

Mainstreaming best practices in energy demand

Sylvia Breukers
Energy research Centre of the Netherlands (ECN)
Radarweg 60
1043 NT Amsterdam
breukers@ecn.nl

Julia Backhaus
Energy research Centre of the Netherlands (ECN)
Radarweg 60
1043 NT Amsterdam
backhaus@ecn.nl

Oksana Mont
Lund University
International Institute for Industrial Environmental Economics
P. O. Box 196 Tegnersplatsen 4
SE- 221 00 Lund Sweden
oksana.mont@iiee.lu.se

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Abstract

It is becoming increasingly clear that we need an integrated approach to understanding and encouraging transitions towards a sustainable energy system. Current overall unsustainable 'practices' are locked into cultural, material, institutional and infrastructural settings. This limits the scope for individual choice and action. Even when actions are taken on individual or project level, they often remain stand-alone niche experiments and little further diffusion takes place. This paper addresses this problem by investigating how new more sustainable practices in the field of energy demand at the micro level can become mainstream and how energy demand side management projects can encourage this.

We first discuss how a multilevel systems approach and practice theory may be fruitfully combined to address the problem of mainstreaming. Second, we analyse four empirical cases of energy demand side management. We explore efforts at diffusing these sustainable energy practices, the encountered challenges, employed solutions and achieved outcomes with the goal of learning about opportunities to mainstream best practices in the field of energy demand. The analysis reveals that the case that involved the most radical innovation faced the highest resistance to mainstreaming from the incumbent system. The more incremental initiatives were more successful at diffusing, but had rather modest outcomes in terms of environmental and efficiency gains. An important finding is that in order to shift everyday practices to a more sustainable direction, an understanding of possibilities to trigger changes in social norms is needed. When these changes are quite invasive, more time for

negotiation and discussion might be needed before they become regarded as legitimate. Furthermore, connecting supply and demand (instead of merely addressing the demand side) can be crucial in mainstreaming sustainable energy practices. Although lessons learned from the cases do not offer clear-cut 'do's and don'ts' for future efforts, they do highlight important issues for mainstreaming sustainable practices. These issues can sometimes be addressed within the scope of a single energy demand side project, but often policy has an important facilitating role to play in making sustainable energy practices legitimate and mainstream.

Introduction

There is a growing recognition that an integrated approach is needed in order to encourage transitions towards sustainable energy systems. First of all, such an approach involves an acknowledgement of the path dependent nature of innovation processes. Current unsustainable practices have over time become embedded and locked into cultural, material, institutional and infrastructural settings. Accumulations of choices in the past have resulted in the build-up of these settings. These choices, though subject to contingencies, have been co-shaped by choices made at earlier moments in time (Mahoney 2000; Thelen 2003). As a result of that, certain directions have become more likely and have worked to strengthen certain arrangements and technologies rather than others. Combinations of infrastructure, dominant actors, networks and institutional arrangements facilitated the mutual strengthening of one another in a path dependent process of system-building. Second, an integrated approach entails a multi-level understanding. Next to the system level, we also need to address relevant prac-

tices at the micro level of households, neighbourhoods, offices, schools etc. We furthermore need to pay attention to what happens in different dimensions at the level of the incumbent system, like the physical infrastructures and technologies, formal and informal institutions (legislation, policies, norms, expectations), stakeholders and stakeholder networks (based on shared visions, interests, expectations, and dominant ways of doing).

In this paper we ask how new best practices in the field of energy demand side management (DSM) may get diffused over time and how DSM projects and programmes may help encourage and facilitate this. This is a relevant question, as we witness a wide array of emerging more sustainable practices of doing and living that often remain localised, dispersed niches. We use the term diffusion of innovative practices, which can refer to different degrees of diffusion and different processes:

- **Embedding:** an innovative practice or initiative becomes embedded and institutionalised, meaning that it becomes more aligned with societal dynamics (be it on micro-scale or broader).
- **Multiplying:** a similar practice or initiative is taken up/implemented in other locales (diffusion in the sense of 'replication'; involves some degree of commitment from relevant stakeholders because else this replication would not happen)
- **Up-scaling:** when a practice or initiative is up-scaled (e.g. a local pilot initiative becomes a national or even international initiative – refers to the scope and scale of the project; it also involves some degree of commitment from relevant stakeholders)
- **Mainstreaming:** when an innovative practice becomes mainstream ('full diffusion').

For a full diffusion of innovative practices, all dimensions of the incumbent system may need to change: social norms, policies, infrastructures, technologies, behaviours and stakeholder relations. We are interested in efforts at diffusion that can also entail the partial 'spreading' of an innovative practice.

This paper addresses efforts by intermediary organisations to diffuse emerging sustainable best practices through energy DSM projects and programmes. In addition to contextual and case-specific characteristics, we can explore typical efforts at diffusion, the challenges faced, solutions sought and the achieved outcomes. This knowledge will help us understand opportunities to mainstream best practices in the field of energy demand.

This paper first explores how a multilevel systems approach and practice theory may be fruitfully combined to address issues of mainstreaming. The main focus is on processes of social innovation¹ and how new sustainable practices are introduced and become embedded (or not). Second, we analyse four empirical cases of energy DSM from a research-practice EU-funded project CHANGING BEHAVIOUR, whereby we focus specifically on how they have attempted to diffuse sustainable energy behaviours and practices. This analysis of cases also includes the investigation of the role of social norms and

incumbent systems of provision in changing behaviours and practices. The paper concludes with a discussion on relevant issues to consider for those trying to mainstream best practices: energy intermediaries preparing DSM projects and policy makers.

Conceptual background: mainstreaming best practices

In this section, we develop an approach that borrows from the multi-level approaches from the transition and innovation literature and the theory of practice. The goal is not necessarily to contribute to theory building, but rather to develop an applied analytical framework that is based on a combination of bottom-up and systemic understanding of sustainable transitions. This framework is then used to explore opportunities and challenges associated with moving towards sustainable energy practices.

MULTI-LEVEL INNOVATION APPROACHES

In the innovation and transition literature, many efforts have been undertaken to connect the multiple levels that innovations 'move through' before they reach maturity (Geels 2004; Jacobsson & Johnson 2000; Rothmans, Kemp et al 2001). Systemic innovation and transition approaches regard innovations as non-linear sociotechnical processes. They try to identify numerous barriers that innovations witness during their evolution into maturity. Emerging technological fields are conceptualised as emerging *systems* where actors, institutions, networks and technologies interact and where the quality of these interactions influences the development and diffusion of technologies. By addressing both niches and the systemic levels multi-level innovation approaches seek to understand how dynamics at different levels affect one another (see Figure 1). According to this approach, one possible explanation for unsuccessful innovations is the lock-ins that favour incumbent over innovative technologies. For instance, wind power technology in the Netherlands for a long time struggled with the prevailing system of centralised power generation. Physical infrastructures, legislation, policies, market structures, norms and values that supported the incumbent system created an unfavourable climate for the wind power innovation. In contrast, established technologies, such as centralised coal-fired power production, did enjoy support by the incumbent infrastructure, legislation, norms, networks and stakeholders that all co-evolved together and perpetuated the prevalence of these systems of power production (Agterbosch & Breukers 2008; Breukers & Wolsink 2007; Jacobsson & Johnson 2000).

Over time, however, successful innovations move from the niche/experimental level towards regime levels where they are scaled up and become embedded and diffused. In order for this to happen, various institutional, network, actor and technological conditions need to be conducive to the innovation. This is crucial as innovations are usually not supported or even impeded by existing systems. For successful innovations to diffuse, support, knowledge and networks need to be mobilised at several levels.

Multi-level innovation approaches are useful to address the question of diffusion, how this may involve different levels and system dimensions and what role different actors, networks and institutions play. Even more importantly, they seek to under-

1. Social innovation refers to changes in organisational processes and institutional arrangements addressing social needs

stand how dynamics at different levels affect one another. This is important if we want to explore opportunities for sustainable practices to move beyond the experimental and niche level and become better established, embedded and mainstream.

Multilevel innovation research often involves ex-post historical inquiries of transition processes, thereby focusing on the longer term rather than on the day to day practices, behaviours and changes at micro-levels of e.g. households. They do not explicitly address the demand side of energy. Also, this research takes technologies and technological innovations as a starting point. Even where studies include insights from a host of social science disciplines, their starting point is still to understand how certain technologies and technological innovations have performed over time. In contrast, our interests lie more in the field of *social* innovation (which may or may not involve technological innovation). In addition, we explicitly want to pay attention to innovation in peoples' everyday routines and behaviours. Our focus is on innovative social practices. For these reasons, we discuss another theoretical perspective in the next section.

SOCIAL INNOVATION AND PRACTICE APPROACH

While keeping the multilevel perspective in mind, our approach also borrows from the practice theory (e.g. Reckwitz 2002; Warde 2005; Shove et al 2007; Spaargaren & Oosterveer 2010), which goes back to Giddens' structuration theory (1984). In answering the question about individual behaviour, rational choice theory explains actions and outcomes by referring to individual decision-making with the goal of maximizing own utility, while some sociological accounts take a deterministic view and see individual behaviours being determined by the societal structure that leaves no room for agency. Structuration theory, in contrast, views behaviour as affected both by agency and structure. While the social-institutional context structures behaviour, actors also (collectively) shape this context over time. For the field of energy consumption, this means that instead of looking at individual behaviours or consumption *per se*, the analysis should focus on how practices change towards less energy-intensive ones and how they contribute to contextual changes that accommodate and facilitate these new practices. A practice is understood as: "a routinized type of behavior which consists of several elements, interconnected to one other: forms of bodily activities, forms of mental activities, 'things' and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge" (Reckwitz 2002:250). Examples of practices are ways of cooking, shopping, working, doing business, farming, of taking care of oneself or others, etc. The existence of such a practice depends on the "existence and specific interconnectedness of these elements, and which cannot be reduced to any one of these single elements." (Reckwitz 2002:250).

Each individual has his/her own combination of practices in which s/he engages, whereby the level of integration in each practice can vary (Spaargaren & Oosterveer 2010). Most practices entail consumption and practices steer consumption. They do so through norms and conventions that they carry and reinforce. The consumption pattern of an individual person is the sum of all moments of consumption in all practices this person is engaged in (Warde 2005). Behavioural changes go hand in hand with changes in practices (or with the develop-

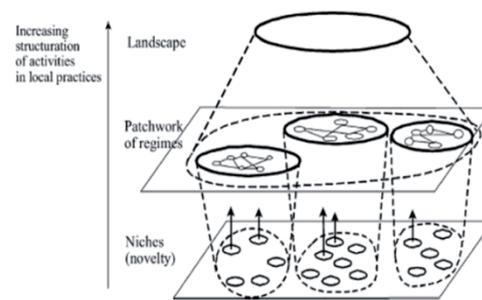


Figure 1 Multiple levels as a nested hierarchy (Geels 2002).

ment of new practices). These changes can be minor or more drastic depending on the perspective of the particular persons involved (e.g. no longer using meat to prepare meals may be a drastic change to some and a minor change to others who already consume little meat). Changes in behavioural routines are involved in shaping innovative practices and are hence an important focus for analysis.

Many of our everyday routines are shaped, guided and mediated by collective systems of provision and vice versa, our everyday practices sustain or reshape these systems in the long run (Otnes 1988; Wilhite, Shove, Lutzenhiser and Kempton 2000). Systems of provision include collective physical infrastructures and institutions providing various types of services and utilities to citizens, such as our water and sewerage system, the electricity supply system and grid, waste management systems, the health care system and educational system. There are also privately provided systems, e.g. IT services, such as broadband (Van Vliet et al 2005). Existing practices, technologies and systems of provision can be locked into each other and shape consumption patterns and levels (Mont & Power 2010:2240). Lock-ins of various kinds can be identified (e.g. technological, infrastructural, and institutional). When investigating changes towards more sustainable practices, we need to understand how systems of provision influence their evolution and dissemination. It may be that new practices evolve (partly) outside or despite the existing systems of provision (e.g. decentralised electricity generation) or that new systems of provision are emerging next to or replacing the old ones.

A MULTILEVEL PRACTICE APPROACH

Addressing practices that shape consumption patterns and behaviours, whereby opportunities for changes in these practices are constrained by system-level conditions and infrastructures, but where there is still room for agency to (collectively) affect change in a bottom-up manner fits with a multilevel perspective introduced earlier. Both approaches regard innovation as the combined outcome of non-linear processes involving complex interactions between actors, networks, technologies, institutions and physical infrastructures. In addition, both approaches acknowledge the important role of context and path dependencies.

Practices are situated in a wider context: systems of provision, various formal and informal institutions (including norms, policies, and markets) and technologies. Learning about changes towards more sustainable practices involves learning about the behaviours involved in these practices and various social and institutional rules and arrangements, the physical

and technical artefacts that are needed for these practices, and the broader overarching systems of provision and how these affect new and more sustainable practices. Using a multi-level practice approach allows us to address how new or changed practices, over time, can become better diffused and what is needed for that to be accomplished.

Case studies: mainstreaming practices through energy DSM projects

METHOD AND DATA

The empirical cases were conducted in a research-practice project (CHANGING BEHAVIOUR²) that studied opportunities for improving the success of energy DSM projects aimed at the micro-level: households, schools, offices, neighbourhoods, towns, etc. It addressed both one-shot behavioural changes (e.g. investment behaviour: purchasing appliances, building insulation), as well as changes in daily routines and habits. The CHANGING BEHAVIOUR project involved among others a multiple case study of energy DSM projects that aimed to change practices into more sustainable ones. From 27 case studies analysed in the project, we selected four cases that included efforts to mainstream practices. Four case study reports have been analysed, asking the following questions:

Four case study reports have been analysed, asking the following questions:

- What was the sustainable practice(s) involved?
- What aspects of the incumbent system inhibited a shift towards more sustainable practices?
- What were the instruments used to bring about change to (more sustainable) practices?
- What was the role of the intermediary?
- What efforts were undertaken to diffuse the new practices?
- What was the influence of relevant stakeholders on the success of the diffusion?
- What were impediments from the incumbent systems of provision?
- How successful were these efforts at diffusion?
- What norms were addressed?
- What lessons can be learned for successful diffusion?

Scaling up and mainstreaming emerging best practices involves transition processes that span over longer time frames than these case projects' timelines. To fully describe and understand the path-dependencies involved projects should be followed-up for longer periods of time. Due to the short time that has passed since finalisation of the projects, we instead focused on analysing:

- the extent to which projects (localised niches) aimed at diffusion as part of their strategy (next to the very concrete

energy efficiency goals that are central to energy DSM projects), and

- the main challenges faced by projects when employing efforts at diffusion

THE ACTIVE LEARNING PROJECT

The Active Learning project³ was implemented in Greece from 2006–2008. The main objective was to make children at school aware of energy consumption and to teach children about possibilities for energy savings by means of innovative teaching approaches and materials. Classes were held interactively and focused on 'hands on' experience rather than 'front of class' lectures. The project aimed at establishing the topic of energy conservation and the use of developed methods and materials on a national level. Therefore, the implementing intermediary involved the Ministry of Education as well as a number of other relevant stakeholders. However, interest among these stakeholders was rather low and the education system proved to be too rigid to open up to new topics and approaches within the time frame of the project. More details of the case are shown in table 1.

THE GREEN OFFICE PROJECT

The Green Office project in Finland has been tested in a pilot phase for four years before implementation in 2003. It has been successfully running since then, with new companies still signing up and the programme being exported to other countries. The main instrument used is a certification scheme developed by WWF Finland for offices. It allows offices to become easily involved, monitors energy and resource consumption and provides advice for consumption reduction. Yearly checks are part of the programme. In the beginning 'low hanging fruits' are picked, later on also efficiency investments are addressed. One of the crucial factors for success is the trust people have in the intermediary implementing the programme. WWF is a globally operating NGO with a trustworthy image which makes it attractive for companies to join the programme. Additionally, companies seem to appreciate the networking events between companies involved in the programme. For more details about the case, see table 2.

THE OFF.REALLY OFF PROJECT

The Off. Really off? campaign was planned in Germany as a pilot for a nation-wide follow-up. It focused on stand-by consumption of appliances and used marketing techniques to promote more control over energy consumption at home. In terms of awareness raising among consumers this campaign was deemed to be successful and another regional and national campaign followed focusing on slightly different topics related to energy efficiency but using the same approach. One of the main reasons for success in terms of awareness raising may have been the broad support for this campaign among public bodies and NGOs. Additionally, the campaign triggered considerable secondary media attention which further contributed to this effect. The actual effect in terms of change in practices cannot be measured or estimated. For more information about the pilot, see table 3.

2. CHANGING BEHAVIOUR is a European Commission supported project (Seventh Framework Programme). For more information, see www.energychange.info.

3. For the full case reports, please go to: <http://mechanisms.energychange.info/casestudies>

Table 1: Active Learning project, Greece.

Focus of analysis	Active Learning, Greece
General project information	<ul style="list-style-type: none"> - Background/initiation: part of an EU funded research project - Time: 2006-2008 - Scope: 14 EU countries, 10 schools per country, case study focuses on Greece where 1200 pupils participated - Aim: developing and testing Active Learning and Energy Monitoring and integration in national energy curricula
Sustainable practice(s) involved	<ul style="list-style-type: none"> - Various practices (heating, cooling, hot water, lighting, electric appliances and transport), at home and school. - Teaching practices: energy saving as new subject, Active Learning (hands-on, experimental) and Energy Monitoring as new methods - Learning practices: students as active participants in knowledge creation and dissemination, rather than passive recipients
Aspects of incumbent system inhibiting a shift from unsustainable to more sustainable practices	<ul style="list-style-type: none"> - Lack of societal sensitisation, knowledge and awareness - Lack of knowledge and capacity among public actors - Lack of incentives for more efficient behaviour
Instruments used to change practices	<ul style="list-style-type: none"> - Development of educational package, train teachers to use it - Teaching children about energy efficiency and renewable energy at home, school and when travelling through Active Learning - Aiming to influence children's and (indirectly) parents' practices
Role of the intermediary	<ul style="list-style-type: none"> - Creating innovative teaching materials and methods - Mobilising schools and teachers for participation - Networking and aligning interests of project stakeholders
Efforts to diffuse more sustainable practice	<ul style="list-style-type: none"> - Network building (national and EU level) among energy, policy and school actors - Involving school authorities - Collaboration with governmental departments - Free availability of Active Learning web-toolkit
Influence of relevant stakeholders on success of diffusion (expectations, visions, agendas, influence)	<ul style="list-style-type: none"> - School authorities and government department did not show significant efforts at supporting the changes (is that true?) - Ministry of Education provided no support (inhibiting system change) - Participating schools (10)/teachers (105) indicated willingness to continue using Active Learning – but not active commitment by e.g. advocating this new approach
Impediments from incumbent systems of provision	<ul style="list-style-type: none"> - Limited flexibility of Greek educational system for introduction of new methods and topics. - Lack of support from crucial actors at several levels
Success of diffusion	<ul style="list-style-type: none"> - Not beyond project participants
Norms addressed	<ul style="list-style-type: none"> - What is 'normal' in terms of consumption - What is 'normal' in terms of teaching/education - What is 'normal' in terms of parents-children interaction: parents learning from children (lessons learned in school diffused further in children's homes)
Lessons for successful diffusion	<ul style="list-style-type: none"> - diffusion among project participants benefits from tailoring project to target group's needs and close engagement - diffusion beyond project participants could benefit from monitoring and communication beyond target group involved - diffusion involving systemic change is challenged by the lack of flexibility of the educational system. A longer period of involvement, negotiation and adaptation may allow further diffusion.

THE ENERGY EXPERT PROJECT

The Energy Expert project in Finland has been initiated in 1993 and has been running since then. The Finnish governmental organisation for energy efficiency and a social housing company jointly started recruiting volunteers for becoming energy experts. Since then 3,000 experts have been trained and new people are still signing up to the programme. Energy experts are asked to devote some time to the task of promoting energy efficiency in their buildings and communities. The implementing

intermediaries organise events for networking, sharing experiences and trainings of energy experts. For more information on the case study, refer to table 4.

ANALYSIS OF OUTCOMES

Each energy DSM project addressed multiple practices (implicitly or explicitly) that involve energy behaviours. These practices are carriers of rules, norms and values that may need to change in order to result in sustainable energy consumption

Table 2: Green Office project, Finland.

Focus of analysis	The Green Office, Finland
General project information	<ul style="list-style-type: none"> - Background/initiator: WWF Finland - Time: pilot phase: 1999-2002, programme start: 2003 - Scope: over 150 organisations have gained the Green Office certificate - Aim: provide information and support for more sustainable offices
Sustainable practice(s) involved	<ul style="list-style-type: none"> - More sustainable working styles: less use of natural resources in offices (e.g., reducing use of paper, energy) - More sustainable lifestyles (aiming at impact also outside work) - New practice of discussing sustainable behaviour in organisation
Aspects of incumbent system inhibiting a shift from unsustainable to more sustainable practices	<ul style="list-style-type: none"> - Lack of institutions addressing environmental awareness and behaviour in service sector offices. - Limited (willingness to hire) knowledge and capacities for sustainability at offices. - Inefficient office building infrastructure requiring high investments to increase efficiency - Lack of incentives: office space is often rented - IT supply side is not aligned to (changed) needs of the offices
Instruments used to change practices	<ul style="list-style-type: none"> - Energy advice and certification (annual check) - Focus on environmental benefits, cost savings, increased staff motivation and enhanced reputation of certified organisations - 'Easy point of entry' offered by developing the participants' capacities to recognise conservation opportunities. 'Low-hanging fruit' done first. Over the years, more attention to efficiency investments.
Role of the intermediary	<ul style="list-style-type: none"> - Providing information (including monitoring and feedback) and support - Developing, establishing and monitoring a certification scheme that allows easy entry
Efforts to diffuse more sustainable practice	<ul style="list-style-type: none"> - Long-term programme - Institutionalisation through certification and regular checks (lock-in) - Self-financing programme - Building networks among Green Office companies (social learning) - Creation of new norms: popular companies greening their image with certificate and communicating their efforts - Learning from feedback by participants to improve programme - Flexibility of programme to be adapted to specific circumstances
Influence of relevant stakeholders on success of diffusion (expectations, visions, agendas, influence)	<ul style="list-style-type: none"> - Programme is implemented by WWF which has a strong track record and excellent reputation - Companies trust the programme implementer and like using their logo for communication and image greening - Participating companies network and exchange experiences
Impediments from incumbent systems of provision for diffusion	<ul style="list-style-type: none"> - Lack of involvement of facility owners/managers is an obstacle to larger investments and savings (e.g. space heating/cooling) - Lack of involvement of suppliers of IT equipment and services is obstacle to larger savings (Green Office has started to address this)
Success of diffusion	<ul style="list-style-type: none"> - high success beyond initial pilot group: - Increasing number of different kinds of companies/organisations participate - Regular network meetings - Environmental and energy management is institutionalised in participating offices (e.g. public sector organisations, where environmental management systems are becoming a requirement). - Spreading of Green Office programmes to Asian and other European countries
Norms addressed	<ul style="list-style-type: none"> - What is 'normal' consumption behaviour in the office (and at home) - Environmental management in offices are becoming a new norm
Lessons for successful diffusion	<ul style="list-style-type: none"> - Well-known project implementer (known logo) can facilitate diffusion - Low entry barrier can facilitate diffusion - Establishing a trustworthy certification scheme motivates participants to become involved (as it can also be used for communicating a green image) - Networking participants can facilitate diffusion (joining the circle)

Table 3: Off. Really Off? campaign, Germany.

Focus of analysis	Off. Really Off? Germany
General project information	<ul style="list-style-type: none"> - Background/initiator: Pilot project for a national campaign in one federal state - Time: Nov 2000 – April 2002 - Scope: Mass media campaign on appliance stand-by consumption - Aim: Reduce stand-by power consumption
Sustainable practice(s) involved	<ul style="list-style-type: none"> - Buying and using of electrical appliances in households involved in all sorts of practices (e.g. listening to music) and use of a remote control (which demands stand-by). Selling of appliances: retailers providing information
Aspects of incumbent system inhibiting a shift from unsustainable to more sustainable practices	<ul style="list-style-type: none"> - Lack of national and EU regulation aiming at all household appliances - Insufficient/ineffective ‘soft measures’ (e.g. information) - Stand-by has been introduced as service to the user (e.g. remote control) and has become the norm rather than the exception
Instruments used to change practices	<ul style="list-style-type: none"> - Information about and marketing of cutting stand-by consumption - Mass media (newspapers, radio, cinema, internet, brochure, information hotline) - Cooperation with appliance retailers - Focus of the campaign: financial savings and ‘being in control’
Role of the intermediary	<ul style="list-style-type: none"> - Disseminating information among end-users - Disseminating information among retailers - Networking and aligning project implementers and mediators
Efforts to diffuse more sustainable practice	<ul style="list-style-type: none"> - Broader campaign followed from this pilot project - Diverse set of stakeholders on national and federal level involved, NGOs and independent experts acted as mediators, creating trust - German Energy Label Association promoted the label throughout the country - Shifting focus from demand-side measures only to a market perspective and the interaction between supply and demand. - Targeting new audiences (young, male, interested in electrical appliances)
Influence of relevant stakeholders on success of diffusion (expectations, visions, agendas, influence)	<ul style="list-style-type: none"> - Support of actors on national and federal level crucial for success: creating trust - Support by NGOs crucial for success: creating trust
Impediments from incumbent systems of provision for diffusion	<ul style="list-style-type: none"> - Lack of flexibility of market system: involving retailers in campaign insufficient for market transformation
Success of diffusion	<ul style="list-style-type: none"> - Diffusion of awareness campaign successful: - National level: energy efficiency initiative with similar approach - Regional level: follow-up programme with similar approach - The project’s information strategy was successful – it triggered a lot of secondary media attention, thereby furthering its scope and impact. - The campaign was considered successful in terms of awareness raised but actual saving effects are difficult to estimate. Also, the effect of involving retailers and the success in terms of market transformation are difficult to estimate, probably insignificant.
Norms addressed	<ul style="list-style-type: none"> - What is ‘normal’ in terms of ease and comfort - What is ‘normal’ in terms of controlling energy consumption
Lessons for successful diffusion	<ul style="list-style-type: none"> - Creating broad support among various stakeholders (by aligning interests) creates trust among consumers - marketing strategies that are unusual for the promotion of energy conservation can facilitate diffusion - A well-planned and implemented pilot project can facilitate diffusion of information across new target groups and about new practices

behaviours. Furthermore, systems of provision affect the room for change in existing practices and the room for new practices to emerge. In order to better understand the efforts at diffusion in the four cases, it is useful to discuss changes in practices, norms (e.g. what is desirable, appropriate, ‘good’) and systems.

Changes in existing practices and accompanying norms

The Active Learning DSM project aimed at changes in all sorts of practices (involving use of heating, air conditioning, hot water, lighting, electric appliances and transport), both at the

household level (within the homes of the children) and at the schools themselves. The project also targeted the practice of teaching by introducing a new topic (energy saving) and methods of Active Learning and Energy Monitoring techniques. Finally, children’s learning practice were addressed: they were no longer recipients of information but taking on an active role in the process of learning and disseminating knowledge.

The Green Office programme encouraged changes in practices among company personnel in office environments, focusing on energy consumption involved (use of paper, equipment,

Table 4: Energy Expert project Finland.

Focus of analysis	Energy Experts, Finland
General project information	<ul style="list-style-type: none"> - Background/initiator: Finnish governmental organisation for energy efficiency and social housing association - Time: developed 1993-1997; ongoing - Scope: 3000 people have been train as energy experts and work as 'multipliers' in their own home
Sustainable practice(s) involved	<ul style="list-style-type: none"> - All home energy and water consumption practices
Aspects of incumbent system inhibiting a shift from unsustainable to more sustainable practices	<ul style="list-style-type: none"> - Lack of knowledge and awareness of more sustainable energy and water consumption - System of energy advice is somewhat distant to the consumer
Instruments used to change practices	<ul style="list-style-type: none"> - Training voluntary participants to act as 'energy experts' within the dwellings they live, whether rental or owner-occupied - Energy consumption monitoring - Energy expert network
Role of intermediary	<ul style="list-style-type: none"> - Recruiting volunteers - Training and networking volunteers - Monitoring project - Aligning interests of project stakeholders
Efforts to diffuse more sustainable practice	<ul style="list-style-type: none"> - National programme - Establishment of national trainers' network (150 qualified trainers) - Establishment of national energy experts' network (social learning)
Influence of relevant stakeholders on success of diffusion (expectations, visions, agendas, influence)	<ul style="list-style-type: none"> - Support by national government creates relevance of project and ensures funding - Support by building corporations helps recruitment of volunteers
Impediments from incumbent systems of provision for diffusion	<ul style="list-style-type: none"> - Lack of flexibility of incumbent systems of energy and water supply hampers more radical changes
Success of diffusion	<ul style="list-style-type: none"> - Over 3000 energy experts trained - Because of voluntary nature of programme, no incentives given but nevertheless an average of 100 new registrations per year.
Norms addressed	<ul style="list-style-type: none"> - The idea of who can provide useful advice (also trained lay-people) - New norms of interaction between residents and housing association (through experts and their network) - Social cohesion - Community building
Lessons for successful diffusion	<ul style="list-style-type: none"> - Voluntary lay-people can become trained experts who can support the diffusion of more sustainable practices - Volunteers are part of the target group (social cohesion) and are trusted - National programmes can create a sense of urgency and high participation

lightning etc). It aimed at establishing a new practice of discussing and improving energy behaviour together in the daily working environment. As such, this involved a change in social norms within the office. But the programme also attempted at changing social norms more broadly, by emphasising the green image as status-enhancing for all sorts of companies.

The Off. Really Off? campaign addressed changes in the habit of leaving electrical equipment on stand-by. Hence it targeted a wide array of practices involving electrical equipment (including remote control devices). In addition, it aimed at changing the practice of selling electrical equipment by asking retailers to provide additional information on e.g. stand-by killers.

The Energy Expert programme addressed changes in heating and cooling practices at home, changes in energy and water consumption practices (relating to all practices at home) and norms. It addressed changes in repair practices by having residents ask the Energy Expert first for advice. In addition, it involved changes in (social) interaction practices, potentially contributing to social cohesion in apartment buildings

and neighbourhoods. People would ask for and get advice from their neighbour as Energy Expert. The programme institutionalised a new practice of training lay-people to become experts and advisors on energy efficiency to people living in their building and as such changed the norms: lay-people can be trained to become experts.

Systemic level

The Active Learning case showed how lack of support of the educational system (the overall inflexibility of this system; lack of support from a crucial actor like the Ministry of Education) was detrimental to the successful diffusion of the Active Learning project. This project involved innovative educational methods and materials (Active Learning and Energy Monitoring; use of internet-based tools, use of modern technology) and thereby a significant change to existing learning practices (from passive learning to active experiential learning) and hence to some of the norms underpinning the current system.

In the Green Office case, the system of office provision was presenting difficulties when changes in building infrastructural applications were needed (e.g. heating or air-conditioning systems). A related issue was a lack of awareness, knowledge and commitment on the side of facility owners and managers. A change in commitment from the side of these actors will at some point be necessary in order to make progress beyond the 'little steps' (like turning off lights etc).

The Off. Really Off case did not challenge system wide norms or positions, nor was it likely to result in a changed distribution of costs and benefits across society. When no one really loses, the mainstreaming can take place within or next to the existing systems.

The Energy Expert programme focused on the set-up of a new 'system of information provision' by training (interested and motivated) lay-people to explain to others how energy and water conservation may be achieved at home. It emerged in addition to an existing system of information provision involving professionals, e.g. energy advisors, but is unlikely to lead to friction or challenge the existing system as professionals mostly focus on one-shot behaviour and energy experts mostly focus on habitual behaviour.

Efforts at diffusion

The Active Learning DSM project attempted to integrate Active Learning and Energy Monitoring into the national school curricula, by building networks with relevant actors, by disseminating materials, exchanging experiences with other educational actors and by involving national departments. Concrete efforts towards diffusion aimed at all types of diffusion discussed in the introduction (embedding, multiplying, up-scaling and mainstreaming). The implementing intermediary aimed at embedding the new teaching practice institutionally by developing teaching materials together with pedagogues and by encouraging teachers to devote teaching modules that can be used flexibly to this topic. Embedding at the level of national institutions was attempted by involving the Ministry of Education. Had this undertaking succeeded, up-scaling and mainstreaming could have been addressed in the following. However, embedding at national level was not one of the primary targets and could not be realised. Multiplication was attempted through making teaching materials and project experiences freely available on the internet and by disseminating promotional brochures. In terms of system dimensions, the Active Learning case addressed social norms, stakeholder relations and behaviours at project level. Because use of project material was not monitored beyond project participants it cannot be known whether these dimensions were also changed elsewhere through multiplication. Policies were addressed but remained unchanged. Infrastructures and technologies were not addressed.

The Green Office project's addressed and ensured diffusion in a variety of ways. The approach to diffusion entailed a long-term perspective, starting incrementally with small steps, not expecting quick gains. In addition, network building was central for the exchange of experience, the building of commitment (community building, participants becoming promoters) and for social learning. Efforts at institutionalization through certification and ongoing checks aimed at a further embedding of these more resource-efficient behaviours (lock-in). Mul-

tiplication is taking place through exporting the programme elsewhere. Up-scaling followed from thorough implementation and promotion of the programme by WWF: companies are still interested and still signing up. Along with this went the creation of new norms; popular companies greening their image with the Green Office certificate. The diffusion was helped by a variety of participating popular companies spreading the message across various social groups. Having a self-financing programme decreases dependence (dependence can become a threat to the continuation of the programme over the longer term). The diffusion was also supported by the openness to feedback from participants to improve go programme and the flexibility of programme to adapt to specific circumstances – as this facilitated the spreading of the programme to other countries (e.g. EU, Asia). Still, mainstreaming of this practice does not seem to be in close reach so far. Some companies appear to be eager to green their image and at the same time save money and resources while this is certainly not (yet) the case for the mainstream, not even for the majority of offices. The Green Office project addresses social norms, behaviours, stakeholder relations, infrastructure and technology as important dimensions of change. Public policy is not addressed, however, companies who join the programme are willing to adhere to programme policies, accept advice and cooperate for yearly checks of energy and resource consumption.

In terms of diffusion, up-scaling and multiplying were inherent to the Really-Off project which was planned as a pilot. Strong networks were shaped through multiple connections between state and federal levels, involving a diverse set of stakeholders whose support was crucial for follow ups (politicians, utilities, Federal label association; the Federal environmental agency). The approach was a market transformation approach which involves the connecting of supply to demand by aligning retailers to customers. NGOs and independent experts mediated this – making the information provided by retailers more credible to the end users. The project addressed a very broad audience (not the greenies) and in doing so targeted a change in the idea of what is normal (turning the appliance really off as normal) by connecting it to what is desirable (turning the appliance really off saves money and brings the customer 'back in control'). Room for organisational learning through evaluation was helpful to improve follow-ups. However, up-scaling and multiplying effects only relate to increasing awareness while nothing can be said about the actual shift to more sustainable practices. Dimensions addressed by the project are social norms and behaviours. By involving retailers this project additionally aimed to address technologies and stakeholder relations but fell short on realising significant changes within the given timeframe and approach. Policies were not addressed.

Diffusion of the Energy Expert project took place on national level, since a governmental agency is one of the implementers. Mainstreaming may not have been reached, but the programme has been significantly up-scaled since initiation. Main instruments for national diffusion are the institutionalisation and embedding of the programme in form of national networks of trainers and energy experts. Making use of and improving local social networks – asking your neighbour for expert advice – was also crucially important for further diffusion. Multiplication of the programme in other countries is not discussed in the case study. The effects of the programme

are multiplied throughout Finland with energy experts acting as multipliers. The Energy Expert programme takes into account a number of dimensions for change, which may be part of the reason for its long-term success. Social norms, behaviours and stakeholder relations are addressed directly by training lay-people as experts and by sending them out to promote energy efficiency in communities. Changes in infrastructures and technologies may be addressed indirectly as results of advice experts provide.

Conclusion: mainstreaming best practices through social innovation

Energy demand side management projects often remain stand-alone niche experiments. This paper addressed the question of how best practices in the field of energy DSM can become mainstream and how DSM projects can encourage this. A multilevel practice approach has been developed based on the multi-level approaches from the transition and innovation literature and practice theory. The notion of path dependency was used mainly to point out the long-term character of systemic change and the lock-in processes involved. The empirical data themselves did not allow for longitudinal ex-post inquiry.

Still, some interesting observations can be made from the empirical analysis. The project with the most innovative features (the Active Learning) was least successful in mainstreaming as it could not get the incumbent system and influential stakeholders to offer support. This is not surprising as the project, although to a limited extent, did propose an approach that was not in lines with the dominant system and norms. A more incremental DSM project may have had more success, but at the same time might have a more modest efficiency or saving results. For instance, the Green Office programme was successful in the initial small steps, but the bigger changes in heating and cooling infrastructure that needed significant investment and commitment from e.g. facility owners remained the crucial obstacle that will determine the final success to a large extent. A similar conclusion is relevant for the Energy Expert programme. This programme can be considered very successful but has a limit to further mainstreaming due to its reliance on volunteers. The Off. Really Off? project only involved incremental measures - "small steps", not asking for big sacrifices from participants. Incremental projects do not involve major shifts in incumbent systems and accompanying norms and habits, nor do they imply major shifts in the distribution of costs and benefits.

Understanding and targeting changes in norms that the project entails can help trigger changes in practices. The Off. Really Off? campaign successfully changed the idea of stand-by – from a service to the end-user to something that takes away control from the end user and also costs him or her money. This change was rather small in comparison to e.g. changes in norms needed in the Active Learning project. That project involved changes in teaching and in the role of children who became active experiential learners rather than information recipients; in addition, the role of school changed in that it was supposed to encourage children to educate their parents and friends outside of school. These changes are quite invasive and may need more time, negotiation and (political) discussion before they become

regarded as legitimate. The changed norms in the Green Office programme involved an increased appreciation of behaving in a more resource-efficient way within the company, and being proud to be certified as a Green Office vis-à-vis the outside world, which supports the replication at other companies. The changed norms in the Energy Experts programme concerned the training of lay-people to become 'experts' and therefore a new understanding of who is able to provide qualified information to others. Other norms addressed the interaction of residents with their housing company by interposing mediators, i.e. the voluntary experts.

Connecting supply and demand (instead of just addressing the demand side) can be crucial in changing practices. In the Off Really-Off? campaign this was attempted successfully. In the Green Office it was acknowledged that this should be addressed – with better and more timely involvement of facility owners, as well as IT providers to support the greening of the offices.

Social innovation involved in mainstreaming practices means that through networking, institutionalizing, social learning, creating peer-to-peer and other multiplier effects the innovation becomes spread, exchanged, discussed, tried out, evaluated and more normalised and embedded in the end. If it concerns radical innovations, support from influential stakeholders is needed, as well as connections with other relevant stakeholders (not just the end-users or consumers). Even then, changes in basic norms underpinning the incumbent system are needed; there might be too much at stake for a single DSM project to affect change. A longer time horizon, offering more room for network building, exchanging experiences, negotiating and mobilising support is therefore needed (as a necessary but not sufficient condition). Moreover, in the field of energy DSM, we have seen that it is not necessarily the incumbent energy system that crucially affects the success of a programme, but that it can be another system just as well – e.g. the educational system with its established curricula, methods of teaching and degree of flexibility.

Pathways of specific practices reveal different historically-evolved lock-ins (social, technological, infrastructural), which may have perpetuated these routes rather than offering room for new ones. Hence, lessons from earlier experiences offer no clear-cut 'do's and don'ts' for future efforts. However, the empirical material has pointed out the relevance of considering both changes in practices involved and systems of provision that affect the scope for changes in these practices. The following issues are relevant to consider when emerging sustainable practices are to be diffused:

- Inquiring which and whose practices the project will affect and what norms and values these entail
- Inquiring which and whose norms and images of normality the project may change
- Inquiring which systems are implicated and what norms these represent
- Inquiring into the willingness and influence of actors representing these systems to provide support
- Aligning demand and supply

- Timing (taking sufficiently long time horizon)
- Asking which changes in cost-benefit distributions the project may affect
- Trying to find ways to institutionalize institutionalise new practices
- Building new networks
- Encouraging social learning among and across networks.
- Analysing and identifying in what dimensions of the incumbent system change is needed to support the diffusion of sustainable practices. elements need to be changed in the incumbent system.

Mainstreaming best practices through social innovation is highly conditional on these issues. Some of them can be tackled by intermediaries implementing energy DSM projects, while others need concerted action whereby policy has a role to play, e.g. by facilitating market transformation, network building, triggering incumbent system actors to accept changes.

References

- Agterbosch, S. & Breukers S., Socio-political embedding of onshore wind power in the Netherlands and North Rhine-Westphalia, *Technology Analysis & Strategic Management* 20(5) (2008) 633–48.
- Breukers, S., Mourik, R., Heiskanen, E. et al. (2009) *Interaction Schemes for Successful Energy Demand Side Management. Building blocks for a practicable and conceptual framework*. D5 of the CHANGING BEHAVIOUR project. 164 pp.
- Geels, F.W., 2002. *Understanding the Dynamics of Technological Transitions, A Co-evolutionary and Socio-technical Analysis*. Ph.D. Thesis. Twente University Press, Enschede, NL.
- Giddens, A. (1984). *The Constitution of Society. Outline of a Theory of Structuration*. Cambridge, Polity Press.
- Guy, S. & Shove, E., 2000, *A Sociology of Energy, Buildings and the Environment. Constructing knowledge, designing practice*. Routledge, London, 141 pp.
- Jacobsson, S., & Johnson, A. (2000) The diffusion of renewable energy technology: An analytical framework and key issues for research, *Energy Policy* 28(9) (2000) 625-640.
- Mahoney, J. (2000). Path dependency in historical sociology. *Theory and Society*, 29(4), 507-548.
- Mont, O., & Power, K. (2010) The Role of Formal and Informal Forces in Shaping Consumption and Implications for a Sustainable Society. Part I. *Sustainability* 2, 2232-2252; www.mdpi.com/journal/sustainability
- Power, K., & Mont, O. (2010) The Role of Formal and Informal Forces in Shaping Consumption and Implications for Sustainable Society: Part II. *Sustainability*, 2, 2573-2592; www.mdpi.com/journal/sustainability
- Reckwitz A. (2002) Toward a Theory of Social Practices. A Development in Culturalist Theorizing. *European Journal of Social Theory* 5(2): 243–263
- Shove, E. (2003): Converging conventions of comfort, cleanliness and convenience. *Journal of Consumer Policy*, 26, 395-418.
- Shove, E., Watson, M., Hand, M., Ingram, J. (2007). *The design of everyday life. Cultures of Consumption series*. Berg Publishers, Oxford, UK.
- Spaargaren, G. (2006) *The Ecological Modernization of Social Practices at the Consumption Junction*. Discussion-paper for the ISA-RC-24 conference ‘Sustainable Consumption and Society’ Madison, Wisconsin. June 2-3, 2006
- Spaargaren, G. and Oosterveer, P. (2010) Citizen-Consumers as Agents of Change in Globalizing Modernity: The Case of Sustainable Consumption. *Sustainability*, 2, 1887–1908
- Thelen, K. (2003). How institutions evolve: insights from comparative historical analysis. In Mahoney, J. and Rueschemeyer, D. (Ed.), *Comparative Historical Analysis in the Social Sciences*. Cambridge: Cambridge University Press, 208-240.
- Van Vliet, B., Chappells, H. et al. (2005). *Infrastructures of Consumption. Environmental Innovation in the Utility Industries*. London, Earthscan.
- Warde, A. (2005) Consumption and Theories of Practice. *Journal of Consumer Culture* 5(2) pp131-153.
- 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.