretical/conceptual work (the aim of the action research approach). Researchers should develop the outcomes of their 'thinking' into immediate changes and action and not into indirect recommendations or 'utilisation of results'.

5. Conclusions and further steps

The CHANGING BEHAVIOUR project is based on the action research approach in which researchers and practitioners continuously cooperate and engage with each other, in smaller individual tasks of the research as well as during the overall project and its outcomes in general. Based on the evaluation of using this approach in practice, we can recommend the following to future users of the approach:

- Speaking the same language and having the same cultural background improves the cooperation between research and practitioner organisations

- Although cooperating, misinterpretations between researchers and practitioners based on having different working cultures and using language differently must be solved at all stages of the project. Create therefore time and possibilities to discuss these misunderstandings.

- The difference between the work of the researchers ('thinking') and practitioners ('acting'), should be overcome with efforts from both sides. Researchers should illustrate their 'thinking' with practical examples and practitioners should take the time to reflect upon their 'acting' in the terms of the researchers. In practice this means that the cooperation is based on a lot of direct contact between researchers and practitioners to explain their 'work' to each other. This can lead to learning and lasting changes on both sides.

We have selected and analysed 27 case studies of more and less successful DSM programmes. From this we conclude that apart from arranging the right internal factors we recommend intermediaries to adapt their DSM programme to its national and project specific context. Related to this is the timing of the programme. Intermediaries should aim to align the programme with other

developments in its context. The fourth element influencing the outcomes of the case studies is the engagement and interaction of the target group and other stakeholders with the project. The more a project fits the needs, norms and values of the target group and other stakeholders, the higher the likelihood of success is.

The outcomes of the analysis of the case studies are combined with the outcomes of an extensive literature review of theories on behavioural change in economics, psychological and social psychological research and sociological and sociotechnical research. This results in a list of building blocks for the toolkit for practitioners, the final aim of the CHANGING BEHAVIOUR project (Mourik et al. 2009b). We translate these building blocks into recommendations for practitioners to test in the pilot projects. These recommendations are described in concrete activities related to problem and target group, context and network, monitoring, evaluation and feedback which the practitioners have to perform step by step in their pilot projects. Based on their experiences with these activities and the outcomes of the implementation in the pilot projects, we will rewrite these activities into the toolkit that will be freely available online in English and at least two other languages in the beginning of 2011.

References

Abrahamse, W., Steg, L. Vlek, C. and Rothengatter, T. (2005). A review of intervention studies aimed at household energy conservation. *Journal of Environmental Psychology,* Vol. 25, 273-291.

Backhaus, J. (2009). *Innovative actors in the energy system: the importance of intermediairy organisation*. Paper presented at the ICICI conference, 1-2 October 2009, Prague, Czech Republic.

Breukers, S. et all (2009a). *Interaction Schemes for Succesful Energy Demand Side Management. Building blocks for a practicable and conceptual framework.* Deliverable 5 of the CHANGING BEHAVIOUR project. Available via www.energychange.info/deliverables

Breukers, S., Heiskanen, E., Brohmann, B., Mourik R. and Feenstra, C.F.J. (2009b). *Connecting research to design: interactive and iterative learning about energy demand side management*. Paper presented at the 5th Dubrovnik conference on sustainable development of energy, water and environment systems. 29 Sept – 3 Oct 2009, Dubrovnik, Croatia.

European Commission (2006). Action Plan for Energy Efficiency. Communication from the Commission. *Action Plan for Energy Efficiency: Realising the Potential*. http://ec.europa.eu/energy/action_plan_energy_efficiency/doc/com_2006_0545_en.pdf

Heiskanen, E. and Rask, M. (2009). *From Sociotechnical Theory to Sociotechnical Practice: An Action Research Project*. In Proceedings of Sustainable Consumption and Production: Framework for Action 2nd Conference of the Sustainable Consumption Research Exchange (SCORE!) Network. Refereed Sessions V, pp. 3-16. http://www.score-network.org/files//24119_CF2_session_5.pdf

Hodson, M. et all (2009). *Conceptualizing and understanding intermediaries in context: Developing an enhanced understanding of context, actors and transferability.* Deliverable 7 of the CHANGING BEHAVIOUR project. Available via www.energychange.info/deliverables

Jackson, T. (2005). *Motivating sustainable consumption – a review of models of consumer behaviour and behavioural change*. A Report to the Sustainable Development Research Network. London.

Kurz, T. (2002), The Psychology of Environmentally Sustainable Behaviour: Fitting Together Pieces of the Puzzle. *Analysis of Social Issues and Public Policy*, 2(1), 257-278.

Mourik, R.M. et all (2009a). *Summary database of the past 10 years of best and bad practices in demand management*. Deliverable 2 of the CHANGING BEHAVIOUR project.

Mourik, R.M. et all (2009b). *Past 10 year of best and bad practices in demand management: a meta analysis of 27 case studies focussing on conditions explaining success and failure of demand-side management programmes*. Deliverable 5 of the CHANGING BEHAVIOUR project, available via www.energychange.info/deliverables.

Stern, P.C. (2000). Towards a coherent theory of environmentally significant behaviour. *Journal of Social Issues*, 52(3), 407-424

Wilhite, H., Shove, E., Lutzenhiser, L. & Kempton, W., (2000) The Legacy of Twenty Years of Energy Demand Management: we know more about Individual Behaviour but next to Nothing about Demand. pp. 109-126 in E. Jochem et al. (Eds.) *Society, Behaviour, and Climate Change Mitigation.* Dordrecht: Kluwer Academic Publishers.

Tables and figures

Country	Programme	Summary of programme	Target Group*	Size target group**	Temporal scale
Old member states					
The 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	2	228 households in 8 apartment blocks	2001-2003
	Green Energy Train Leidsche Rijn	Reduce the energy, heat and water use in apartment houses by 5% through a specific education and communication approach	1	45 persons	2001-2003
UK	CIS Co-operative insurance Society Solar Tower	Renovate a landmark building using solar panels	3	One large office building	2004-2006
	Manchester is My Planet (MiMP) programme	Increase policy development/implementation on Climate Change among Greater Manchester local authorities	7	100+ organisations	2005-2008
	MiMP Climate Change Pledge	Attract citizens in Greater Manchester to sign up to a Climate Change Pledge, with information and marketing to encourage a switch to less carbon-intensive lifestyles.	7	21,000 people of 2.6 million	2005-2008
	Metropolitan Police Energy Efficiency Programme	Improve energy efficiency in existing buildings and practices of the Metropolitan Police Service	4	50,000 staff, 600 buildings and 6,000 vehicles	2008-ongoing
	Warmzone Kirklees	Free cavity-wall and loft insulation in the Borough of Kirklees	1, 2, 5	125,000 households	2007-2010
Denmark	Samsø	Creation of a renewable, energy self-sufficient island municipality	5	4,000 inhabitants and whole demand	1997-ongoing
Germany	ETT. EcoTopTen initiative	Nation-wide information and rating service for energy efficient products	6, 7	2,000 individuals receive newsletter, 413,000 visits to website	2005-2007
	Contracting Rommerskirchen	Implementation of energy performance contracting for municipal buildings	4	All municipality owned buildings in Rommerskirchen	2004-2014
	Off. Really Off?	State-wide campaign to create awareness of standby energy among consumers and retailers	7	About 35% of 2.8 million inhabitants of Schleswig-Holstein	2000-2002
	SANIT	On-site advice service for energy efficiency renovations provided by consumer NGO	2	3071 audits in houses carried out	2005-2008
Greece	Active Learning	Energy education at 10 primary schools in Attica and on Crete	4	Almost 2,000 children	2006-2008
Finland	Municipal Energy Efficiency Agreements	Negotiated agreement to promote energy audits and investments in municipalities	5	80% of municipality owned buildings and production plants	1997-ongoing
	Energy expert program	Training of volunteer residents promoting energy efficiency in housing associations	1	More than 3,000 resident volunteers	1994-ongoing
	Green Office programme	Certification and management scheme to reduce CO_2 and resource consumption in offices	3	200 offices in 80 organisations. About 20,200 employees	2002-ongoing
	Ilmari Climate Change Campaign for Schools	School climate change awareness campaign implemented by environmental and youth NGOs	4	800 schools	2002-ongoing
Europe	Eco n'Home	Reducing energy use and CO_2 emissions in 940 households in Europe via personal energy advice	2	940 households	2006-2008
	Energy Trophy	Competition for energy savings in office buildings through changes in employee behaviour.	3	38 companies	2004-ongoing

***Table 2**: Overview 27 Case Studies: summary, type and size of target group*

Country	Programme	Effectiveness	Efficiency	Double loop learning indicators*
The Netherlands	Green Energy Train The Hague	Medium	High	4,5,6
	Green Energy Train Leidsche Rijn	Low	Medium	7
UK	CIS Co-operative insurance Society Solar Tower	Medium	Medium	1
	Manchester is My Planet (MiMP) programme	High/medium	High	1,2,3,4,5,6,7,8,9
	MiMP Climate Change Pledge	High	High	1,2
	Metropolitan Police Energy Efficiency Programme	High (expected)	High (expected)	1,3,4,7,8
	Warmzone Kirklees	High	Medium	1,2,4,5,7,8,9
Denmark	Samsø	High	High	1,2,3,4,5,6,7,8,9
Germany	ETT. EcoTopTen initiative	High	High	1,2,3,4,7,8,9
	Contracting Rommerskirchen	High	High	1,7
	Off. Really Off?	High	High	3,4,7,8,9
	SANIT	High	High	1,3,4,7
Greece	Active Learning	High	Medium	1,3,4,8,9
Finland	Municipal Energy Efficiency Agreements	High	High	1,4,7,8
	Energy expert program	High	High	1,3,4,7
	Green Office programme	High/medium	High	1,3,4,5,6,7,8,9
	Ilmari Climate Change Campaign for Schools	Medium	Medium	1,2,4,6,7,8,9
Europe	Eco n'Home	Low	Low	1,2,7
	Energy Trophy	Medium	Medium	1,4,6,7
Hungary	Social Housing Energy Efficiency Renovation	High	High	5
	Climate Watch	High	High	1,2,3,4,6,7,8,9
	Carbonarium Association	Low	Medium/high	1,3,7
Latvia	EnERLIn - Efficient Residential Lighting Initiative	Medium	Medium	1,7,8,9
	Building energy audits	Low	Low	1
Lithuania	Multi-apartment buildings modernisation programme	High	High	1,7
	Taupukas residential awareness campaign	High	High	1,2,7
Estonia	KRED-EX Energy Saving Competence Centre	High	High	1,2,5,7,8,9

***Table 2**: Indicators of success and failure of the case studies*
** see text for explanation numbers of indicators*

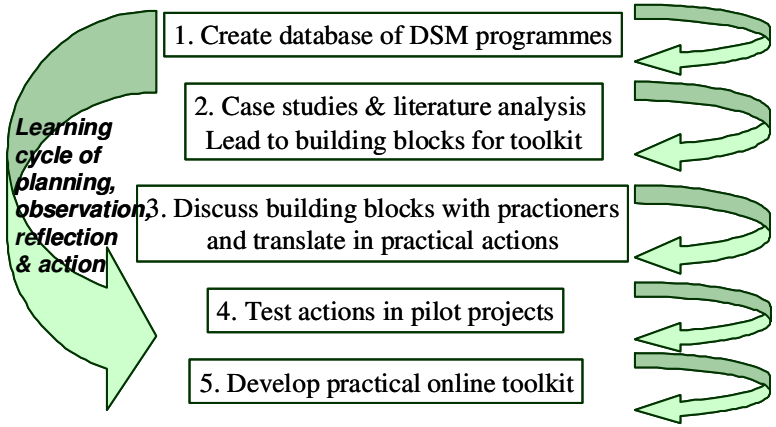

Figure 1: *the 5 research phases and the learning cycles of the action research approach in the CHANGING BEHAVIOUR project*