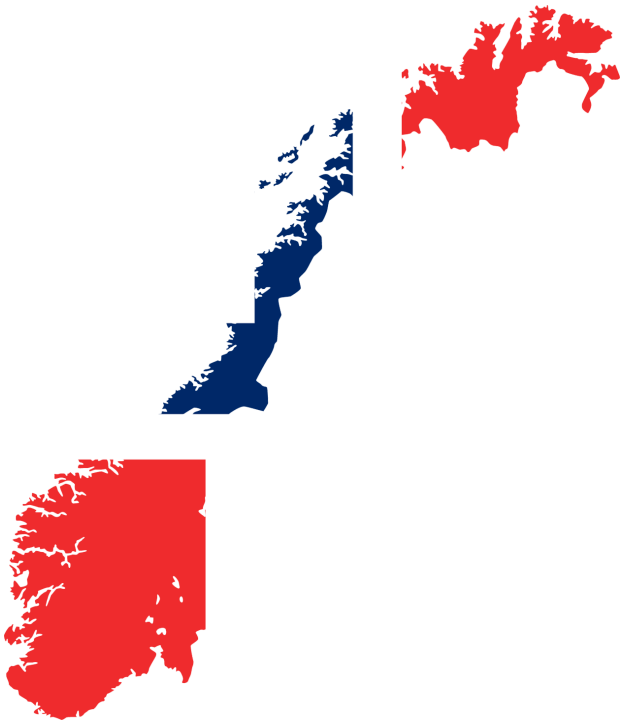


# Guidelines and recommendations for Norway

## *Task 24 – Phase I*

Closing the Loop – Behaviour Change in DSM:
From Theory to Practice

*March, 2015*

*Dr Sea Rotmann, NZ Operating Agent*
*Dr Henrik Karstrøm, Norwegian National Expert*

# Contents

# Do's and Don'ts for Norwegian Behaviour Changers

| Intervention Phase | DO | DON'T |
|---|---|---|
| DESIGN PHASE | – use models of understanding behaviour and theories of change to design interventions<br>– spend some time pre-intervention researching your audience, its motivations, needs and heterogeneity<br>– collaborate with other Behaviour Changers, especially researchers and intermediaries to design your interventions<br>– segment your audience where you can as it will help tailor the intervention<br>– design evaluation into the intervention up front, including the evaluation team (if different)<br>– learn from mistakes and (re)iterate your intervention<br>– put a lot of thought into dissemination and don't be afraid to use unusual means like social media, group learning and storytelling | – believe that there is one silver bullet model for behaviour change<br>– always use the same model, neoclassical economics is a valid model that fits our socio-economic and political reality but it does not explain peoples' mostly habitual energy-using behaviour well enough<br>– be afraid to mix models and create a toolbox of interventions<br>– think you can design, implement, evaluate and disseminate a (national) behaviour change programme all by yourself<br>– think all people are rational, utility-maximising automatons, even in each household you will find very different attitudes, behaviours and motivations<br>– think you can leave evaluation til after the programme is finished<br>– just think in kWh and cost savings, most people don't think of energy in this way but of the services they derive from it |
| IMPLEMENTATION PHASE | – collaborate with other behaviour changers in rolling out the intervention<br>– use trusted intermediaries and messengers<br>– target your audience with tailored information and feedback that makes sense to them<br>– keep learning during the implementation by evaluating ex durante<br>– listen to peoples' stories and especially the nay-sayers and laggards<br>– not underestimate the power of moments of change, use them wisely | – operate in a silo, you need help<br>– stop looking in unusal places for allies<br>– let your (conflicting) mandates stop you from working with other Behaviour Changers<br>– let technology overwhelm the intervention, it is a means to an end<br>– ever forget that you are dealing with people and their homes are their castles and their cars their steeds<br>– think you know better than your audience how they should use energy<br>– keep a successful intervention to yourself, share it widely |
| EVALUATION PHASE | – evaluate ex ante, ex durante and ex post<br>– put 10-15% of your resources into evaluation, it's worth it<br>– benchmark!<br>– think of the most relevant metrics and indicators, not just for you but for your target audience and the other Behaviour Changers<br>– use double-loop learning methods<br>– provide strong, ongoing, targeted feedback to your audience | – think it's just about kWh, evaluate beyond it (eg health, comfort, safety...)<br>– think you need to do all evaluation yourself, use your collaborators to evaluate the bits they know best<br>– leave evaluation til the end or ignore its importance in showing that your intervention worked<br>– just model, measure as well<br>– ignore the pathway of behaviour change that led to a kWh change – ask people |
| (RE)-ITERATION PHASE | – (re)iterate your intervention often<br>– learn from your mistakes<br>– listen to your collaborators and end users | – ignore your evaluation<br>– hide your mistakes and horror storries, they are often the ones we can learn the most from |
| DISSEMINATION PHASE | – understand your audience, collaborators and stakeholders, tailor your dissemination accordingly<br>– tell stories, use social media and word of mouth<br>– use trusted intermediaries to tell your story | – spend all your money on (social) marketing campaigns<br>– keep doing the same thing, peoples' willingness or brand awareness doesn't usually translate to behaviour change<br>– tell a boring story about kWh<br>– think you know better, ever |

# A summary of Task 24

Human behaviour is 'the way that people act socially and in the environment and spans a number of scientific disciplines including psychology, sociology, (behavioural) economics and neuroscience[1]'. It is estimated that there is about 30% energy efficiency potential in the so-called 'behavioural wedge', a lot of which is relatively cheap to access (e.g. changes in habits and/or purchasing behaviours), with some of the potential locked in more expensive, one-off investment behaviours. There are several different models of understanding behaviour (i.e. how human behaviour works) and theories of change (i.e. how to design interventions to change it)[2]. However, there is no behaviour change 'silver bullet', like there is no technological silver bullet that will ensure energy efficient practices. Designing the right programmes and policies that can be measured and evaluated to have achieved lasting behavioural and social norm change is difficult.

We believe that this Task, and its extension, helps to address these difficulties and has a multitude of guidelines, recommendations and examples of best (and good) practice and learnings from various cultures and contexts. We relied on sector-specific experts (researchers, implementers and policymakers) from participating and interested countries to engage in an interactive, online and face-to-face expert platform and contribute to a comprehensive database of different behaviour change models, frameworks and disciplines; various context factors affecting behaviour; best (and good) practice examples, pilots and case studies; and examples of evaluation metrics. The Task has several deliverables, including the expert network for continued exchange of knowledge and the large-scale analysis of the helicopter overview and case studies. We also tailor these country-specific reports with recommendations, outcomes and guidelines specifically to our funders' needs.

## Some numbers of Task 24

- **July 2012 - March 2015:** Official start and end dates
- **8 participating countries:** Netherlands, New Zealand, Sweden, Norway, Switzerland, Belgium, Italy, Austria
- **9 countries gave in-kind (expert) support:** the UK, Spain, Portugal, UAE, France, Australia, South Africa (which was meant to join but didn't do so in time), Canada and the US.
- **227 behaviour change** and DSM experts from **21 countries** participate in Subtask 5, the invite-only Task 24 Expert Platform (www.ieadsmtask24.ning.com).
- **15 successful expert workshops/webinars** have been held to date[3]
- **137 videos and presentations** of these events on the Expert Platform
- **1000s of experts in 28 conferences and seminars** have heard about Task 24
- **Over 30 publications** have been created and disseminated[4]
- **Almost 60 case studies** showing the successful (or not so successful) use of diverse models of understanding behaviour in the areas of transport, SMEs, smart meters and building retrofits have been collected to date from **16 countries** in a Wiki.

## Involvement of Norway in Task 24

Norway has been involved in Task 24 since its startup in July 2012. The national energy efficiency agency, Enova, is a member of the executive committee of the Task, and appointed Dr. Henrik Karlstrøm to be National Expert after a tendering process. The Norwegian University of Science and Technology (NTNU) has provided some in-kind work in the form of extra hours from the national expert and some consultation, and the work of the national expert has been aided by input from Enova, Sør-Trøndelag regional government and Finnfjord, indicating support from both industry, policy and research institutions. NTNU was the host of the Norwegian Task worskhop in May 2013.

[1] UK The Parliamentary Office of Science & Technology (2012). Energy Use Behaviour. Number 417.

[2] Described in detail in Darnton, Andrew (2008). GSR Behaviour Change Knowledge Review. Reference Report. 83pp.

[3] See Appendix 1 for all workshops, conferences and seminars that Task 24 organised and partook in

[4] See Appendix 2 for a list of all reports and publications

## The Norwegian Country story (wider energy culture and contexts)

The Norwegian energy story has been presented by Dr Henrik Karlstrøm at the Brussels workshop as Pecha Kucha in September 2012. Briefly, some defining characteristics of Norway of relevance to the Task are:

**Geography:** Norway is a large, mountainous country with a small, spread-out population of five million. There are substantial and stable amounts of rainfall, and plenty of dammed-up lakes and waterfalls for hydroelectricity production. A long coastline towards the stormy North Sea means there is a lot of wind for use in both onshore and offshore wind installations.

**Socio-economics:** Buffered by the world's largest sovereign wealth fund, filled by income from the oil sector, Norway has the world's second largest GDP per capita. It also has a low income inequality and gender-based income disparity. The price of electricity is low enough that most households don't consider their electrical bill to be a substantial part of their disposable income.

**Energy supply:** Norway is energy-rich, with large deposits of fossil energy in the form of oil and gas in the North Sea, as well as abundant hydro-electricity. The country produces an amount of renewable (and cheap) hydro-electricity roughly equal to its consumption in any given year, and it has constructed new power cables to neighbouring countries to facilitate export of hydro-electricity when conditions allow it. There is a high potential for wind and tidal energy as well.

**Energy politics:** Norway's energy wealth leads to energy politics that are different from most other countries'. Being already more or less 100 % supplied with renewable electricity means there is less pressure to transition towards new renewables than for its European neighbours. Also, hydro-electricity is so low-cost that other energy sources that could be competitive have problems being cost-efficient without subsidies. Norway's abundant oil, being such an important part of the national economy, is also a barrier towards de-carbonisation of the Norwegian energy system.

**Institutional:** Norway's supply-side management of energy policies is organised in the Norwegian Water Resources and Energy Directorate, which grants concessions and governs building and operation of energy installations both onshore and offshore in Norway, while the demand side is organised through a separate energy efficiency authority, Enova. On the political side, the Ministry of Petroleum and Energy has an interesting balancing job between the needs of the fossil fuel industry (of which the Ministry is main owner) and the renewable sector.

**Programmes and Initiatives:** Generally, the main instrument of energy efficiency authorities directed towards households is information campaigns. This is also often used towards non-energy expert local policymakers, in order to advertise the possibilities inherent in municipal energy plans and the like. There is also an energy labeling scheme for household appliances and buildings that are for sale, and an auditing scheme that is organised through the electricity utilities.

**Consumption:** Norway has the world's highest residential electricity consumption. This is due to a combination of factors: low price of electricity, high income, space heating predominantly being done with electricity (a result of our self-sufficiency in hydro-electricity) and a distinct lack of an energy savings culture. The energy consumption behaviour in Norway has been characterised as tending towards comfort at the expense of savings – Norwegians really like a warm indoor climate.

**Residential:** Traditionally, Norway has had strong building codes for reducing residential heating demand and a well-insulated building stock, and these are being tightened in the new residential building code this year, *TEK 15*. Norwegian houses are quite large and require a lot of energy, and the country is, in a word, freezing. Still, the trend in recent years is towards slightly smaller units per household, because of the exploding cost of living in the urban centers of the country.

**Infrastructure:** Due to its long distances, Norway's transport infrastructure is geared towards cars and airplanes rather than public transport. Similarly, the heating infrastructure is based on electricity, so there is very little district heating or similar technology employed.

**Energy Culture:** All in all, there is a large potential for energy efficiency gains in all sectors of Norwegian society, partly due to the over-abundance of cheap energy that is available.

# The phases of Task 24 and behaviour change interventions

## THE DESIGN PHASE

One of the most important phases to ensure successful behaviour change interventions is the design phase. This is where Behaviour Changers chose a model of understanding behaviour (usually based on the disciplines of economics, psychology or sociology), one or more theories of changing it and, hopefully, think about what to evaluate to measure success, and how. Our first Subtask looked at this phase in particular, by analysing best (and not so great practice) from over 40 case studies from 16 countries.

The main advantages of a "helicopter overview" like the one provided in Subtask 1 are:

- ✓ the easy general understanding and overview it provides, together with
- ✓ a good representation of the different models of understanding behaviour that various disciplines bring to the topic of energy efficiency
- ✓ a snapshot of the current international best and substandard practices in the field
- ✓ a good platform to do some quality storytelling around what works and what doesn't.

It does not, however:

- ☒ represent an in-depth review of all available literature
- ☒ give a strict disciplinary or sectoral approach in any way
- ☒ present in a very usable format, which is why the Wiki was created.

## Subtask I - 'The Monster'

45 case studies have now been analysed (with another 12 to be added) and a 160pp 'Monster' report and Wiki (www.ieadsmtask24wiki.info) have been developed. A short storybook version of the 'Monster' report is also available. The different models of understanding behaviour and theories of change, as well as some examples for intervention design can be found in Appendix 4. In summary, the case studies in the 'Monster' show:

- That conventional approaches (providing information and financial incentives) towards energy behavioural change often fail to achieve a strong, lasting impact but are still widely used.

- That there are many promising experiments with end-user and context-tailored approaches that move beyond changing the individual into more societal, lifestyle and practice changes.

- That current experiences are very scattered and there is no overarching method to evaluate success (nor are there commonly agreed-upon metrics) and that this makes it difficult to replicate success elsewhere, which is why we need to investigate a more coordinated approach.

- That we need more empirical and in-depth case studies (including field research) in order to investigate how such a coordinated, whole-system approach could work in practice, in different (national) contexts.

- That there are still gaps in social science knowledge, for example, the use of narratives is being promoted, especially by marketers, but has not been researched in depth in the energy field.

- That there is still limited interaction between different relevant stakeholders and disciplinary and sector silos, due to their different mandates and system-imposed restrictions, which keep them from collaborating effectively.

These general findings directly led to the development of the Task 24 extension work plan which addresses many, if not most of these issues.

In the (RE)ITERATION PHASE section of this report we will look at the Norwegian case studies from the 'Monster' and assess the recommendations from each of the domains, and how the individual cases may be 'redesigned' to lead to potentially more effective behaviour change outcomes with these learnings.

# THE IMPLEMENTATION PHASE

This is where the rubber really hits the road, and where it usually becomes quite apparent if an intervention has been designed well and based on the right model of understanding the particular audience and their particular behaviour that is meant to change and the right theory/ies of changing it. By looking at each country's in-depth case study (different for each country report), we can provide some '20/20 vision in hindsight'.

## Subtask II – In-depth case studies

Several case studies for Subtask 2 have been collected, and more are on their way. These offer a way to:

- ✓ drill deeper into specific cases that are of particular interest to the Task
- ✓ focusing on the importance and impact of country-specific contexts in the design of programmes and initiatives
- ✓ offering some insights into cross-national potential
- ✓ standardising the analysis across countries and contexts.
- ✓ collect different points of view.

However, the case study analysis is not:

- ☒ in-depth, as it focuses on only one issue per country
- ☒ a literature review, as it is built on interviews and points of views of several stakeholders
- ☒ available to countries that provided in-kind expertise only.

The proposed Subtask 6 of the Task extension will offer more of these case studies as well as expanding on already existing ones.

### *The Finnfjord case study*

#### Background

Norway's contribution to the Task's Subtask 2 was a case study of an industrial energy efficiency project, discussing the role of government in nurturing innovative energy efficiency technologies and balancing that against achieving low-hanging fruits in the energy efficiency field.

The Subtask 2 report details the process within a large Norwegian SME, Finnfjord AS, as they decide to implement an innovative energy efficiency technology scheme involving the reuse of excess heat and off-gases from the ferro-silicon production process to produce electricity locally, as well as the interaction with Norwegian energy efficiency authorities (Enova) as they try to balance the twin- but sometimes opposing concerns of fair support for risky innovation projects and designing good incentives and subsidy schemes for national energy efficiency measures.


*Figure 1. IEA-DSM Operating Agent Sea Rotmann being shown around the heat recovery plant by Finnfjord CEO Geir-Henning Wintervoll. Photo: Henrik Karlstrøm*

The report details the process from the initial decision to go forth with the project to the point when FInnfjord were able to produce 15 GW from its own internal power plant. It also points out some possible points of contestation for future policies for providing incentives for similar projects at other ferrosilicon plants. First, the report gives some background information about the heat recovery project, before presenting contextual factors to be borne in mind when assessing the case. Then it presents the case in light of the International Energy Agency's Demand Side Management framework for behaviour-related energy efficiency programmes, arguing that a more organisational approach yields better results when analysing firms than more individually-oriented behaviourally-based ones. Finally, it discusses a controversy that arose between Finnfjord and Enova about the nature of Norway's subsidy schemes before concluding with a nice story.

### Key lessons

The key lessons to take home from the Finnfjord case might not be the usefulness of any particular behavioural model of energy efficiency, but rather the interplay between several factors that must be in place for a project such as this to succeed:

- An **organisational culture** that heeds all levels of the organisation, which makes the creation of a positive energy culture throughout the organisation possible.
- **Management that is willing to take on substantial risk** in the pursuit of competitive advantages. This also relates to the ownership structure of the company, which allows for more long-term industrial concerns in planning than a more capital-driven form of ownership.
- **A public support system** which involves both the existence of subsidy schemes which see past pure competitive logics of most government dealings with business in order to realise gains that benefit both companies and the public over the long term and a certain flexibility for the funders to enter into negotiations and devise flexible plans tailored to the specific needs of energy-demanding industry (which often vary quite a lot in comparison to e.g. households).

As should be clear from the nature of these factors, there are limits to this type of intervention, both in terms of replicability and transferability to other sectors. The ferro-silicon industry has certain input factors and economies of scale that do not exist elsewhere. However, the points above are general enough to be applicable to other situations, and both the point about organisational design and that about flexibility of support agency mandates should carry some weight when designing policies for energy efficiency in SMEs in the future.

# THE EVALUATION PHASE

Surely one of the most important, yet often most neglected phases of a successful behaviour change intervention. In best practice, about 10-15% of the total cost of an intervention should be spent on evaluation and it should be undertaken ex ante, ex durante and ex post. In real life, these numbers hardly ever add up and there is no standard way or data collection in the literature of evaluating how a behaviour change has led to a change in eg kWh before and after an intervention[5]. To complicate things even more, different stakeholders (and the end user) have different perceptions of what should be a successful behaviour change outcome and there are many different metrics of how these can be measured[6]. We address all these issues in our Subtask 3 reports and factsheets and will go much further into an actual, standardised tool design in ST 8 and 9 of the extension.

## Subtask III - Evaluation 'Tool'

Task 24 recognises evaluation as one of the most important parts of any type of behavioural intervention, and it is regarded in this Task to be:

- ✓ in great demand from decisionmakers and those funding behavioural interventions
- ✓ very important as it is the only way to truly show that an intervention has had actual impact on behaviour changes that last
- ✓ one of the most difficult issues to evaluate
- ✓ largely dependent on models, approximations and estimates rather than actual measurements
- ✓ a collection of different metrics beyond kWh and even beyond energy
- ✓ a methodological review of behavioural interventions in the residential building and feedback sectors
- ✓ an overview of how different disciplines monitor and evaluate behaviioural interventions
- ✓ an overview of definitions used in monitoring and evaluation in this Task
- ✓ an in-depth discussion of the many challenges facing Behaviour Changers
- ✓ a recommendation of switching from single- to double-loop learning and providing
- ✓ examples of how to do so in the building retrofit domain.

However, it is not:

- ☒ fully possible in the scope of Phase I of Task 24
- ☒ an easy thing to do, as there is no good existing or standard methodology for doing it, especially once different needs and expectations of various Behaviour Changers and end users are taken into account.

Developing a behavioural evaluation tool with concurrent methodology will be part of the focus of the Phase II of Task 24 (Subtasks 8 and 9).

Even though we have not yet a fully completed evaluation 'tool' that can be applied to all possible combinations of intervention tools in different domains, we have developed some fact sheets based on the insight that, instead of only undertaking 'single-loop learning', we also need to delve more deeply into the 'double-loop learning' process (see Figure 2 below for explanation). This is especially the case in more systemic, collaborative interventions, as promoted by this Task (after analysis of the case studies in Subtasks 1 and 2 showed how successful such interventions were, compared with siloed, individual, top-down approaches).

[5] See Karlin et al's 'Beyond kWh' Methodological Review for Subtask 3

[6] See the different evaluation metrics in the 'Monster'

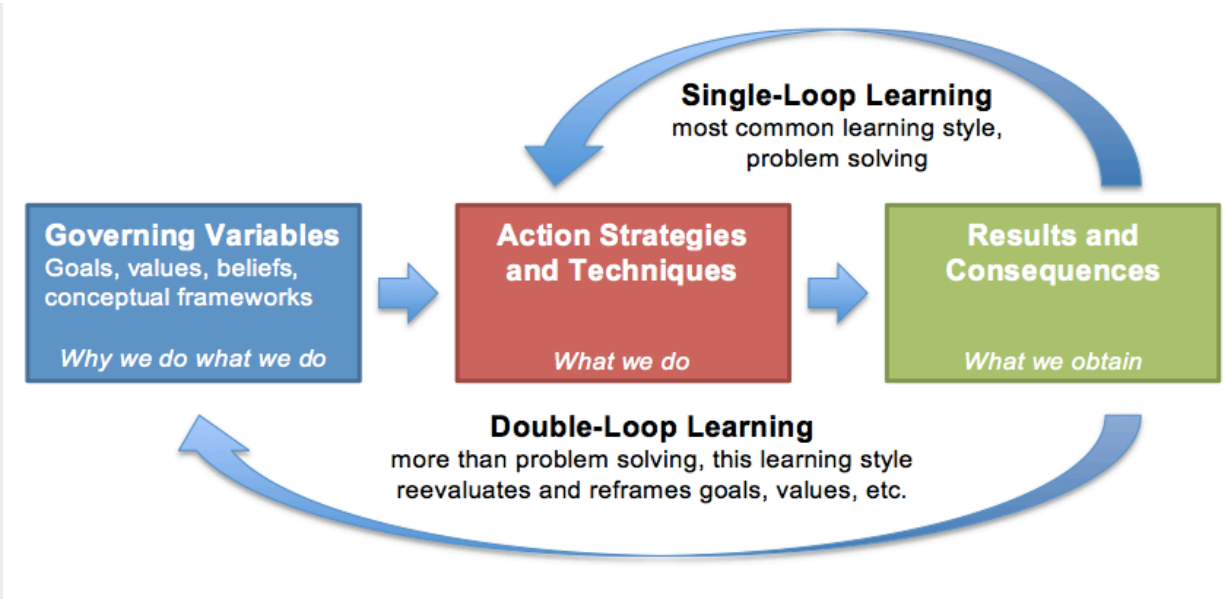



*Figure 2: double vs single loop learning. Retrieved from http://www.afs.org/blog/icl/?p=2653*

The template of questions that need to be addressed in both single- and double-loop learning (and which the individual fact sheets examining specific tools are based on) can be seen here:

**Table 1. Different learning types, indicators, questions and metrics for monitoring & evaluating behaviour change programmes**

| Learning type | Indicators | Questions for M&E | Metrics (examples) |
|---|---|---|---|
| Single-loop learning | Efficiency indicators:<br>• Cost-effectiveness<br>• Lowering the total energy consumption | • Was the intervention cost effective?<br>• Are the goals reached within the time and within the allocated budget? | • Costs and benefits (eg RoI or NPV)<br>• Pre-set goals<br>• Available time and time needed<br>• Budget and costs |
| | Effectiveness indicators:<br>• Reaching the intended goals<br>• Lowering the total energy consumption | • Are the goals reached?<br>• Is the total energy consumption lowered (per household? by sector?) | • Energy savings<br>• Energy consumption before and after intervention |

| | | | |
|---|---|---|---|
| Double-loop learning | Process indicators:<br>• Realising a network of a heterogeneous set of actors with different definitions of success<br>• Interaction and participation by the target group (so that they can learn about their own behaviour and consequences for energy consumption)<br>• Interaction and participation with a diverse set of stakeholders since the design phase<br>• Learning as an explicit aim of the intervention<br>• Record new lessons for future interventions<br>• Making use of lessons that are learned during previous interventions<br>• Perspectives of intermediaries before and after a intervention<br>• Changes in assumptions, norms and beliefs | • To what extent is a network of a heterogeneous set of actors developed in which they all participated and interacted with each other since the design phase? Did this lead to different definitions of success?<br>• How was interaction and participation by the target group allowed in the programme? And to what extent did end-users learn about their own behaviour and consequences for their energy consumption?<br>• How was learning during and after the intervention ensured?<br>• How did the perspectives, assumptions, norms and beliefs of intermediaries and other stakeholders change during the programme? | • Diversity of actors that are involved in the design and implementation of the intervention<br>• Definitions of success that were co-created and used<br>• The way end-users were involved in the design and implementation of the intervention<br>• Perceived self-efficacy<br>• Perceived impact and benefit of the intervention<br>• Learning strategy<br>• Perspectives, assumptions, norms and beliefs of stakeholders before, during and after the intervention |
| | Content indicators:<br>• Alignment of the expectations of the stakeholders<br>• Reflection upon the function of evaluation/monitoring together with stakeholders<br>• Learned lessons during the intervention are translated into (re)designs<br>• Improving the capacity of own or similar organisations to perform successful DSM interventions<br>• Creation of new networks and institutions that support the newly formed behaviour and its outcomes<br>• Lasting changes (behavioural or practice change) | • To what extent were the expectations of stakeholders aligned? How is this done?<br>• How did reflection upon the function of M&E with stakeholders take place?<br>• Which lessons learned during the intervention are translated into (re)designs?<br>• Is the capacity of own- or similar organisations improved to perform successful DSM interventions?<br>• Are new networks and institutions created that support the newly formed behaviour and its outcomes?<br>• Did lasting changes take place? | • Collective impact approach to co-develop metrics to measure this<br>• Main lessons learned by different stakeholders<br>• Perceived success of collaboration and intervention design and implementation<br>• Short- and long-term effects |

## THE (RE)ITERATION PHASE

During this phase, after we have designed, implemented and evaluated a behavioural intervention, we sometimes get the chance to reiterate current policies, programmes or projects with the results of our analyses. Often, evaluation happens only after a programme has been completed and the results can get lost (also an issue when e.g. losing corporate knowledge). This phase is hugely important in order to ensure that previous learnings and lessons have not been lost, but been used to improve future behaviour change interventions.

## Subtask IV: Country-specific recommendations

The function of this part is to demonstrate some country-specific recommendations based on the country contexts and stories detailing interventions that worked (or did not). Each country will have a set of recommendations tailored to its specific context – though there will be similarities and cross-country transferability. A country-specific list of recommendations is:

- ✓ a main drawcard of Task 24, providing specific recommendations to countries depending on their contexts
- ✓ a collection of country-specific contexts, based on the country stories
- ✓ different for each of the countries
- ✓ but with some similarities and overal, global conclusions (eg the do's and dont's)
- ✓ based on input from the country experts and their specific knowledge

However, it is not:

- ☒ Conclusive
- ☒ Entirely objective, some sector or disciplinary views may be missed
- ☒ Available to countries that are not financially participating.

## Norwegian case studies – guidelines and recommendations

On finalising the Task, we are providing country-specific recommendations and to do's/not to do's from in-depth stakeholder analyses collected during workshops, from our National Experts and during case study analyses. In this section we give a short summary of the three Norwegian case studies that were analysed in Task 24. They deal with a housing retrofit project in a housing cooperative outside Norway's capital Oslo, a project to increase usability of electric vehicles by providing a mobile application with all charging points across the country and a demo project for introducing smart metering systems in all households in a region in Mid-Norway.

### *Building retrofits*

**Project: Retrofitting of Myhrerenga Housing Cooperative to passive house standard**

*Figure 3: Myhrerenga Housing Cooperative*

After long-term dissatisfaction with the current standard of housing in terms of drafts, heating, energy bills, and ice damage to outside surfaces, a relatively large (by Norwegian standards) housing cooperative decided to look into retrofitting their houses to passive house standards. After putting it up for a general vote they called in an architect to produce detailed plans for retrofitting and applied to Enova for extraordinary project funding. This was well received by the funding agency, and the project was partially funded by Enova. Houses were fitted with extra insulation,

central heat pumps, new ventilation and highly reflexive solar thermal energy systems. Although the newly refurbished buildings are not technically eligible for passive house status, the standard of insulation and ventilation are such that it can be described as such.

Evaluation metrics include cost (high), energy savings (high), and living comfort (increased). Due to high costs of retrofitting, the time for the investment to return costs is long. Also, because of the difficulty of measuring directly things such as living comfort, there are few relevant metrics for some of these. Although monitoring is not complete, the housing cooperative claims to have achieved savings of 2,1 million kWh so far, which comes on top of an improved indoors climate and general well-being. Inhabitants report increased comfort and support for the retrofitting, in addition to an increased sensitivity to energy efficiency measures.

The project is interesting for the role played by the end users, as they were instigators of energy efficiency by themselves. The question is who brought up the project in the first place, and did the work to convince the others to start looking into it? Can such people be identified systematically, and would that be a viable way of effecting change? It also points to the role of the funder in allowing for innovative project solutions.

Some weaknesses of this example can be pointed to: while the number of households is not so small, they are all in the same location, meaning contextual issues might arise. Similarly, it can be hard to identify any specific models that have been used in this example.

| MYHRERENGA HOUSING COOPERATIVE: PASSIVE HOUSE STANDARDISATION<br>Domain: Building Retrofits<br>Target: Collective Investment Behaviours | | |
|---|---|---|
| **Recommendations** | **What the programme did** | **What the programme could do better** |
| 1. Be ready for bottom-up intitatives | Although firmly rooted in individually based behavioural models, the energy efficiency agency recognised a chance to affect real change by responding to an outside initiative that did not exactly fit their existing support structures. | The approach is not formally included in the policy of the agency, and how it decides to deal with similar situations in the future will still be a matter of judgment in the specific case. It might be a good idea to formalise some procedures regarding these types of initiatives. |
| 2. Don't think too narrowly about evaluation metrics | The standard way of evaluating projects is by calculating amount of kWh saved per invested *krone*. While still the core metric by which the agency is ultimately judged, it leaves out large parts of what it actually means to live in comfortable low-energy housing as opposed to energy-intensive housing. | Include more metrics beyond kWh and beyond energy into the evaluation of interventions. Reported increases in living comfort achieved with a lower input of energy is a good in itself. Indoors climate and air circulation is also important for well-being, and for lowering the risk of misuse of new technical solutions. |
| 3. Pay more attention to stakeholders | Let the housing cooperative do all planning and consultation before processing the application. | Myhrerenga came about because of the presence of energy-minded architects and someone with an actual investment into the project. Could this be encouraged in some way, so that first starter and firebrands can be identified and supported at an earlier stage, and hence increase the chance of more such projects popping up? Identifying intermediaries are crucial for this. |
| 4. Success breeds success | Enova is using Myhrerenga as a model housing cooperative in its work towards more such projects. Inhabitants are more positive towards large renovation projects, even if they entail periods of noise, construction chaos and not least considerable costs. | Get more model projects! This is connected to the first point: By creating a more robust framework for identifying and nurturing ”off-kilter” projects, the agency can spread retrofitting as a concept in a more organic way than is currently being done. |

*Transport – EV Uptake*

### Project: EV charging overview funded by Norwegian transport efficiency agency (Nobil)

Norway has the world's largest EV fleet in relation to population size, partly due to a set of very favourable incentive structures, including tax breaks, use of car pool lanes and free parking in urban centres. This is related to a stated public goal of increasing EV adoption throughout the country, as part of Norway's commitment to reduce emissions from the transport sector.

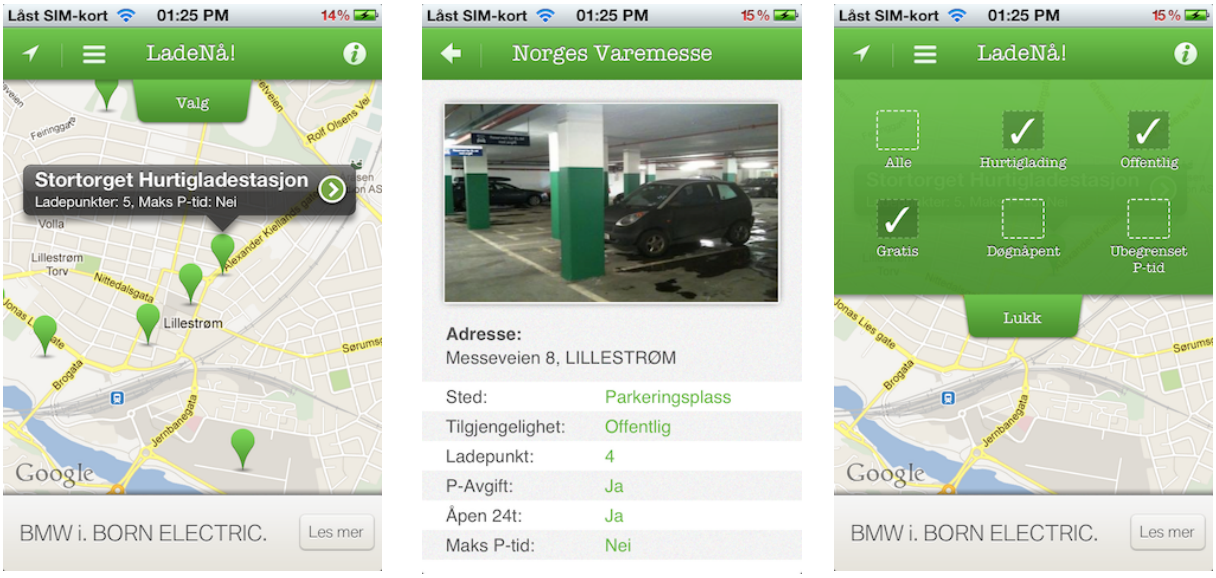



*Figure 4. Screenshot of the Nobil app*

The Norwegian transport efficiency agency *Transnova* has funded the development of *Nobil*, an online database of all charging stations for EVs nationwide (currently around 5000 charging points) that provides real-time information on their availability and location. The database combines GPS data with an online API that can be used by both a dedicated website and a mobile app to provide drivers with instantaneous information relative to their position.

The rollout of the app has been fairly successful, and it has been operating since 2010 with a large upswing in activity since 2013. The major difficulties in developing the system had to do with the technicalities in setting up the GPS system and the API to be used by the app. Since the charging stations are publicly available, there were none of the privacy issues that often plague these kinds of services.

In terms of casting this as an energy efficiency project, it is important to remember that lowering barriers to EV adoption is one of the more important tasks moving towards a more efficient and environmentally friendly transport system. The role of supporting infrastructure such as the internet should not be underestimated.

| NOBIL: EV STATION DATABASE<br>Domain: Transport<br>Target: Individual Behaviours | | |
|---|---|---|
| **Recommendations** | **What the programme assumes to do** | **What the programme could do better** |
| 1. Incentive structure matters! | The Norwegian EV policy is a resounding success in terms of increasing uptake, and this is due to the combination of financial incentives for purchasing EVs and a set of other benefits related to the actual use of the vehicles. Not only are EVs tax free at point of purchase and free of yearly ownership charges, EV drivers are also given free public parking in dense urban areas, designated charging points outside all public buildings and the use of road lanes normally reserved for public transport. | The key – given that continued uptake of EVs is a goal (there are political signals that the golden era of EV policies might be nearing an end) – is to keep on identifying ways in which the actual experience of everyday drivers can be leveraged to configure EV policy differently from fossil fuel transport. Money matters at point of purchase, but once the car is bought, the ”luxury” status of EVs in terms of free urban parking, carpool lane status and designated public charging points carry at least as much weight in the minds of drivers. |
| 2. Small steps go a long way | Nobil provides a very small but crucial service for electric drivers – information about where they can recharge should the need arise. This has the effect of reducing distance anxiety, the bane of electrical transport for decades. | While Nobil itself will not revolutionise the transport sector, it represents a way of thinking about how transport is a large package of separate but inter-linked concerns for drivers: they are simultaneously investors, citizens, employees and family members, and the needs of all these roles must be taken into account when designing policies and incentive schemes. |
| 3. Make use of new technology | The ubiquity of networked personal computers allows for easy dissemination of available information, and this is utilised well in Nobil. | One possible way forward is better integration of these solutions in the car system itself. Rather than having a smart phone app separate from the operation of the car, future developments could impart such information directly to the car's GPS systems. |
| 4. Set public goals and follow up with policy | Norwegian EV policies are the result of a larger commitment to reducing emissions from the transport sector (again a result of the country's joining the European Union renewable energy directive) and utilising more of Norway's renewable energy resources in the transport sector. These goals have then been followed up with a policy package demonstrating willingness to make changes to reach lofty goals. | The EV policy package is still highly vulnerable to shifting political winds, and there is talk of scaling back some of the benefits of owning an EV as the uptake increases. Of course, all policies can be changed by politicians (that's what they're there for), but unless Norwegian EV policy is firmly anchored across the political spectrum it might be time-limited offer. |

## *Smart Meter/Feedback*

### Pilot: DEMO Steinkjer, a smart metering project in Mid-Norway

A project initiated by the regional grid company in Nord-Trøndelag county in Norway to roll out smart meters to a total of 4500 households. The pilot project features 700 households and 66 SMEs and is designed to give information to the grid operator (NTE) and government regulators about what type of interventions consumers accept in the name of energy efficiency. The pilot part is testing different meter solutions in 700 households, by installing different meters in different households. After evaluation, the chosen meters will be installed in all 4500 households in the area.

The design allows for supplier control of “low priority consumption such as hot water heating and underfloor heating cables”. Hourly billing and increased monitoring will be provided to customers. “The ultimate aim of the demo is that after ten years Steinkjer will have a community of active, aware and adaptable energy customers.”

*Figure 4. Examples of information given to consumers about electricity use and costs*

Increased information will sensitise households and larger consumers (SMEs) to their electricity consumption, thus helping them to take measures to lower their consumption. It will also provide grid operators with better information on usage over time, and aid in the design of load shifting measures.

The pilot is still running, but some preliminary findings can be found in the subtask reports of the project: Report phase 1 and Report phase 2 (Norwegian only). These reports are for the testing of TCP/IP based meters, but other types are also being tested.

The findings so far deal more with technical challenges in the roll-out phase, and less with actual savings. The reports detail a rather long list of improvements and adjustments that needs to be made to iron out the chinks in the implementing phase, among them improving communications between end users, installers and grid company.

| DEMO STEINKJER: SMART METERING PILOT<br>Domain: Smart meters<br>Target: Individual Investment Behaviours | | |
|---|---|---|
| **Recommendations** | **What the programme assumes to do** | **What the programme could do better** |
| 1. Don't focus only on technical problems | The main concerns of the demonstration project are overwhelmingly technical in nature, focusing on problems of implementation and the operation of the smart meters. | As is known from the research on smart metering and other price-signal behaviour interventions, there are several concerns for the end user that are not addressed by a focus on the functioning of the technology itself. |
| 2. Practices also matter | End users accept “low-level” interventions in the operations of their electrical appliances, such as intermittently turning off water heaters or activating washing machines at night. | Although some housekeeping tasks can be automated, most are intimately intertwined with the everyday needs of end users and tied to the average working day of the entire population. While some savings can be achieved by interventionist load shifting, the rest must come through changes to the way ordinary life and its concurrent practices are structured. |

| Recommendations | What the programme assumes to do | What the programme could do better |
|---|---|---|
| 3. Information only gets you so far | DEMO Steinkjer provides extensive information on the price of electricity at any given time, delivered through a somewhat cluttered interface where users can compare prices over time or with households with similar profiles or close by. | Electricity costs make up less of average Norwegians' disposable income than almost any other populations. It is therefore not surprising that even if there are savings to be had, they make up a much smaller economic incentive than in other countries (for example, India is experiencing a boom in smart metering because of a need among households to pinch every penny). Users ask themselves: is it really worth it to have clothes lying wet in the washing machine for hours every night just to save €40-50 annually? This must be addressed by policy. |
| 4. Pay heed to the middleman | Installers' contact with the end user turned out to be one of the crucial points in the preliminary reports of the projects – they were the ones to iron out difficulties regarding meter placement and installation. | In general, too much attention is paid to systems design and too little to the role of installers, systems managers and other knowledge brokers or so-called Intermediaries. A better understanding of the role of the people who are tasked with actually going into peoples' homes is crucial. |
| 5. Experiment! | DEMO Steinkjer installs different types of meters and in combination with different types of software connected to it. This increases the utility of the project itself, both in practice and as a source of knowledge in a narrower research sense. | While the design of the project in itself is good, all benefits from this experimental design would not have been reaped had not independent researchers (at NTNU) found an extra interest in the project and elbowed their way into it. Next time, invite all interested parties! |

## Possible Pilots and Research Questions for each Domain

All the research questions collected during workshops and from the Subtask I analysis of the case studies can be found in Appendix 7. In the last Task 24 workshop in Graz (October 2014) we discussed the main areas of focus the Task extension should drill into in each of the four domains. The national experts (and three ExCo members) came up with the following problems which are globally regarded as major behaviour change issues (see also NZ stakeholder feedback) that have not been successfully tackled as yet. We will propose possible pilots, based on our learnings collected so far, in each of these areas and will discuss this in more detail during workshops in our Task extension (Subtask 6).

*Building Retrofits:*
How to deal with the Split Incentives/Principal Agent issue in rental properties?

*SMEs:*
How to deal with the Split Incentives/Principal Agent issue in a chosen SME segment?

*Smart Metering/Feedback:*
How to link smart meters to better feedback, using ICT?

*Transport:*
How to get people out of their cars and into healthier and/or more environmentally friendly modes of transport?

# THE DISSEMINATION PHASE

A huge part of an intervention's ongoing success lies in its dissemination - both of (tailored) feedback to its intented behaviour change targets (the end users) and a wider audience of Behaviour Changers who can benefit from the learnings. Storytelling as a methodology for both kinds of feedback is very, very powerful and will be discussed below. Social media and networking is also very powerful to foster relationships and shared learning but has its pitfalls.

The expert platform described below forms an important part of the dissemination phase of the task. It is:

- ✓ a good place to 'collect' experts and information on the Task
- ✓ a great broadcasting tool with all the news, reports and events, reaching many more people more directly than eg traditional academic publishing
- ✓ a good way of measuring Task impact (via Google Analytics)

However, it is not:

- ☒ a silver bullet to make people talk or engage online
- ☒ a way of making busy experts use social media or social networking
- ☒ a way of easily managing files, which is why we have created the Wiki.

## Subtask V - The Expert Platform

The expert platform has been an invaluable tool to invite interested experts to the Task and provide them with a safe platform to share and discuss learnings. However, it has not been as successful as expected in terms of creating engagement, face-to-face workshops, conferences and meetings have been shown to be imperative to foster true engagement and trust. The social media aspects of the platform are mainly used by one of the Operating Agents and it provides a very good platform for broadcasting to its members. It is also a good way of collecting members' bio, interests and details and to ensure their privacy (eg when filming interviews with them or presentations at workshops). However, the platform will be assessed and potentially slightly changed when going forward with the extension. It is particularly important to enable easier file sharing, although the new IEA DSM website, plus the Task 24 Wiki may be sufficient to do so.

We currently have 4 members from Norway on the expert platform (1 Government official, 3 researchers). Task 24 just wrote a letter of intent for Dr Erica Löfström's post doc position at NTNU. Her proposed research looks at Eco-Visualisation of smart grid feedback and would fit very well with Phase 2 of Task 24.

### *Norway's expert workshop*

Norway held its expert workshop in May 2013. The national ExCo member was present together with the Operating Agents and the other national experts from the Task. Some "local" experts gave presentations on topics such as domestication theory, a continuation of the discussion of practice theory that started in the Oxford workshop and NTNU's perspective on behavioural aspects of energy use. The theoretical basis for the Norwegian energy efficiency policy was also presented and we discussed gamification and its applicability in practice, the Subtask 3 issues on evaluating behavioural research programmes and the 'Monster' results and analysis.

## Storytelling Methodology

One of the main outcomes of the task is the development of a form of storytelling methodology for task findings dissemination. Due to its simple structure and focus on the most important aspects of a theory or intervention, it is:

- ✓ a good wayto break down silos between disciplines or sectors and the every-present tendency towards jargon
- ✓ a valid social science tool, using narratives
- ✓ something inately human, we all understand and tell stories well
- ✓ fun, engaging, social and most importantly: memorable
- ✓ a way of removing 'bias' due to complexity?

However, it is not:

- ☒ a reason to bypass 'proper' analysis.

Storytelling is a very powerful social science methodology to ensure recall, engagement and interest. The initital impetus to use storytelling in Task 24 was created in our largest, Oxford workshop. The story of Task 24 is told here (at the March 2014 NERI Conference as Pecha Kucha) and here (at the last workshop in Graz, October 2014). There is also a presentation on the different ways we use storytelling as our main dissemination methodology here. We are telling:

- The stories of theTask and our workshops (ST1 & 5)
- Our participating countries' stories to get overview of country-specific contexts for ST4
- Sector stories to be able to workshop specific issues of specific sectors (ST 1 & 2)
- Different types of stories based on Janda and Moezzi's (2013) definition: hero, learning, love, horror stories (ST 1)
- Stories based on how the models of understanding behaviour would be perceived by the end users (ST 1)
- Personal energy stories of our experts (ST 5)
- Telling DSM stories in different genres (ST 5)
- Telling the 'human' story of the Energy System (Extension)

We will continue to flesh out and develop our storytelling methodology in the Task 24 extension. It will be important to start measuring and testing the impact of storytelling, which is rather difficult but will be an important part of our evaluation tool.

# So… what's the story of Task 24 so far?

- ✓ There is no silver bullet anywhere, but the potential for behavioural interventions remains huge
- ✓ Homo economicus mostly doesn't exist (in energy)
- ✓ This is largely because energy use is invisible, not high on our list of priorities and largely habitual
- ✓ Habits are the most difficult thing to break
- ✓ This means we have to get even smarter and embracy the complexity we are facing
- ✓ We are at a crossroads and shouldn't turn back to the old ways
- ✓ We need to look at whole-system, societal change, not just the individual
- ✓ This can't be done in isolation by one sector, collaboration between Behaviour Changers is key
- ✓ Social media and social networks are (theoretically) quite good for it
- ✓ But nothing beats face-to-face interactions and real, strong professional relationships built on trust
- ✓ It is hard to find the right people in the different sectors to build these relationships with
- ✓ Every one of them has an important piece of the puzzle, yet we need all of them to fit it together
- ✓ We need a shared learning and collaboration framework that works, everywhere
- ✓ That also means we need a shared language we all understand, based on narratives.

➔ The most important finding of Task 24? IT'S ALL ABOUT THE PEOPLE!

## The Task 24 Extension

## Norway's involvement going forward

Norway has not yet agreed to join the Task 24 extension, although they have indicated a 'weak maybe' at the last ExCo meeting in Graz (October 2014). We very much hope that it will continue to collaborate with Task 24 on these important issues, especially in the more practical, field research setting of Phase 2.

# Appendix 1

## Task 24 Expert Workshops, webinars and stakeholder meetings

| Date | Place | # of Experts | # of Countries | Type of meeting | Government | Industry | Academic |
|---|---|---|---|---|---|---|---|
| 10/4/12 | Utrecht, NL | 23 | 4 | XM | 4 | 9 | 10 |
| 10/4/12 | Graz, AUT | 5 | 2 | SHM | 4 | 1 | 1 |
| 11/4/12 | online | 13 | 6 | XM | 2 | 2 | 9 |
| 3/5/12 | online | 6 | 5 | XM | 1 | 1 | 4 |
| 30/8/12 | Utrecht, NL | 20 | 1 | SHM | 2 | 12 | 6 |
| 7/9/12 | Brussels, BE | 24 | 8 | XM | 3 | 8 | 13 |
| 9-10/ 10/12 | Oxford, UK | 65 | 9 | XM | 3 | 13 | 39 |
| 26/10/12 | online | 6 | 5 | XM | | 2 | 4 |
| 12/11/12 | online | 6 | 5 | XM | | 2 | 4 |
| 17/12/12 | Wellington, NZ | 10 | 1 | SHM | 8 | 1 | 1 |
| 20/12/12 | Utrecht, NL | 22 | 1 | SHM | 1 | 14 | 7 |
| 7/2/13 | online | 6 | 5 | XM | | 2 | 4 |
| 15/2/13 | Wellington, NZ | 50 | 4 | XM | 15 | 15 | 20 |
| 22/5/13 | Graz, AUT | 10 | 2 | SHM | 9 | 1 | |
| 27-29/5 | Trondheim, NO | 20 | 8 | XM | 1 | 3 | 17 |
| 15/6/13 | Milan, IT | 15 | 2 | SHM | 14 | 1 | |
| 17/6/13 | Dubai, UAE | 30+ | 3 | SHM | 5 | 15 | other (kids) |
| 21/8/13 | Wellington, NZ | 6 | 1 | SHM | 4 | 1 | 1 |
| 10/10/13 | Stockholm, SE | 12 | 2 | SHM | 4 | 1 | 7 |
| 15/10/13 | Luzern, CH | 30 | 9 | XM | 3 | 12 | 15 |
| 17/10/13 | Brisbane, AUS | 12 | 2 | SHM | 10 | 2 | |
| 17/12/13 | Wellington, NZ | 40 | 1 | SHM | 30 | 4 | 6 |
| 17/03/14 | Wellington, NZ | 55 | | XM | 25 | 15 | 15 |
| 05/09/14 | Oxford, UK | 18 | | XM | 2 | 3 | 13 |
| Feb & July 2014 | Wellington, NZ | 5 | | SHM | 3 | 2 | |
| 12/5/14 | Brisbane, AUS | 12 | | SHM | 10 | 2 | |
| 3/10/14 | Milan, Italy | 10 | | SHM | 7 | 2 | 1 |
| 13-14/14 | Graz, Austria | 40 | | XM/SHM | 20 | 5 | 15 |
| 24/10/14 | London, UK | 12 | | XM | 5 | 2 | 5 |

XM = Experts meeting
SHM = Stakeholder meeting
In green = national expert workshops and webinars

## Seminars and conferences Task 24 was presented at

| Date | Place | Total # Experts | # of countries | Type of meeting |
|---|---|---|---|---|
| 8/5/12 | Linköping, SE | 20 | 2 | Presentation to University |
| 29-31/8/12 | Basel, CH | ~300 | 15+ | Task Presentation at 3rd Intl Sustainability Conference |
| 19/9/12 | Helsinki, FI | 20 | 3 | Task Presentation to Finnish Experts |
| 20-21/9/12 | Helsinki, FI | ~250 | 15+ | Task Presentation and session chairing at BEhavE conference |
| 24-25/10/12 | Berlin, GER | 100s | 10+ | Attendance at EEIP 'Energy Recovery in Industry: Opportunity for energy efficiency' conference |
| 13-14/2/13 | Wellington, NZ | 100+ | 6 | National Energy Research Institute conference 'Energy at the Crossroads' |
| 13/3/13 | Paris, FR | 30+ | 28 | Presentation to IEA Secretariat Behaviour Workshop 'Choices, Decisions and Lifestyles Roundtable' |
| 24/4/13 | Utrecht, NL | 50+ | 12 | DSM Workshop 'The NL Polder Model', 2 presentations |
| 7/6/13 | Hyéres, FR | 450+ | 45 | eceee summer study, 1 presentation, 3 informal sessions |
| 8/7/13 | Nisyros, Greece | 100+ | 10+ | Task 24 presentation by Swiss expert at ELCAS |
| 7/10/13 | Copenhagen, DE | 100+ | 15+ | IEEE ISGT conference - also leading Consumer Behaviour panel |
| 16/10/13 | Luzern, CH | 30+ | 10+ | IEA DSM Workshop |
| 8/10/13 | Stockholm, SE | 8 | 2 | Presentation at Technical Institute Stockholm |
| 11/10/13 | Brisbane, AUS | 25 | 2 | Skype lecture to Qld University energy efficiency course |
| 20/11/13 | Sacramento, US | 500+ | 15+ | BECC Conference presentation |
| 20/11/13 | Sacramento, US | 25+ | 6 | Transport panel at BECC conference |
| 2/12/13 | Flanders, BE | | | Smart Grid conference |
| 12/12/13 | Bonn, DE | | | Expert Roundtable on Energy Efficiency & Behaviour in Developing Countries, German Development Institute |
| 18/3/14 | Wellington, NZ | >100 | 12 | NERI conference |
| 12/5/14 | Brisbane, AUS | 15 | 2 | Lecture at International Energy Center |
| 9/8/14 | Washington DC, USA | <100/10000 | >25 | APA conference |
| 4/9/14 | Oxford, UK | <300 | >20 | BEHAVE conference |
| 11/9/14 | Berlin, GER | 180 | >15 | IEPPEC conference |
| 10/10/14 | Brisbane, AUS | >10 | 2 | IEC Skype Lecture |
| 23/10/14 | Sheffield, UK | >40 | 2 | Seminar at Sheffield Hallam Uni |
| 21-22/1/15 | Milan, IT | | | ESCO lecture |
| 14/1/15 | DSM University (online) | | | Task 24 webinar |

# Appendix 2

## Task 24 Publications, films and reports

- IEA DSM Initial Positioning Paper on Behaviour Change*
- IEA DSM Task 24 Final Workplan*
- IEA DSM Spotlight Issues (6 stories so far)*
- IEA DSM Task Flyer 24 (updated)*
- IEA DSM website Task 24*
- Positioning paper and minutes from Brussels workshop*
- Positioning and definitions paper and UKERC report from Oxford 2012 workshop*
- 25 minute professional film summarising Oxford workshop
- Template for Models of Understanding Behaviour via Case studies in 4 domains
- IEA DSM Task 24 Pecha Kucha presentation (powerpoint/film)^
- 6 participating countries' Pecha Kucha presentations (powerpoint/film)^
- Interviews of experts' own energy stories (film, over 30 so far)^
- NZ World Café report-back (film/presentations/documents)^
- ECEEE summer study (2013) paper on Task 24 by Rotmann and Mourik*
- ELCAS (2013) paper by Carabias-Hütter, Lobsiger-Kagi, Mourik and Rotmann (2013)*
- BECC (2013) presentations on Task 24 and transport behaviour^
- Overview of definitions and how they were derived (powerpoint)*
- Overview of models of understanding behaviour (powerpoint/film)^
- NL, Swiss and NZ stakeholder analyses (Excel)^
- Implemention bloopers (powerpoint/film)^
- 10 presentations on various aspects of behaviour change models (powerpoint/film)^
- Interview with www.energynet.de (podcast)
- Analysis of Subtask I (160pp report, wiki)*
- The Little Monster storybook (booklet)*
- Green Growth Article (2013)*
- Presentation to Energy Savers Dubai, UAE June 2013
- Presentation and 3 informal workshops at eceee June 2013
- Task 24 presentations at RSE (Milan, Italy); Leeds University (UK); Linköping University (Sweden); Stockholm Technical Institute (Sweden); Grazer Energy Agency (Austria); Energy Efficiency and Conservation Authority and Ministry of Business, Employment and Innovation (both New Zealand); UCLI (USA); International Energy Center (Australia); Queensland Government (Australia); Sheffield Hallam University (UK)^
- Conference and workshop presentations at Utrecht DSM workshop (NL); eceee (France); ELCAS (Greece); IEEE ISGT (Denmark); Luzern DSM Workshop (CH); BECC conference (US); BEHAVE conferences (Finland and UK); Espoo DSM Workshop (Finland)^
- Energy Expert Stories short film
- Filmed presentations from Storytelling workshop in Wellington (youtube)
- ESCo Facilitators report and 5 page summary for Task 16*
- Articles for Energy Efficiency in Industrial Processes Magazine (http://www.ee-ip.org/)
- Evaluation Paper for IEPPEC*
- Six ST2 country case study reports (NL, NZ, SE, NO, AT, CH)*

* indicates reports that are on the IEA DSM Task 24 website
^ indicates presentations and films etc found on the invite online expert platform

## Online sharing and administration of Task 24

- Widely disseminated via @IEADSM on twitter (also @DrSeaRotmann and @RuthMourik), IEADSM linkedIn and facebook groups; ECEEE and EEIP columns and various energy and behaviour linkedIn groups

- Weekly publication of Behaviour Change & Energy News by Dr Sea Rotmann
- Expert platform www.ieadsmtask24.ning.com
- Task 24 dropbox (www.dropbox.com) to share templates and collected models etc
- Task 24 wikipedia (www.ieadsmtask24wiki.info)
- Task 24 youtube channel (http://www.youtube.com/user/DrSeaMonsta/videos?flow=grid&view=0)
- Task 24 slideshare (http://www.slideshare.net/drsea)

# Appendix 3

## Norwegian DSM interventions (from 2014 IEA DSM Annual Report)

### DSM Developments and Priorities in Norway

The structure of stationary energy use in Norway is the result of a strategic utilization of the country's rich waterfall resources. This is reflected in the build-up of a power- intensive industry and a buildings sector where heating solutions traditionally have been based on the availability of inexpensive electric energy. Industry represents around 45% of the net electricity consumption, while households and the services sector represent 55%. The perhaps most principal characteristic of the Norwegian stationary energy use is the high dependence on electricity use for heating purposes, both hot water and space heating.

In a typical year, the consumption of electric energy in the Norwegian power system is around 120 TWh. More than 96% of the electricity production is based on hydropower. The main source of risk in the primary production system lays in the variations in reservoir inflows, which depend on seasonal precipitation (snow- and rainfall). In a normal year, domestic production capacity covers national demand for electric energy. With the introduction in 2012 of the Norwegian/Swedish green certificate system, the goal is to expand the Scandinavian production capacity for green electricity (e.g. hydro, wind and bio) with 26 TWh by 2020. The main market response in Norway to this program, is an addition of hydropower capacity to the current supply structure. Even with the predicted population growth, the expected normal market situation in the coming years is therefore one of surplus production and relatively low prices. There are, however, challenges related to network capacities, particularly energy transmis- sion between geographical regions of the country. These issues typically arise in cold periods with high heating needs.

Current policies for stationary energy use reflect this situation. Programs dedicated to energy efficiency in industry and the built environment have been in operation during the last decade and half. Energy efficiency has primarily been stimulated in terms of measures to reduce heating needs in buildings. Investment subsidies to improve exist- ing buildings and efforts to prepare the construction industry for increasingly strict building codes have been central elements. In addition, there have been programs for conversion from direct electrical and fossil fuels based heating to non-electric renew- able heating systems. Looking forward from this situation, we see the following DSM issues from a Norwegian context:

1. *From load level to load shape*. The combination of public programs addressing elec- tricity demand (energy efficiency and non-electric heating) and the expanded sup- ply through the green certificates, are now showing results. As a consequence, the total supply is expected to more than cover demand. However, given the spatial "mismatch" between supply and demand and the uncertainty regarding winter temperatures, the load shape remains an issue. Network capacities and power management are becoming relatively more important issues in the discussion of national energy security. Balancing grid expansions with demand side management to optimize the grid is thus a key strategic issue.
2. *Deployment of metering infrastructure ("smartmeters")*. Rollout of smart meters for all customers has started. The new metering infrastructure must be in place before 2019. A few pilots are underway to gain experience with the new metering technology and the smart grid applications it enables, however the majority of grid companies have not yet initiated the mass deployment. Experiences from other countries sug- gest that both technical issues and consumer concerns related to this technology could become important in the coming years.
3. *New generation and loads.* Heat pumps and electrical vehicles are examples of new loads increasingly entering the grid, and potentially adding to the challenge of the power capacity. Solar energy (photovoltaics) is an example of a small-scale tech- nology that could contribute to supply security. Given the establishment of the metering infrastructure, which mix of "smart grid technologies" are best suited for the Norwegian situation is far from clear. The design of the future electricity grid,

particularly the demand side of it, is therefore a necessary strategic debate involv- ing both policy makers, research and market actors.

4. *Adapted market mechanisms.* New technology enables new ways of managing the grid. It is not granted that the end users behave accordingly. The creation and dis- tribution of benefits from the new technologies must be considered. End user ac- tions creating disproportionate benefits for the grid owner is not a viable solution. Tariffs, pricing mechanisms and other incentive structures – business models – that motivate "efficient" end user behaviours and choices need to be developed to match the technology. Our smart grid pilot projects indicate that much development work remains in this respect.

# Appendix 4

## Examples of different models and interventions

'Models of behaviour help us to understand specific behaviours, by identifying the underlying factors, which influence them. By contrast, theories of change show how behaviours change over time, and can be changed. While behavioural theory is diagnostic, designed to explain the determinant factors underlying behaviour, change theory is more pragmatic, developed in order to support interventions for changing current behaviours or encouraging the adoption of new behaviours. While the two bodies of theory have distinct purposes, they are highly complementary; understanding both is essential in order to develop effective interventions.'[7]

In the Subtask I analysis we added a short narrative demonstrating what approaches based on various theories and models actually tell the end-user. The storyline from an end-user's perspective is based on the following questions that an end-user would ask when confronted with an intervention:

- How am I motivated or approached or seduced to respond or change my behaviour?
- Why should I do this?
- What do I need to do and what will others do?
- What will it take or what will it 'cost' me?
- Will I get help?
- What behaviour needs to change and how much will I need to change?
- Will it be difficult?
- What will I gain? What is in it for me?
- Will I get feedback that I understand/ trust and that tells me what the result of my actions was?

## Influence of economic theories on building retrofit intervention design

The programmes based (explicitly and implicitly) on economic theories usually translate into approaches that:

- focus mainly or even solely on individuals
- focus (indirectly but mainly) on generating biggest benefits for the supply side when based on subsidies and technological innovations
- regard individuals as instrumentally/economically rational creatures ('Homo economicus') that aim at maximising financial benefits and act largely in a self-interested manner
- regard information deficits as an important cause of 'non-rational' behaviours (and consequently view information provision, along with financial incentives, as imperative to enable economically rational choices by individuals)
- focus often on short and one-off financial incentives
- focus on extrinsic motivations mainly
- do not tailor their approach to the individual characteristics, except for (sometimes) some financial or technological tailoring
- lack flexibility and room for engagement, co-creation and participation
- monitor mainly quantitative aspects and work with calculated or modeled savings
- Behavioural economics-based approaches also include insights from social psychology, and for instance focus on the power of nudging people into different behaviours through their infrastructural, institutional or design environment.

[7] Darnton, Andrew (2008). GSR Behaviour Change Knowledge Review. Reference Report: An overview of behavioural models and their uses. 83pp.

**A Story on an economic theory-based approach in retrofitting**

Money makes the world go round

You need to change your home's energy use and we will help you by paying (part of) its retrofitting

By the way, you need to pay up first and it might take a while before we pay you back

The info we need from you will teach you all you need to know

You only need to make a one-off decision to invest

We have the technology you need, contractors or installers (you need to find/ choose) will put it in and that's it!

If you do not understand the technology, just don't touch the buttons…

You will save money for a nice weekend to the Bahamas

You only need to give us a bill from your installer, we probably won't check how much energy you actually saved

What counts for us is how many m2 are insulated, how many homes are retrofitted or how much money is spent. Oh yes, and how many kWh are saved of course!

We will do the number crunching, don't worry, we do not need to know what you actually saved, we will use models to calculate all energy savings

But if you want to know how much energy you saved, buy a metering device.

**A Story on an behavioural economics (Nudge) approach in retrofitting**

Money still makes the world go round

By the way, you still need to pay up first and it might take a while before we pay you back

The info we need from you will teach you all you need to know

You have many choices but we will design choice architecture to ensure you make the right one to retrofit your home

You only need, not only for yourself but for the sake of everyone, to make a one-off decision to invest

And to do so, we have the money and technology you need and we will design rules, regulations, institutions, or infrastructure that will nudge you in the right direction

You will save money, or the environment or whatever matters to you

You only need to give us a bill from your installer, we won't check how much actual energy was saved

What counts for us is how many m2 are insulated, how many homes are retrofitted or how much money is spent. Oh yes, and how many kWh are saved of course!

We will do the number crunching, don't worry, we do not need to know what you actually saved, we will use models to calculate all energy savings

But if you want to know how much energy, CO2, trees or polar bears you saved, buy a metering device.

*What are the upsides of this economic approach?*

Even though we have made some strong criticism of the most-commonly used economic approach here, they obviously have some positives as well:

- They do well within what they intend to do and fit well within the current economic and political system and way of thinking
- The programmes are relatively easy to evaluate in quantitative terms and often show good results
- The retrofitting market can grow
- Subsidies are often used up to the max
- Many homes do get insulated
- Behavioural economics does manage to nudge a certain percentage
- Free riders upgrade their plans and retrofit more comprehensively
- Sometimes even a new norm seems to be emerging.

## Influence of other theories (psychology and sociology) on building retrofits design

They:

- focus on collaboration and institutional capacity building
- focus on building trust in market parties and information sources
- target end user needs and multiple benefits
- use multiple definitions of success
- perform pre-scoping
- allow for engagement and participation
- allow for flexibility and iteration of programmes
- focus on institutional change
- focus on lifestyles
- use the power of social norms

**A Story on a more system-based approach in retrofitting**

**Together we will make the world go round**

**You embody what we need to know and change: do, feel, learn**

**We will help you understand and use the technology, and train those that install and sell it to you**

**We will create a supportive material, institutional and social environment**

**Your needs are important so we need to do this together, as if this were your kitchen or bathroom**

**Your life will change**

**It's all about us now, and our grandchildren and their future**

**Quality matters and we will keep learning and sharing**

**If we need to be flexible we will**

**This is only the start of a long way and your home is the first step**

**We will monitor, calculate and report on energy, money, health, welfare, comfort, wellbeing**

**And learnings based on qualitative and quantitative inputs will be shared (with you)**

**We will help you figure out what your impact is to be able to make sure you get where we collectively want to!**

*What are the downsides to this more whole-system approach?*

This approach' storyline sounds more appealing to most and its systematic approach makes inherent sense. Also, the participants of such programmes often report more satisfaction with being engaged in this way.

However, as there is no silver bullet, if we want to tell a learning story:

- These types of interventions are very complex with many partners who have different mandates, needs and restrictions
- They cannot be driven by policy alone, need all levels collaborating
- Not everyone wants to change everything or their lifestyle
- Not everyone wants to engage but it is important to ensure that the naysayers are not becoming the over- riding voice
- The flexibility of changing goals, aims and interrelatedness of issues etc makes it difficult to evaluate

## Influence of psychological theories and models on the design of transport interventions

Many of the psychological theories underpinning (explicitly or implicitly) transport interventions can be described to result in the below listed design characteristics of interventions. We have made one list for all psychological theory-underpinned interventions because the theories more or less contain these elements with differences in emphasis.

- focus on needs and the meaning attribution of the car (use)
- prescoping = essential
- focus on concrete actions, capacity building, not sustainability guidelines
- targeting and visualising the information deficit
- leveraging moments of change
- Nudging: creating supportive institutional and infrastructural environments
- focus on lifestyles
- use social norms and commitment

**A Story on value Action Gap informed transport interventions**

**You can make the wheels of your car go round more efficiently**

**You are good driver and should be proud, but you can become the best!**

**You only need the right attitude and the motivation to act, we know you will want to act as soon as you see what you can do**

**We will pull down the barriers you experience, may they be social, individual or institutional**

**We know you also experience constraints such as lack of time, money, information, encouragement, facilities or whatever**

**We will help you take responsibility and do away with your laziness or lack of interest, or lack of trust and the feeling that you cannot be efficient at changing your behaviour**

**So we will make sure a peer you respect and trust will show you how to drive more efficiently**

**Don't worry, only your driving will change, you and your car will still be cool**

**It's all about you and your car and your driving and of course your money**

**We will monitor your driving, we got really cool gadgets to do that**

**You will see how easy you can save money, fuel and become an even better driver!**

### A Story on Theory of Planned Behaviour informed transport interventions

You can make the wheels of your car go round more efficiently

You can become the proud owner of a fuel efficient or even electric vehicle, you only need to intend to do it, want to join the others already ahead and feel that you can do it!

We know you will act as soon as we remove whatever makes you feel you cannot do the right thing

And of course what makes you feel you cannot do is due to money, lack of information or lack of availability of the fuel or car, so we will tackle that for you!

We know you also experience constraints such as lack of time,, encouragement, facilities or whatever

As soon as we give you and your peers more information you will of course all want to go get a green car! Right?

Don't worry, only your car will change, nothing else needs to change

It's all about you and your car and of course your money and what you know

We will only monitor the sales figures, we do not need to know if your driving is ok, or if you use the car right or even if you need a car at all....

You will see you can save money, fuel and nothing else changes!

### A Story on Murray & Sachs descriptive theory informed transport interventions

We know your car makes your world go round

And it still can, but slightly differently, and guess what, you will be even more in control than before!

You just need to rethink if the way you drive really is the best way to treat your car...

We know you will act as soon as we train you and show you how to take even better care of your beloved car

Do not worry about those other drivers, they form the 99.9% that are really bad at driving, do not compare yourself to them..

You know, there are really cool ways to find out how good this new driving is for your car, its engine and your wallet too!

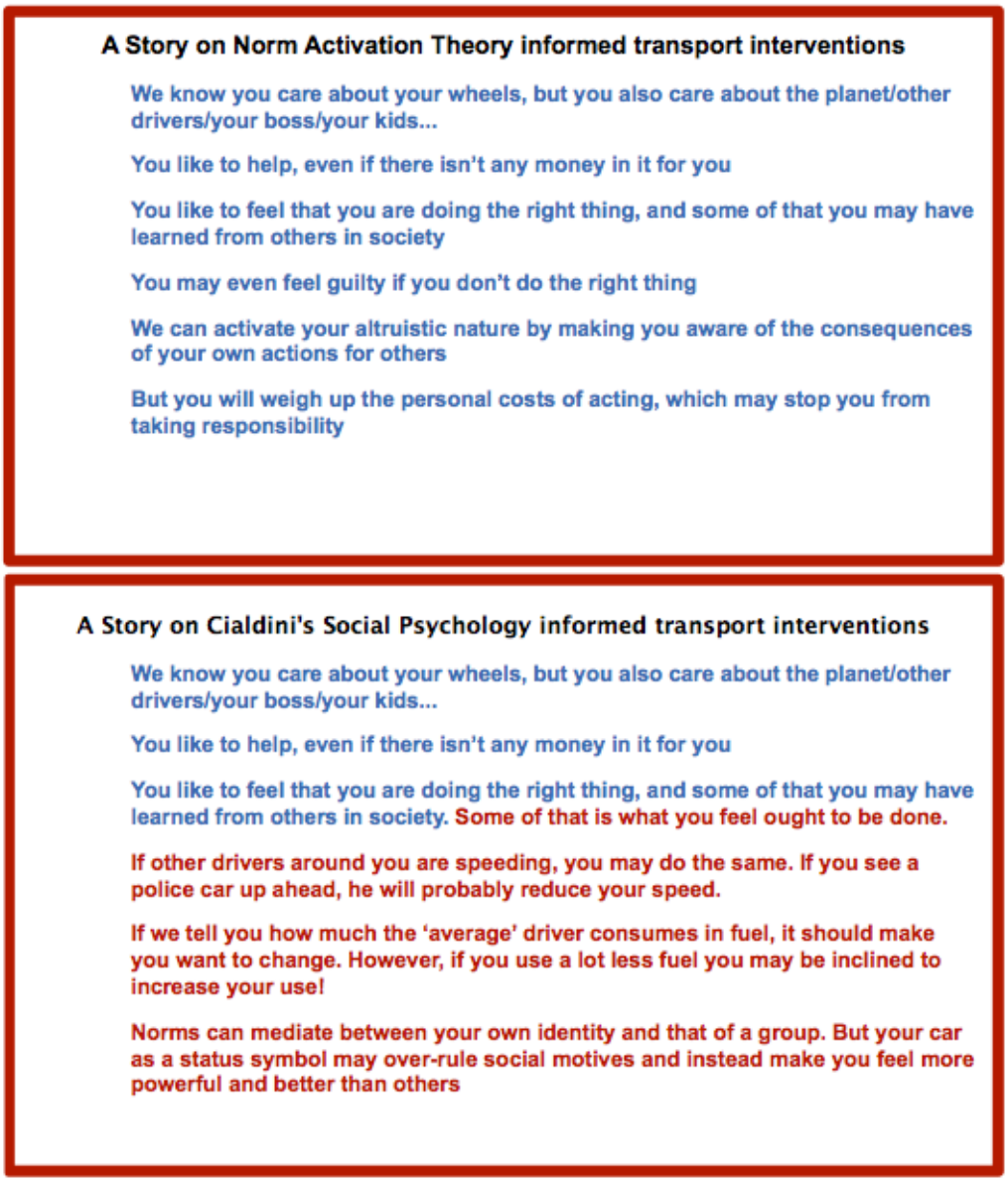
Don't worry, only your driving will change, the car stays the same, you might even pimp it with the savings you yield!

It's all about you and your car and of course your money

The environment and road safety? Oh well, you will contribute to that as well, sorry about that...

You can do all the monitoring, and even compete with yourself or pals on the road. Do not worry we will not touch your car, we know what it means to you!

If we want to know what your impact is we will use boring stats such as traffic accidents (not saying you caused them before) or emission reductions (that is good for the kids with asthma)




## Influence of economic theories on smart metering interventions design

Several of the analysed interventions were informed by economic theories such as neoclassical economics and or behavioural economics. The design characteristics of such programmes were already mostly discussed under the theme of retrofitting. Specific smart meter issues were:

- Time is money
- Strong technology push focus
- distributional issues

## Influence of psychological theories on smart metering interventions design

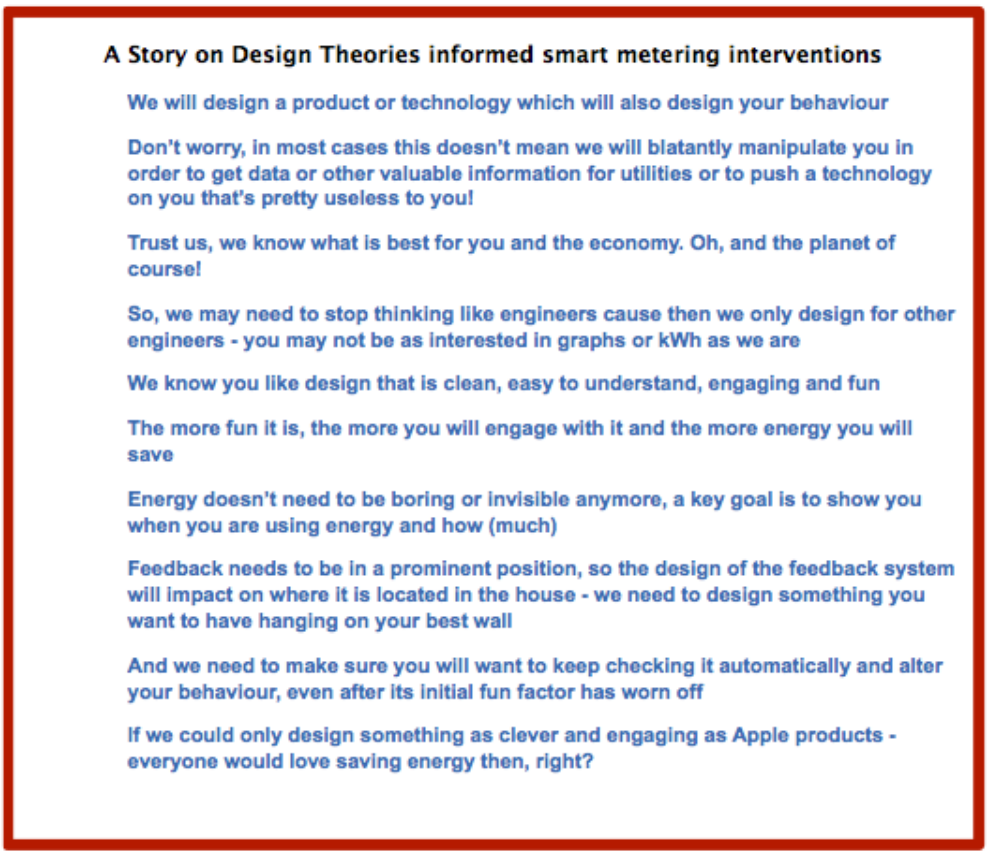
The design characteristics of programmes based on psychological theories such as value action gap theory were already discussed under the theme of transport. Smart metering specific design characteristics of interventions based on psychological theories are as follows:

- visualising behaviour and information deficits
- targetting the behaviour in context from smart metering to meaning attribution of living in one's home
- social norms are key
- segment, tailor, motivate, act!

## Influence of design theories on smart metering interventions design

Design with Intent (DwI) is a theory by Dan Lockton which states that through the design of products or services, behaviour is designed as well. Lockton created a toolkit for designers to adapt the design in order to influence and steer behaviour. It is a composition of various findings from several (psychological) disciplines. The combination resulted in 101 suggestions in the form of questions ('did you take ... into account?') to steer behaviour. Suggestions vary from strategic positioning of the design to decoying alternatives. According to Design with Intent, technology and architecture can contain scripts; it has the ability to steer users towards a certain behaviour. And the use of norms and values to influence behaviour is proposed, for example motivators as 'guilt', 'expert's choice' and 'social proof' can be used to change behaviour. The (implicit or explicit) use of design theories result in several design characteristics for smart metering interventions:

- electricity meters and home displays need to visualise energy and thus make energy use more understandable to the common person
- Feedback should be delivered in the household's central locations, to create an awareness of electricity consuming household activities
- keep engaging your end users, feedback often gets boring quickly




## Influence of collaborative learning theories on smart metering interventions design

Projects using elements of collaborative learning theories have the following distinct characteristics:

- piloting and building on previous experiences
- participation matters


## The influence of Nudge on SME interventions

SME-specific design characteristics of interventions based on behavioural economics, nudge theories and approaches:

- from nudging to nudgers: get high level involvement
- losing some, winning some
- Intervening in the specific decision-making context
- Energy or the environment might not be the magic words to nudge people...
- Nudging needs continuity
- Nudging is what it is: it is a nudge, not a life changer

## Influence of using social norms approach on SME interventions

SME-specific design characteristics of interventions based on social norms theories and approaches:

- Institutionalising social norms
- Even social norms need to take account of specific implementation context
- Distributional issues and social norms
- Competition and social comparison creates committed communities, at the start

## Influence of the Energy Cultures approach on SME interventions

SME specific design characteristics of interventions based on the energy cultures approach:

- Energy cultures differ from company to company

**A Story on Energy Cultures in SMEs**

We know that there are different Energy Cultures in each SME and that someone coming from the outside, telling you what to do according to some generalist scheme, is not going to go down well

You may like the way you do things and think you are doing them in a rather capable manner already

Or you may be stuck in a way of doing things because that's how all other SMEs in your sector are doing it

So, it is important that you help us understand how your business works by listening to you and your staff

We can then use a framework to explain the different elements that need to work together

There are external drivers including commercial pressures, technology networks and supply firm interventions which you can't do anything about

But there are also internal drivers, how you use energy ("practices"), your physical technologies and infrastructure ("material culture"), and mental models of what is normal or appropriate ("norms"), which tend to become self-reinforcing

The best way to break through these locked-in Energy Cultures is to bring in trusted outside expertise and to find a CEO who is willing to take a risk and be an innovator

Then we also need someone capable who can introduce the new technology or process into the business

There may need to be some money in it for you in order to nudge you to do it

Or there may be some competitive element, that you simply want to be the first or the best

## Influence of using Collaborative learning approaches on SME interventions

SME-specific design characteristics of interventions based on a collaborative learning approach:

- Building collective capability
- Getting the right intermediary in place to lead the group learning
- Shared learning needs time
- Shared learning requires connected goals
- Anchoring and owning the learnings
- Shared learning is only really successful once sharing takes place again

Table 1. Example of interventions (both regulatory and non-regulatory) available to policymakers when trying to change light bulb purchasing behaviours[8].

[8] From the UK's Parliamentary Office of Science & Technology (2012). Energy Use Behaviour. Number 417.

**Box 2. Ladder of Interventions**[1,6]

| | | Interventions | Illustrative examples to encourage energy saving light bulbs |
|---|---|---|---|
| Regulation | | Eliminate choice | Prevent the use of conventional, inefficient light bulbs |
| | | Restrict choice | Stop selling conventional light bulbs (current policy[7]) |
| Fiscal measures | | Guide through financial disincentives | Increase tax on conventional light bulbs |
| | | Guide choice through financial incentives | Reduce tax or subsidise energy saving light bulbs |
| Non-regulatory and non-fiscal measures | | Guide choice through non-financial incentives or coerce through non-financial disincentives | Offer a reward, e.g. entry into a prize draw, for buying energy saving light bulbs |
| | | Persuade individuals using argument and coercion | Persuade people that improving energy efficiency is important and that energy saving light bulbs help save energy whilst reducing bills |
| | Nudges | Guide choices through changing the default policy | Supply energy saving light bulbs in new light fittings and lamps |
| | Nudges | Enable choice by designing or controlling the physical or social environment | Make energy saving light bulbs the most prominent type at the point of sale |
| | Nudges | Use social norms and salience, provide information about what others are doing | Use adverts to show how many people are buying energy saving light bulbs |
| | | Provide information to educate and increase knowledge and understanding | Explain how energy saving light bulbs work and how they save energy |
| | | Do nothing or monitor the current situation | Track sales in different types of light bulb |

# Appendix 5

## Norwegian Stakeholder Feedback

There has been no specific collection of Norwegian stakeholder feedback, although the ExCo members from Enova were involved in several aspects of improving Task reports and outputs.

# Appendix 6

## Detailed recommendations for each domain (from the 'Monster')

### Building Retrofit Recommendations:

Key DSM retrofitting interventions lessons and questions for further research. The lessons below are tailored to policymakers, intermediaries or other initiators of DSM retrofitting interventions.

1. Focusing retrofitting interventions on the level of individuals and individual households ignores the need of individuals to be part of a social group or society. Addressing the collective level of e.g. home owner associations can upscale the impact and create more lasting changes. Rather than thinking in terms of technology (which is a means) think about and inquire into end-user needs and their way of life so that these form the point of departure and make use of peer to peer education or the neighbour effect. It's not only about the houses, but first and foremost about the people who live there. Involve, engage and target multiple members of a social group, at the collective level, not only at the level of the individual. FOCUS ON THE SOCIAL SIDE.
2. Subsidies and incentives focus mainly on investment behaviour and alter the home but do not address the use of the building and its installations or appliances. Focus on both investment and habitual behaviour to avoid bad and unnecessary rebound effects. IT'S NOT JUST WHAT WE BUY, IT'S WHAT WE DO.
3. Programmes that have a more systemic perspective as starting point acknowledge that retrofitting can be a 'gateway' into other more habitual behaviour changes around for example lighting and appliance use and even domains beyond the energy domain such as waste and transportation behaviour. Use insulation as a gateway, not a one-off. CHANGE LIFESTYLES NOT LIGHTBULBS
4. An approach focused on incentivising and subsidising individuals to invest in technologies and measures actually benefits mainly and mostly the supply side (economically and on the short term). Beware if only the supply side or the implementer of the intervention seems to benefit. THINK OF THE BENEFITS FOR THE END USER AS WELL
5. Providing information only works if relevant stakeholders agree on the truthfulness of the information e.g. through a trusted consortium of societal and policy stakeholders. Trusted messengers are everything. FOCUS YOUR MESSAGING.
6. When a project aims to solve an information deficit, it should not request this information from the end-users, but arrange for training or intermediaries to help the end-users find this information. And when targeting the individual need for money and financial support, do not ask for prefinancing. PAY THE SUBSIDY UPFRONT.
7. Targeting the individual need for maximising financial benefit ignores that comfort and other benefits often rank higher on the priority list. Focusing first on financial rewards might create serious barriers for (follow-up) interventions also aiming at getting the bigger message why it is an important social or a global issue will likely fail. Cooperation between multiple parties - from governmental agencies to landlords and NGOs such as district health boards - can result in more tailored and context-sensitive programmes. Cooperation between multiple parties can also result in a more diverse set of instruments being deployed, from more segmented financial incentives to certifying contractors, enhance building codes quality, installer trainings, and TV marketing campaigns, and including instruments targeting outcomes that are not directly related to energy efficiency, e.g. health improvements. Tailor to your end users' needs which may not be about kWh savings. Cooperate widely and make it about more than money. USE A TOOLBOX OF INTERVENTIONS AND GO BEYOND kWh TARGETS.
8. Pre-scoping to analyse the problem to be solved can allow for a more broad or integral approach focusing also on other, e.g. health, comfort and social benefits. However. performing research to find out about homeowners' needs and preferences prior to implementation is only conducive to success when the needs that were identified are also targeted in the intervention. Pre-scope to find out what is most important to end users. IF YOU KNOW WHAT THEY WANT, MAKE SURE YOU TRY AND GET IT FOR THEM.

9. Programmes that focus on lifestyle implicitly or explicitly acknowledge that end-users do not live according to sectoral divisions, even when governmental agencies do. They allow for an approach that focuses on the function of the use of energy in the life of end-users instead of on the use of energy. DON'T BOX PEOPLE IN TOO MUCH
10. Metered instead of modelled saving calculations are necessary to assess the real impact of the measures on energy consumption. Benchmarking and monitoring of the actual impact of the measures on the energy use, living quality, reduced costs, improved health etc should be part of the programme. It should not be left to the individual to buy and install metering devices to meter the actual impact of retrofitting. BENCHMARK YOUR HEART OUT, MEASURE, NOT MODEL
11. 'Decliners' or opt-out households are potentially as valuable to survey as those engaged. LEARN FROM THE UNWILLING

## Transport Recommendations:

The key lessons below are tailored to policymakers, intermediaries or other initiators of DSM transport interventions.

1. Creating new meanings for the car might allow for more sustainable driving behaviour and purchasing behaviour. Focus on what is meaningful to drivers, and that probably will not be the environment or traffic accidents, but their health, wellbeing, comfort, health of their car, their status, feelings of power. Cars mean everything to many people, be careful how you approach them. DON'T TAKE AWAY THEIR WHEELS.
2. Focusing on lifestyle and the role of the car is key but do not forget that life is also very much about the technological thing called car. Allow for the same meaningfulness but in a more energy-efficient manner by producing and providing things from which people derive meaningfulness in an energy- efficient manner. An energy efficient car can be sexy (see the Tesla!). CARS REFLECT LIFESTYLES.
3. Focusing on lifestyles also implies that multiple interventions are necessary to address behaviour in its many complex interrelated contexts. Use a toolbox of interventions that work together. YOU NEED MORE THAN ONE TOOL TO FIX A CAR.
4. Used trusted and respected peers to deliver the message and show the alternative. Active coaching by trusted peers is key. TRUST IS EVERYTHING.There is not much as habitual as driving and traveling patterns. It is truly embodied in seasoned drivers and very often we shift gear or take a look in the mirror on a very unconscious level. Training is essential. Prescope to understand where the drivers behaviour comes from. Set goals and visualise the gap between the actual and the goal behaviour and confirm when the gap is closed. Focus on concrete actions, capacity building, not sustainability guidelines to change the behavioural routine. PRE- SCOPE AND TRAIN, VISUALISE THE GAP BETWEEN ACTUAL AND GOAL BEHAVIOUR.
5. Driving is an individual but also a very social activity, so it is important to demonstrate how normal the desired behaviour is and get people to commit to it and become proponents. Reward good behaviour with a diploma or license, or making them driver of the week, to reaffirm the new behaviour. Make smart driving the social norm. BE SMART, DRIVE SMART.
6. Leverage change moments to normalise the desired behaviour. The New Year/new car/new licence is great place to start! SOMETHING CHANGED, SO I THINK ABOUT HOW I TRAVEL.
7. Urban design and decadal infrastructural decisions such as roading and town planning can be a real obstruction or a big opportunity. The creation and in particular the sustaining of a new behaviour and a new norm need the accompanying institutionalisation of this new norm and associated changes in the infrastructure and technologies. Change the institutional and infrastructural environment! IT'S ABOUT SO MUCH MORE THAN JUST THE CAR.
8. When you use the social norm as a lever, do not forget to also involve the social environment of your target (family, friends, coworkers). Create a sense of community amongst drivers in an intervention and use social based marketing. YOU'RE NEVER ALONE WHEN YOU'RE DRIVING.
9. Beware that the use of risk messages is a very difficult matter with many potential unexpected impacts, e.g. people can feel that cycling is life threatening when you require

them to wear a helmet for safety reasons. Beware of perverse outcomes. RISK MESSAGES CAN BE RISKY.

10. Money might not do the trick or create lasting change, but economic incentives can play a strong role play in starting and emphasising the social desirability of a new social norm and accompanying behaviour. Money is a good start but not enough in the long run. MONEY AIN'T EVERYTHING.

## Smart meter/feedback recommendations:

The lessons below are tailored to policymakers, intermediaries or other initiators of DSM retrofitting interventions.

1. Projects based on neoclassical or behavioural economics assume that people react 'rationally' when stimulated with the right triggers, and financial benefits or threats are such triggers. However, in many instances it is clear that economic gains or losses are not necessarily the only trigger necessary. TIME ISN'T ALWAYS MONEY
2. Smart metering projects are, by definition, projects that push a technology. But, a smart meter is not necessarily a meaningful device for household members. Often households do not (feel they) need it. Usually the only two challenges identified for smart metering projects are its adoption, and the education of people of its economic benefits. The successful implementation of smart metering is dependent on the creation of an intervention that goes beyond acceptance and aims at creating multiple benefits through the introduction of a smart meter. TECHNOLOGY ISN'T EVERYTHING
3. The issue of distribution of costs, risk and rewards and benefits is key but not very often addressed. End-users can start to feel that the distribution of costs and benefits actually benefit the utilities and DSOs more (in terms of customer loyalty, avoided investments in the grid, more information on customers) than the end-users themselves. Who benefits and who pays (eg with assumed loss of privacy)? MAKE SURE THERE IS CLEAR VALUE FOR THE CUSTOMER
4. Automated feedback on actual energy use and potential for changing one's energy consumption behaviour is at the core of most smart metering projects. This stems from the assumption present in almost all economic and psychological theories or models that increased knowledge and know-how about energy and energy consuming behaviour will lead to a reduction of energy. It is mainly when information provision is coupled to active learning, coaching and shared learning through peers, that this approach can indeed be effective. Information isn't everything - it needs to be coupled to active or shared learning. AUTOMATONS SHOWING kWh DON'T TEACH NEARLY AS WELL AS REAL PEOPLE AND THEIR OWN STORIES
5. Beware the self-selecting participants, they cloud results on acceptance and acceptability of smart meters. If they want it, they're already convinced it's a good idea and not your main target. FIND AND CONVINCE THE 'LUDDITES' THAT YOUR TECHNOLOGY IS GOOD FOR THEM
6. Smart metering targets the home, its inhabitants and their electricity and gas, and sometimes water consumption. The behaviours that should therefore target habitual actions AND investment behaviour (including retrofitting actions). Smart metering projects, however, usually target the behaviour of people, not of the home. The home and its technologies are left untouched. Tailored advice should also take into account the impact of the house on the capabilities and capacities of households to change the use patterns and its impact on the energy bill. Don't just tackle the behaviour of people, but also of their home. HOUSEHOLD DYNAMICS HOLD YOUR KEY.
7. The devil is in the detail: the personalities of installers can have an influence on the understanding of clients about the technology, and on their "happiness" regarding the technology. Small differences are found to be key explanatory variables. Beware of the strong effect of personalities when using intermediaries, champions or advisors. SOCIAL CUES ARE MORE POWERFUL THAN TECHNOLOGY - FOR GOOD AND BAD.
8. People do not invest in their home but live in them, and the home means different things for different people and means different things at different times. One fairly constant meaning the home often has is comfort. A home is not where energy is used, it is where people live (comfortably, thanks to energy). MY HOME IS MY CASTLE.

9. Seeing is doing. Specially trained "Energy Masters", volunteers within the groups that motivate, supervise monitoring and provide material, such as 'DIY energy audits' can be a key to success. Use trusted champions and advisors. SEEING IS DOING.
10. Technological maturity of a region or target group needs to be matched to the ambitions of a project. The technology solution needs to match the technology literacy/maturity of the target. DON'T SELL IPHONES TO PEOPLE WITH NO POWER
11. Providing feedback on particular behaviours or practices rather than on the more abstract level of overall electricity consumption facilitates the identification of particular behaviours that are 'wasteful'. Focus not on individuals but on their practices. IT WILL TAKE A LONG TIME TO CHANGE 7 BILLION PEOPLE INDIVIDUALLY
12. Participation can be a key success factor. Co-development can have a strong impact on satisfaction levels. Engage your customers through multiple channels. PARTICIPATION IS KEY
13. Talking about "wastefulness" in interventions may be more effective than talking about saving money. Being wasteful can be worse than spending money. NO ONE LIKES WASTE
14. Social norming information about the consumption of others is engaging and interesting. Potentially disaggregated social norming information could encourage energy reduction. It is important to provide detailed feedback in hourly or half-hourly consumption, and in graphs which display peaks and troughs to enable users to identify high–consuming energy practices. Regular emails displaying users' own recent consumption over time, and access to personalised websites are a useful complements to real-time energy monitors. I wanna know what others are up to and where I stand. TELL ME IF I'M DOING BETTER THAN MY NEIGHBOUR

## SME recommendations:

The lessons below are tailored to policymakers, intermediaries or other initiators of DSM SME interventions.

1. Interventions focused on changing employee behaviour need a very active support or even involvement of the management level, implementation level, staff and even from clients. Top-Down, middle and bottom-up is needed, plus some external validation. IT CAN'T ALL COME FROM THE TOP OR THE BOTTOM.
2. For a better evaluation comparing successes between SMEs a more detailed analysis of different enterprises and their future plans need to be undertaken, and the data comparability with all enterprises has to be up to date. Compare and celebrate successful companies and interventions. BENCHMARK YOUR HEART OUT.
3. Target the key staff or champions or champion nudgers in an organisation and work with them. Economics as an approach is not sufficient to deal with the often implicit power plays and personal relationships in an office and between different layers of staff. Creating ownership amongst relevant staff is therefore key. Find your champions in your organisation and work with them. IT'S ALL ABOUT THE PEOPLE.
4. Mobilising towards shared goals can help increase internal support for reforms or organizational changes. If you have shared goals, you're halfway there. I WANT WHAT YOU WANT, SO LET'S DO IT.
5. In SMEs a multitude of people work, in different roles, and not everyone will feel comfortable with changes in the company, or with required changes. It is natural to 'lose' some along the road, and potentially this self-selection will strengthen the new social norms emerging amongst those that stay. The 'laggards' can have a powerful negative effect on your staff. DON'T BE AFRAID TO LOSE THE NAY-SAYERS.
6. Nudges do not necessarily act on the internal motivations, the attitudes or the intention to change behaviour. They are external stimuli to facilitate or discourage certain behaviour. Nudges can thus support people as reminders about their motivations and attitudes but more (e.g. changing social norms, institutionalisation of norms) is needed to change attitudes and motivations. NUDGING IS WHAT IT IS: A NUDGE, NOT A LIFE SAVER.
7. The creation of a dedicated institution or intermediary por label/certification such as the Ecolabel (EU) and the Dutch 'MKB prestatieladder' (SME performance ladder) can be key to successful

implementation in a certain branch of SMEs. Validate where possible. SHOW WHO'S A LEADER.

8. There are many competing demands when addressing SME energy consumption behaviour. individual visits and tailoring leads to actionable goals and recommendations. Tailor to each SME, they are not all the same. TAILORING IS ESSENTIAL.
9. The equitable distribution of burdens and costs and the continued use of the same subsidy rules is key to creating movement amongst SMEs. Be fair, support innovators. THEY LEAD SO OTHERS CAN FOLLOW.
10. Whereas energy efficiency efforts are often a matter of external consultants coming and going (along with the knowledge) equipping companies with the capability, methods and tools to themselves take control of and reduce their energy use through a collaborative learning approach might be more effective. Build your own capability if you want to share learnings. CONSULTANTS DON'T CARE AS MUCH ABOUT YOUR COMPANY AS YOUR STAFF DO.
11. Getting the right intermediary in place to lead the group learning is key. Industry associations, e.g. provide a more homogenous group of SMEs that can more easily benchmark each other against their progress. Go to trusted intermediairies. TRUST IS EVERYTHING.

# Appendix 7

## Future research questions collected in Task 24

### Building Retrofits

1. Can ambitiously set programmes create technological innovations and even professionalise a market, including the accompanying job growth? And do interventions aimed at retrofitting at the comprehensive level of the house generate more impact on the market, than e.g. simple insulation measures?
2. Does institutionalised longer-term support help to foster new markets and provide clarity and security/certainty for both end users and market parties? (e.g. setting quality standards for contracting service providers, building codes, training schemes for installers, performance contracting schemes, energy label for homes or low interest bank loans)
3. Is involving all relevant stakeholders in the form of diverse partnerships conducive to the creation of a new social norm? Has their interaction, and their often diverging needs and key performance indicators demanded alignment of interests with the potential for social learning?
4. Has social learning through building on previous programmes resulted in more effective programmes? And is this key to successful mainstreaming of retrofitting initiatives?
5. Should 'free riders' (people who would have taken measures without the subsidy) be welcome too? Can incentives actually motivate towards even better or more comprehensive retrofitting than planned without the incentive?
6. What is the potential of un-orchestrated collective learning? What could be the impact of seeing your neighbours retrofitting their home with the aid of a financial incentive?
7. With overly extrinsically motivated interventions, will the bigger message why it is an important social or a global issue, get lost and ignored, thus enhancing the changes of rebound? One could also ask whether programmes potentially veer towards appealing to self-interest because otherwise they drown in a sea of marketing encouraging consumption practices that work against altruistic motivations?

### Transport

1. Many of the intended outcomes, e.g. changes in the symbolic meaning attributed to a car or a bike, or increased positive perceptions of urban traffic, can only be assessed by qualitative inquiries making use of e.g. surveys or interviews. Changing the meaning attribution can, however, be a very effective way to change driver behaviour. What methods are best to assess the changes in meaning attribution of the car?
2. It is very difficult to monitor the actual change in driving behaviour on the individual level. Mobility DSM is not deployed in a laboratory situation, or in the confined space of a home, so other (changing) conditions always interfere with the intervention. How could a comprehensive monitoring regime look like that focuses on both the individual and societal level and on quantitative and qualitative changes?
3. The costs of transport campaigns are most likely not the only costs of interventions. Generally, only costs on the supply side are calculated. But the individual drivers themselves potentially have additional costs in terms of lost time, problems with getting negative comments or social stigma, but these costs can hardly be calculated. How can the costs of transport interventions incurred on the end-user side be calculated and weighted?

### Smart Metering/Feedback

A key design challenge is to create a smart metering system that keeps engaging with the household members. Changing the messages and feedback in the course of time following energy literacy can be key. Information should thus be dynamic over time. What designs work well for whom?

## SMEs

1. How to evaluate the savings (energy, CO2, cost) or increased productivity of the earlier (due to the intervention) implementation of already-planned measures?
2. Concerning the application of Nudge it would be interesting to see if a specific approach applied to the specific context of a single SME is more effective rather than a general policy measure aimed at all SMEs.
3. Are competitions potentially most effective as an early incentive to familiarise the public with a (social) innovation and start up initial behaviour?