



International Energy Agency
Energy Technology Initiative on
Demand Side Management Technologies and Programmes



Guidelines and recommendations for Sweden

Task 24 – Phase I

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

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Do's and Don'ts for Swedish Behaviour Changers

Intervention Phase	DO	DON'T
DESIGN PHASE	<ul style="list-style-type: none"> - use models of understanding behaviour and theories of change to design interventions - spend some time pre-intervention researching your audience, its motivations, needs and heterogeneity - collaborate with other Behaviour Changers, especially researchers and intermediaries to design your interventions - segment your audience where you can as it will help tailor the intervention - design evaluation into the intervention up front, including the evaluation team (if different) - learn from mistakes and (re)iterate your intervention - put a lot of thought into dissemination and don't be afraid to use unusual means like social media, group learning and storytelling 	<ul style="list-style-type: none"> - believe that there is one silver bullet model for behaviour change - 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 - be afraid to mix models and create a toolbox of interventions - think you can design, implement, evaluate and disseminate a (national) behaviour change programme all by yourself - think all people are rational, utility-maximising automats, even in each household you will find very different attitudes, behaviours and motivations - think you can leave evaluation til after the programme is finished - 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	<ul style="list-style-type: none"> - collaborate with other behaviour changers in rolling out the intervention - use trusted intermediaries and messengers - target your audience with tailored information and feedback that makes sense to them - keep learning during the implementation by evaluating ex durante - listen to peoples' stories and especially the nay-sayers and laggards - not underestimate the power of moments of change, use them wisely 	<ul style="list-style-type: none"> - operate in a silo, you need help - stop looking in unusal places for allies - let your (conflicting) mandates stop you from working with other Behaviour Changers - let technology overwhelm the intervention, it is a means to an end - ever forget that you are dealing with people and their homes are their castles and their cars their steeds - think you know better than your audience how they should use energy - keep a successful intervention to yourself, share it widely
EVALUATION PHASE	<ul style="list-style-type: none"> - evaluate ex ante, ex durante and ex post - put 10-15% of your resources into evaluation, it's worth it - benchmark! - think of the most relevant metrics and indicators, not just for you but for your target audience and the other Behaviour Changers - use double-loop learning methods - provide strong, ongoing, targeted feedback to your audience 	<ul style="list-style-type: none"> - think it's just about kWh, evaluate beyond it (eg health, comfort, safety...) - think you need to do all evaluation yourself, use your collaborators to evaluate the bits they know best - leave evaluation til the end or ignore its importance in showing that your intervention worked - just model, measure as well - ignore the pathway of behaviour change that led to a kWh change – ask people
(RE)-ITERATION PHASE	<ul style="list-style-type: none"> - (re)iterate your intervention often - learn from your mistakes - listen to your collaborators and end users 	<ul style="list-style-type: none"> - ignore your evaluation - hide your mistakes and horror storries, they are often the ones we can learn the most from
DISSEMINATION PHASE	<ul style="list-style-type: none"> - understand your audience, collaborators and stakeholders, tailor your dissemination accordingly - tell stories, use social media and word of mouth - use trusted intermediaries to tell your story 	<ul style="list-style-type: none"> - spend all your money on (social) marketing campaigns - keep doing the same thing, peoples' willingness or brand awareness doesn't usually translate to behaviour change - tell a boring story about kWh - 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:** the Netherlands, Norway, Sweden, New Zealand, 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.leadsmtask24.ning.com).
- 15 successful expert workshops/webinars have been held to date³
- **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 disseminated⁴
- **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](#).

Sweden’s Involvement in Task 24

Sweden joined Task 24 in December 2012. Associate professor Cecilia Katzeff, from the Interactive Institute Swedish ICT was appointed as national expert. The Swedish contribution was funded by a grant from the Swedish Energy Agency with contact person and Executive Committee representative Dr Maria Alm. The Swedish audience for Task 24 was in addition to the Interactive Institute, the Energy Agency, CESC at KTH Royal Institute of Technology and the SIGRID network, which was formed in 2014. Sweden participated in workshops organised in Norway, Switzerland and Austria. Sweden also organised and hosted a workshop in Stockholm in October 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

Sweden contributed with the following case studies:

- SMEs: The project [Energy Efficient Companies \(EnergySave\)](#)
- Transport: The [Stockholm Trial](#) on congestion charges
- Retrofitting: The [Sustainable Järva](#) project
- Smart metering: The [Clockwise](#) project

Each of these case studies was very different – they were based on different models of understanding behaviour, different end user groups and different Behaviour Changers. Some were very top down (e.g. the Stockholm Congestion Trial) and some very bottom up (e.g. Sustainable Järva). All were incredibly interesting in the context of Task 24.

The Stockholm trial was selected as a project for in-depth case study and resulted in "[The Stockholm Trial Report](#)" by Sofie Nyström, Interactive Institute (Subtask 2).

Sweden submitted a proposal for a suggested extension of the Task 24 project to the Swedish Energy Agency in March 2014, and the proposal was accepted as long as four countries minimum would join the extension (they have: New Zealand, the Netherlands, Austria and Sweden).

Sweden's Energy story (wider energy culture and contexts)

1. **Geography:** Sweden is a sparsely populated country, characterised by its long coastline, extensive forests and numerous lakes. It is one of the world's northernmost countries. In terms of surface area it is comparable to Spain, Thailand or the American state of California. Sweden's borders have been unchanged since 1905 and the country has not been at war since 1814. Considering its geographic location, Sweden enjoys a favourable climate. Because of the warm Gulf Stream, the climate here can be much milder than you might expect. Spring, summer, fall and winter each have their own unique personalities. Spring runs from March/April to May, summer from June to August, fall from September to October/November and winter from November/December to March/February. In a land as varied as Sweden, these seasons can be quite different depending on where you live. For simplicity's sake, the country can be divided into three major regions: Götaland in the south, Svealand in the middle and Norrland in the north⁵.
2. **Socio-economics:** Sweden has a quite small population of 9.6 million spread over a very long country with the majority of the population living in the South. About 85% live in urban areas⁶. The GDP of Sweden in 2014 amounted for 45 814 US dollars/capita⁷.
3. **Energy system:** The Swedish energy system is based partly on domestic sources of renewable energy such as water, wind and biofuels. In addition, a large proportion of the energy supplied is dependent on imports such as nuclear fuel for electricity production in nuclear reactors and fossil fuels like oil and natural gas for the transport system. Swedish electricity production is based to a large extent on hydropower and nuclear power, but the use of biofuels for electricity production and heating is constantly rising⁸.
4. **Energy supply:** The annual supply of energy in the Swedish energy system in 2011 was about 600 TWh. Fossil fuels accounted for about one third of the total. Oil products, natural gas, town gas, coal and coke accounted for 129 TWh, with the remainder being made up of losses and use for non-energy purposes. 132 TWh of the energy supplied in 2011 came from biofuels, peat and waste incineration. The district heating and industrial sectors are the largest users of biofuels, but a small proportion is used as transport fuel. Electricity production from hydropower and wind power was 60.9 TWh and 9.8 TWh, respectively, in 2013⁹. Wind power's contribution to electricity production has however increased by more than 70 per cent between the years of 2010 and 2011. About 30 per cent of the energy supplied in 2011, 168

⁵ Swedish Institute 2014, <https://sweden.se/nature/swedish-weather-and-nature/>

⁶ http://www.scb.se/statistik/publikationer/BO0801_2007A01_BR_BO01SA0701.pdf

⁷ OECD (2015), Gross domestic product (GDP) (indicator). doi: 10.1787/dc2f7aec-en (Accessed on 17 April 2015)

⁸ Energy in Sweden 2013, page 5.

⁹ <http://www.scb.se/sv/Hitta-statistik/Statistik-efter-amne/Energi/Tillforsel-och-anvandning-av-energi/Arlig-energistatistik-el-gas-och-fjarvarme/6314/6321/24270/>

TWh, came from nuclear fuel. Of this, 60 TWh was converted to electricity and the rest was accounted for by conversion losses.

5. **Energy policy:** By 2020, the proportion of renewable energy in the EU will be equivalent to 20 per cent of all energy used, according to the Renewables Directive. The directive also contains details of how the burden of the EU targets will be distributed between the member states. Sweden has the additional ambition to source at least 50 per cent of its final energy use from renewables. In 1990, Sweden's proportion of renewable energy was 33 per cent and has increased since then to 48 per cent in 2011. The increase since 1990 is, to a large degree, down to the increased use of biofuels, primarily in electricity and heat production and in the forestry industry. The energy efficiency target in the EU is a 20 per cent reduction in energy use compared with the predicted energy use in 2020. The target is binding. Sweden also has a national target of a 20 per cent reduction in energy intensity (supplied units of energy per unit of gross domestic product) in 2020 compared with 2008. The roadmap for moving towards a zero carbon dioxide society¹⁰ presents a vision of an EU that reduces emissions of greenhouse gases by over 80 per cent by 2050 without disrupting the energy supply or harming competitiveness¹¹.
6. **Agencies:** The Swedish Energy Agency is working to create a sustainable energy system that unites ecological sustainability, competitiveness and security of supply. The Agency is also responsible for producing the official energy statistics on specific areas. The Energy Markets Inspectorate supervises the Swedish electricity, natural gas and district heating markets. The Inspectorate works for an improvement of the functioning and efficiency of these markets.
7. **Energy Use:** Sweden consumes a substantial amount of electricity per capita (15,000 kWh per person/year). Few countries consume more energy, yet Swedish carbon emissions are low compared with those of other countries. According to the website www.sweden.se¹², the average Swede releases 5.1 tons of carbon dioxide per year into the atmosphere. This compares with the EU average of 7.9 tons and the US average of 19.1 tons. The reason for this low emission rate is that the majority of electricity in Sweden comes from nuclear power and hydroelectric power, neither of which generates carbon emissions¹³. However, if imports are to be included, this emission is 12 tons¹⁴. In 2011, total final energy use amounted to 379 TWh, which is a reduction of 4 per cent from 2010. The industrial sector and the residential and services sector each used 144 TWh. Energy use in the residential and services sector is affected in the short-term by, primarily, the outdoor temperature as a large proportion is used for heating. Electricity is the dominant type of energy used in Sweden, and total final electricity use in 2011 was 126 TWh. The residential and services sector together used the largest amount of electricity, followed by the industrial sector. Oil products constitute the second largest energy carrier after electricity. In Sweden, oil products and gas are used almost exclusively in the transport sector.
8. **Residential use:** Close to 60 per cent of the energy used in residential buildings and non-residential premises is used for heating and to provide hot water. The need for heating is affected by the outdoor temperature, which can lead to large variations in energy use from year to year. A cold winter results in increased energy use for heating, while a warm winter results in decreased energy use. Electricity use in the residential and services sector increased continually from the 1970s until the middle of the 1990s. Since then, it has remained relatively stable at a little over 70 TWh.
9. **Infrastructure:** Sweden is a fairly large country with an extensive road network. The seasonal climate requires specific maintenance, especially during the winter when roads are snow ploughed regularly and all major highways are de-iced to minimise accidents. All vehicles in Sweden are required to have winter tires when weather demands between December 1 and March 31. In several cities, however, the use of studded tires is now banned on certain streets to reduce road wear and environmental impact. Sweden holds an extensive rail system making it possible, and practical, to commute within Sweden. Sweden's domestic rail system

¹⁰ A Roadmap for moving to a competitive low carbon economy in 2050. COM(2011) 112 final. European Commission

¹¹ Energy in Sweden 2013, page 93-94

¹² with source information from Swedish Institute, Business Sweden, Regeringskansliet etc.

¹³ <https://sweden.se/society/energy-use-in-sweden/>

¹⁴ <http://www.naturvardsverket.se/Sa-mar-miljon/Statistik-A-O/Vaxthusgaser--utslapp-av-svensk-konsumtion/>

is among the most environmentally friendly in the world — run exclusively on electricity produced from hydropower and other renewable resources.

10. **Appliance use:** Use of *domestic electricity* increased from 9 to 12 TWh between 1970 and 2011. The increase that took place over the course of the 1970s and 1980s is explained by an increasing number of households with a greater number of appliances. Two opposing trends have an impact on the use of domestic electricity: appliances are becoming more energy-efficient, which leads to a decreased use of energy, but the number of appliances in the household and the number of functions of many appliances have both increased, which counteracts the effect of greater efficiency¹⁵.

During the Stockholm workshop in 2013, Swedish stakeholders and experts co-wrote the Swedish Energy Story in the format of Task 24's story spine which aids storytelling and recall due to its short and pithy format. The various storytelling methodologies of Task 24 are described in a paper to be presented at this year's eceee summer study¹⁶. The Swedish story goes as follows:

Once upon a time... in the ancient kingdom of Sweden, the oil shock reverberated through the halls of power.

Every day... policymakers from all colours came together and created policies to reduce energy use in industry, buildings and transport to become less dependent on fossil fuel imports.

But, one day... the clever Swedes came up with a solution to replace fossil electricity with nuclear and thus encouraged their people to use more electricity, especially for heating. This also made it very cheap and thus invisible. People forgot about the oil crisis.

Because of that... Electricity production almost doubled! The economy flourished, people bought a lot of energy using stuff and the ICT sector flourished. The Government even encouraged people to buy computers by removing the sales tax.

However, not all Swedes were this wasteful. Some inventors formed energy associations that continued to work on clever solutions to reduce energy use.

But then... was a reform of the electricity market which ended up making the bills go up.

On top of that, came the Stern report and Al Gore winning the Nobel Peace Prize, not to mention the Power Aware Cord!

Because of that... The Swedish Government realised that the focus needed to turn to reducing energy use and CO₂. It introduced a carbon tax and certificates on renewable energy to subsidise converting from fossil fuels to renewables. This included really innovative heatpumps and Central District Heating, as well as waste to energy converters.

So, finally... The Swedes reduced their CO₂ emissions hugely and have a goal to be free of fossil fuel imports.

And, ever since then... The Swedes are world leaders and act as the moral conscience despite still having really comfortable lifestyles. **The end.**

¹⁵ Energy in Sweden, 2013, page 16.

¹⁶ Rotmann, Goodchild and Mourik, 2015. *How to tell a good behaviour change story that 'sticks'*. ECEEE summer study proceedings (in press)

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 New Zealand 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 theory turns into practice, 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 Stockholm Congestion Trial

Background

The Stockholm congestion trial is described in-depth in the Subtask 2 case study analysis. The project was a congestion pricing system performed in Stockholm between January 3rd and July 31st, 2006. The system was implemented as a tax levied on most vehicles entering and exiting central Stockholm. The trial also involved, apart from the taxing, new parking areas ("park-and-ride") within walking distance to public transportations, and also enhanced public transportation (bus lines etc.). The primary purpose of the congestion tax was to reduce traffic congestion and improve the environmental situation and air quality in central Stockholm. The funds collected were to be used for new road constructions in and around Stockholm. In addition, toll stations were placed around the central Stockholm area and all vehicles that entered or exited the so called "tax zone" during weekdays between 6.30 AM and 6:30 PM were imposed to pay the congestion fee. The main partners in the project were the City Council of Stockholm, the Swedish Road Administration and the Stockholm public transport (SL). It was financed by the Swedish Government. The Swedish Secretariat for Environmental tax was responsible for project management, execution and evaluation. The project was based on **Activity Based Models**.

The Stockholm congestion charges use a financial incentive to establish a change in behaviour, based on a model called the "Homo economicus" (or neoclassical economics). The success in the

trial shows that money as an incentive can work if the circumstances are the right ones and if the behaviour change is facilitated by other factors. Motorists are sensitive to financial incentives and it was therefore a well-founded expectation that car tolls in Stockholm would reduce traffic volumes.

Key lessons

The key lessons and recommendations can be summarised as follows:

The importance of improved public transport: The improved public transport was something that highly contributed to the success of the trial. Together with park-and ride facilities, public transport offered people living in the suburbs another way of transportation instead of the car.

People can be more positive after experiencing the effects: Both the public and corporate opinions have become more positive towards the congestion charges since individual experiences and advantages were experienced. Before having any kind of their own experience, the perceived obstacles and the costs made the biggest impression. But when they faced the trial in practice, people discovered the advantages and the benefits for the individual.

Socio-economic factors were a big consideration (the rich minority paid a large part of the taxes): About 4% of the cars in the county, corresponding to 1.2% of the county inhabitants, paid a third of the total income from congestion charges from civil cars. Why these people went on driving as before and what incentive would make them change are interesting questions that the reports don't answer.

Either you avoid the fees and leave your car, or take advantage from less congestion: There are two adaptations going in opposite directions from each other. Either you changed in order not to pay the fees in one way or another, which reduces traffic, or you changed to benefit from the space resulting from less congestion, which counteracts the reduced traffic.

Trips disappeared into thin air: The reduction of car trips outnumbered the increase of trips done by public transport during the trial. Since the amount of trips done by public transport doesn't add up to the decreased amount in car trips, some trips have changed route, chosen other travel destinations or just not occurred as a result of the trial.

Changing behaviour cannot be planned ahead: Despite several examples of individuals planning to change their habits but didn't go through with it, 25% in the evaluation reported a change in their behaviour afterwards compared to 17% who thought before the implementation that they would change their habits.

Conditions for replication of this project: Stockholm is a special city, geographically and topographically, with few roads leading to few toll stations in the trial. The improvement of public transport in combination with congestion charges has without a doubt contributed to the effects. Stockholm is also a kind of optimum for this intervention since the habitual car driver is not in the majority during rush hour.

Delay in execution leading to incoherent measures: Some of the surveys before the trial were conducted in the autumn of 2004. The idea was that comparisons could be made with the situation one year later, because the trial was planned to start in autumn 2005. As the trial was not launched until January 2006, the comparison should have been made with data for the spring period, but by that time it was too late to collect such data.

The Stockholm Trial was a delicate subject and awoke a lot of reactions when implemented in 2006. Despite delays in the implementation and protests from the public, the project seemed to work from the first day since there was an immediate decrease in traffic. The inhabitants of Stockholm County became a lot more positive towards the trial after it was implemented, and they voted for a permanent implementation of the congestion charges in the referendum 2006. One important aspect of the project was that Stockholm as a city was under the right circumstances to implement congestion charges regarding its geography, topography and infrastructure.

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 intervention¹⁷. 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 measured¹⁸. 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 behavioural 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).

¹⁷ See Karlin et al’s Methodological Review ‘What do we know about what we know?’ for Subtask 3

¹⁸ See the different evaluation metrics in the ‘Monster’

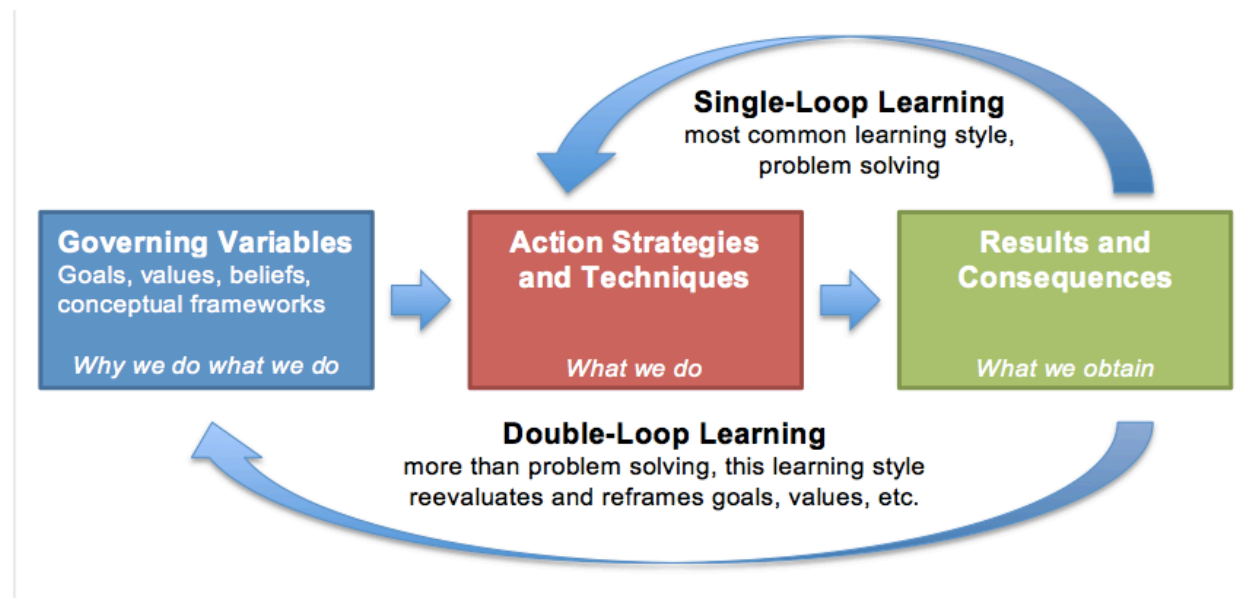


Figure 2: double vs single loop learning. Retrieved from <http://www.afs.org/blog/icl/?p=2653>

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 3. 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: <ul style="list-style-type: none"> • Cost-effectiveness • Lowering the total energy consumption 	<ul style="list-style-type: none"> • Was the intervention cost effective? • Are the goals reached within the time and within the allocated budget? 	<ul style="list-style-type: none"> • Costs and benefits (eg ROI or NPV) • Pre-set goals • Available time and time needed • Budget and costs
	Effectiveness indicators: <ul style="list-style-type: none"> • Reaching the intended goals • Lowering the total energy consumption 	<ul style="list-style-type: none"> • Are the goals reached? • Is the total energy consumption lowered (per household? by sector?) 	<ul style="list-style-type: none"> • Energy savings • Energy consumption before and after intervention

Double-loop learning	<p><u>Process indicators:</u></p> <ul style="list-style-type: none"> Realising a network of a heterogeneous set of actors with different definitions of success Interaction and participation by the target group (so that they can learn about their own behaviour and consequences for energy consumption) Interaction and participation with a diverse set of stakeholders since the design phase Learning as an explicit aim of the intervention Record new lessons for future interventions Making use of lessons that are learned during previous interventions Perspectives of intermediaries before and after a intervention Changes in assumptions, norms and beliefs 	<ul style="list-style-type: none"> 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? 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? How was learning during and after the intervention ensured? How did the perspectives, assumptions, norms and beliefs of intermediaries and other stakeholders change during the programme? 	<ul style="list-style-type: none"> Diversity of actors that are involved in the design and implementation of the intervention Definitions of success that were co-created and used The way end-users were involved in the design and implementation of the intervention Perceived self-efficacy Perceived impact and benefit of the intervention Learning strategy Perspectives, assumptions, norms and beliefs of stakeholders before, during and after the intervention
	<p><u>Content indicators:</u></p> <ul style="list-style-type: none"> Alignment of the expectations of the stakeholders Reflection upon the function of evaluation/monitoring together with stakeholders Learned lessons during the intervention are translated into (re)designs Improving the capacity of own or similar organisations to perform successful DSM interventions Creation of new networks and institutions that support the newly formed behaviour and its outcomes Lasting changes (behavioural or practice change) 	<ul style="list-style-type: none"> To what extent were the expectations of stakeholders aligned? How is this done? How did reflection upon the function of M&E with stakeholders take place? Which lessons learned during the intervention are translated into (re)designs? Is the capacity of own- or similar organisations improved to perform successful DSM interventions? Are new networks and institutions created that support the newly formed behaviour and its outcomes? Did lasting changes take place? 	<ul style="list-style-type: none"> Collective impact approach to co-develop metrics to measure this Main lessons learned by different stakeholders Perceived success of collaboration and intervention design and implementation 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 overall, global conclusions (eg the do's and don't'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.

Swedish 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. This report forms part of the Sweden summary and recommendations. Here we provide examples of how the case studies we looked at in Subtask 1 could be improved or changed following our learnings and recommendations:

Building retrofits

The abbreviated headline recommendations (for detailed recommendations see Appendix 6) from our Subtask 1 analysis of building retrofit case studies are described through the lens of the Sustainable Järva project below.

Programme: *Sustainable Järva*¹⁹

Sustainable Järva is a five-year rehabilitation project where the neighbourhoods around Järvafältet, (largely formed during the Swedish “one million home programme”, 1965-75), are being renovated and developed into a “new” urban district with a strong environmental profile. The project is part of Järvalyftet (Vision Järva 2030), which is a programme initiated by the City of Stockholm, to promote social, economic, and ecologic development in the area. It is a joint investment, including several different actors (local stakeholders, politicians, government administrators, entrepreneurs, residents, etc), where the overall goal of the project is to make Järva into a national and international model for sustainable rehabilitation - that promotes environmental responsibility - while still preserving the area's unique and historical values.

The project revolves around several working areas, where energy-efficient renovations of seven selected apartment blocks (350 homes) constitute a major and important part. Other areas of focus are about renewable energy, as well as sustainable transportation and cycling promotion measurements. In order to promote a sustainable lifestyle the project also (apart from technical solutions) has a Whole System focus on social aspects such as information, involvement, and education. The ambition is that with better knowledge and more influence the residents will become inspired and capable of making use of “new possibilities” that comes with the technological advancement.

Regarding behavioural changes the projects asserts that “technical solutions alone are not sufficient to promote a sustainable lifestyle. At least as important in this respect are a broad-based information campaign and a constructive dialogue with residents that gives them an opportunity to comment on and participate in decisions about the renovation”. Accordingly the main efforts when it comes to behavioural changes are carried out within the working area of ‘participation and information’.

¹⁹ <http://www.jarvadiialogen.se/>

SUSTAINABLE JÄRVA RETROFITTING PROGRAMME

Domain: Building Retrofits

Target: Individual Investment Behaviours

Recommendations	What the programme did	What the programme could do better
1. Focus on the social side	This was primarily the way that the project was carried out, including the tenants in retrofitting the buildings and doing this by gathering them together holding discussions of what can be improved.	
2. It's not just what we buy, it's what we do	To be truly effective, DSM programmes have to go beyond the (granted, very high potential) one-off investment behaviours like insulation and clean heat and change smaller, frequent purchasing behaviours, use and maintenance of technology and habits and routines as well. In Sustainable Järva, the main efforts when it comes to behavioural changes were carried out within the working area of 'participation and information'.	In addition to participation and information, a deeper investigation could have been done to study how the tenants perceive energy, and how their energy behaviour could be further influenced. In defence of the project, one might have to address social matters and create a feeling of unity before addressing individual energy behaviours.
3. Change lifestyles not just light bulbs	This leads into the bigger issue of changing lifestyles, attitudes and values around energy efficiency, not just installing a technology that is largely invisible and needs no further change from the householder. The Sustainable Järva project included the tenants for participation and information, and retrofitted based on these opinions.	The project did not target a direct change of lifestyles, attitudes and values. It merely was meant to inspire the tenants to a more sustainable lifestyle. Changing lifestyles is something like the 'holy grail', akin to changing practices. It is very difficult but, if managed, is one of the most powerful ways to embed long-term change.
4. Think of the benefits of the end user as well	Sustainable Järva did this well when including the tenants in the project, asking them what they think of their surrounding and how they could be improved.	
5. Focus your messaging, use trusted intermediaries	Sustainable Järva did this well when educating their own personnel and environmental ambassadors working with the project, making them well-informed and engaged. The project also included the Swedish Union of Tenants when holding a dialog with the tenants.	
6. Be a one-stop-shop	The Sustainable Järva project did not aim to solve any information deficit. Instead of demanding that all tenants would have to pay for e.g. dishwashers in the retrofitted apartments, this was provided as a possibility and for the tenant to decide later on when the retrofitting was carried out.	
7. Use a toolbox of interventions and go beyond kWh targets	A lot of benefits for the tenants would be included in the retrofitting; many of them would not have to do with maximising energy savings. The project succeeded well in making it about more than money.	
8. Don't box people in too much	The success of the project was to include the tenants in the project and not focus merely on energy savings.	The project did not try to influence people's behaviours directly, it was merely meant to inspire them to a more sustainable lifestyle. The function of the use of energy in the life of end-users was not a significant part of the project.

Recommendations	What the programme did	What the programme could do better
9. Benchmark your heart out, measure not model	Sweden's Royal Institute of Technology (KTH) is responsible for monitoring and evaluating the entire project, both from a technical, social and economic perspective. They measure this by surveys, in-depth interviews, data collection about the buildings and their energy consumption before and after the retrofitting and regular workshops.	The report and evaluation of the project has not been finalised yet. The project goals claim energy savings up to 50%, but if this is to be metered or modelled is not stated. Reliable data regarding changes in energy usage was only available for 4 out of 7 apartment blocks. Savings in hot water and electricity due to behaviour change were reported to be insignificant.
10. Learn from the unwilling	The project has continuously been addressing all tenants living in the area. It is however possible that people who didn't show any interest initially were not asked about their opinions.	This is probably one of the biggest flaws with the project. Since the finalised report of the project is not published at the moment, this is still an unknown matter.

Transport

Pilot: *Swedish Congestion Trial*

The Swedish Stockholm Congestion Taxes Trial has been discussed previously in this report in Implementation phase – Subtask 2 as it was the case report from Sweden. Additional information can be found in the Subtask 2 [Stockholm Trial report](#).

Changing behaviour when it comes to exposed parts of your life such as cars and other objects is fundamentally different from the mundane day-to-day things that are kept in the home or even in the basement. Since the car also is a status symbol for people and a way to express themselves, it is a more complex psychological area than, for example, to install insulation in your house.

The Stockholm congestion charges use a financial incentive to establish a change in behaviour, based on a model called the “Homo economicus”. The success in the trial shows that money as an incentive can work if the circumstances are the right ones and if the behaviour change is facilitated by other factors. Motorists are sensitive to financial incentives and it was therefore a well-founded expectation that car tolls in Stockholm would reduce traffic volumes²⁰.

The trial evaluated the following points:

- The travel pattern of Stockholm inhabitants,
- Car traffic,
- Public transport traffic,
- Pedestrian- and Bike traffic,
- Environmental- and health effects,
- Traffic safety,
- Allocation effects,
- Business and regional economy,
- Benefits and costs for the toll system,
- National economy,
- Attitudes towards environmental tolls/taxes.

The monitoring and evaluation were performed before and during the trial. The trial itself consisted of three parts listed below:

- Park-and-ride sites in the city and the rest of the county
- Expanded public transport
- Congestion tax/Environmental charges

²⁰ Beser Hugosson, Sjöberg & Byström. Facts and Results from the Stockholm Trial - Final version - December 2006. Stockholm: Congestion Charge Secretariat, City of Stockholm.

The three primary goals of the trial were reduced traffic, a better environment and perceived improvements to the city environment. The goal of traffic reduction has been achieved, and thereby also the environmental goal. The degree of achievement of the city environment goal is more difficult to interpret.

When the trial ended after six months, the traffic did not return to its previous levels, probably because people had changed their behaviour during these six months and established a new habit of commuting by public transport or other methods. People became more positive towards the trial after it was implemented.

The Stockholm Trial reduced emissions of both carbon dioxide and particles. This reduction is substantial to have been achieved through one single measure. Seen across the county as a whole however, it can only be regarded as one of several measures required to achieve national climate objectives, for example. As the reduction in traffic took place in densely populated areas, the reduction – mainly of particles – brought a major health benefit to the county as a whole. The health benefit is about three times higher than the benefit that would have been gained had the reduction occurred through an increase in fuel prices. As expected and in general terms, the Stockholm Trial only had a marginal impact on noise levels²¹.

STOCKHOLM CONGESTION TRIAL Domain: Transport Target: Individual Habitual Behaviours		
Recommendations	What the programme assumes to do	What the programme could do better
1. Don't take away their wheels	This is actually what the programme did, trying to reduce the amount of cars with a financial incentive, i.e. making it more expensive to drive cars during daytime. It was, however, of big importance that the park-and-ride facilities were established and improved public transport was improved.	Other areas could have been the focus in addition to the financial incentive.
2. Cars reflect lifestyles	Again, providing other reinforcements to complement for cars were probably very essential for the success and acceptance of the trial.	The project states nothing about the car being a important part of your life or a reflection of taking lifestyle into consideration. However, the finding that richer people paid a disproportionate amount of the taxes shows that, once the financial incentive is not an issue anymore, the ability to use one's car outweighs the cost. A more in-depth analysis of the motivations of this segment would be interesting.
3. Risk messages can be risky	The main risk messages were around environmental pollution and health impacts from increased particles.	The trial did not highlight the safety in riding public transport compared of cars.
4. You're never alone when you are driving	This was not addressed explicitly here but the obvious social norm change that took place when people grew accustomed to the trial showed there was a wider influence by peers.	More could have potentially been done about encouraging car pooling, eg reducing the tax depending on how many people traveled per vehicle?
5. You need more than one tool to fix a car (or its driver)	As explained above, the project tried to facilitate the people getting out of their cars by handing them other ways of transportation. It also encouraged use of green cars since these only contribute to congestion, not to CO ₂ emissions and did not have to pay taxes.	The trial did however also put a burden on the inhabitants of Stockholm. Without provided information beforehand, the people crossing the charging cordon were obliged to know when and where to pay the charge. Other than the park-and-ride facilities and the improved public transports, no other interventions were made to target lifestyles.

²¹ ibid

Recommendations	What the programme assumes to do	What the programme could do better
6. Trust is everything	Since the trial used the financial incentive to get the inhabitants out of their cars completely, it did not address the way people drive their cars at all. However, it became obvious that the initial perception of this trial being a bad idea switched to majority consensus that it should be implemented permanently.	The County of Stockholm has obviously managed to promote this tax as a good idea to its citizens. How this could be replicated in further measures is an additional aspect to research.
7. Be smart, drive smart	This was not addressed at all in the Stockholm Trial.	In addition, another intervention could have been done to reduce congestion by teaching drivers how to drive their cars in a more environmental manner.
8. New car/licence is a great time to change	Except for the trial starting in the beginning of January 2006 (which was not the plan originally), this was not addressed at all in the Stockholm Trial.	This is something that could easily be added as teachings by Stockholm driving licence instructors as part of their curriculum.
9. It's about much more than just the car	The improved public transport is a good example in the Stockholm Trial that facilitated new behaviour.	
10. Money ain't everything	Unfortunately, this was the main incentive used in the trial. It was, however, fortunate that the extension of public transport and ride and share facilities accompanied this.	Since this was the main incentive used, one can be quite critical of the trial. Other methods and incentives such as social norms could've been used additionally.

Smart Meter/Feedback

Project: *Clockwise*²²

The Swedish project Clockwise investigated whether a central power display (Energy AWARE Clock: a real-time display with a graphical image of the household's electrical consumption) could support more energy efficient behaviours. The project started in September 2008 and continued through to August 2009. The Energy AWARE Clock was tested in 9 households in Ursvik for three months from January to March 2009. The artifact Energy AWARE Clock was developed during the earlier project *Aware* and is a new kind of energy display that uses a time (i.e. an analogue clock) metaphor to visualise a homes' electricity consumption. Just as a clock, the EAC may be hung on the wall. Providing the ambient feedback on electricity consumption drew the attention to high-consuming activities and products. Providing electricity consumption feedback in an aesthetically attractive way motivated people to engage in using electricity more efficiently (Emotional Design – e.g. Norman “Emotional Design”, 2004).

The Energy AWARE Clock Domain: Smart Meters/Feedback Target: Individual Habitual Behaviours		
Recommendations	What the programme assumes to do	What the programme could do better
1. Time isn't always money	This project did not assume a financial incentive to stimulate behaviour change. It focused instead on Emotional Design.	
2. Technology isn't everything	The AWARE clock acts as a decoration to your home while it provides the household with an image of their consumption.	The clock does not provide more feedback or other benefits than the use of kWh during different periods of time. This can potentially be improved in further iterations of this technology.
3. Make sure there is clear value for the customer	The AWARE clock did this well by providing the household with direct feedback on their electricity consumption. Plus, there was the added aesthetic value.	However, other co-benefits such as money saving, polar bears not drowned (eg more electricity use leading to a smaller and smaller ice floe for a bear to sit on), health benefits, family time etc could also be built into the clock.

²² <https://www.tii.se/projects/clockwise>

4. Automatons don't teach as well as real people	Since the AWARE clock is an automaton and without stories, it did not increase know-how about energy.	Information that isn't coupled with active or shared learning won't work as well as information that comes from real peoples' stories or word of mouth information from trusted sources such as family and friends.
5. Find and convince the 'luddites' that your technology will work for them	Households agreeing to the project received the product, declining households were not questioned further.	Understand the motivations of the self-selected participants in the trial better before starting. Undertake surveys and interviews to help segment them and uncover any 'luddites' or 'cynics' and understand their reasoning. There is also an issue of avoiding the ' Hawthorne effect ' (the field research in itself changing the behaviour of participants thus biasing the results).
6. The home and the household dynamics hold your key	The intervention should also target the home and its technologies, rather than just householders' behaviours.	Additional tools to provide eg personalised audits including some tailored education around the how the home and its technologies uses energy (in)efficiently, could have helped.
7. Social cues are more powerful than technology	It is unclear which intermediaries have been used when installing and explaining the new technology and feedback mechanisms. Were they trusted by the homeowners? The project was however carried out by researchers, assuring that no commercial interests were involved.	It would also have been interesting to uncover how much the clocks were a talking point among family members and their friends. Did they show the clock off proudly when somebody came around their house, for example?
8. My home is my castle and I know what I'm doing	Energy use of a home is one of the least visible values that a home has to its owner. Making energy use visible is thus a good step, and by doing this with the AWARE clock, energy has a better chance of becoming a visible resource.	It needs to go into the services the home owner derives from its appliances and reassure them that it will not reduce the quality of service. People like to feel capable and smart in the way they use resources, this strong underlying value needs to be supported by the feedback.
9. Focus not on individuals but their practices	The feedback given here was related to overall kWh and monetary savings as well as changed patterns of use during different times of day	Feedback specific to particular practices or behaviours would be much more meaningful than abstract feedback on kWh changes over time.
10. Participation is key	Even though the householders were self-selected, there was not any co-development or shared learning aspect to this intervention, which would have improved engagement. However, the design was based on a field study to gain understanding of the individual household's living spaces and context, collected through home observations.	Co-create the interventions with your audience and enable shared learning (eg via workshops, social media, storytelling) between them
11. No one likes waste	The graph on the AWARE Clock showed consumption and when it was higher or lower, but it did not refer to "wastefulness".	Talking about wastefulness rather than saving money could be more effective in the feedback.
12. How am I doing compared to my neighbours	The normative feedback as to how a household was doing compared with their neighbours was missing	Use normative feedback (eg Cialdini) to show how well they are doing not only in comparison to their own use, but also that of their neighbours

SMEs

Project: *The Swedish Eskilstuna Project*²³

Energy Efficient (Companies in) Eskilstuna is a project developed in collaboration between the Eskilstuna municipality and the Factory Association (Fabriksförening) – with the goal of reducing energy use among companies in the commune. The project was first launched in 2009 as part of a broader investment initiated by the Swedish Energy Agency called *Sustainable Municipality*, which aimed at getting existing players in Eskilstuna to develop activities that contribute to reduced energy usage. It has since then been run several times and in several places in Sweden.

²³ <http://www.eskilstuna.se/sv/Naringsliv-och-arbete/Fakta-om-naringslivet/Naringslivsutveckling/Energieffektiva-foretag/>

Whereas energy efficiency efforts are often a matter of external consultants coming and going (along with the knowledge) – this project wants to equip the participating companies with the capacity, methods and tools, to themselves take control of and reduce their energy use.

The Eskilstuna project essentially builds on a “collaborative approach”, where entrepreneurs, municipality and energy expertise work together in networks. One important element in the process (which takes a course over 10 months), is about education, mapping and evaluation, where representatives from the participating companies, under the guidance and support of an external expert consultant, engage collectively in conducting energy analysis on each other’s company. These analyses then result in further activity plans and actions. Moreover, anchoring the idea among the senior management, sharing experiences among the participants, as well as further training and continuous reporting also constitutes important elements of the process.

Ultimately the project idea is about creating the best possible conditions for the companies to “own” the process of becoming more energy efficient, and to promote collaboration between geographically close companies in order for them to support and learn from each other.

SWEDISH ESKILSTUNA ENERGY EFFICIENCY PROJECT Domain: Small to Medium Enterprises Target: Individual Investment Behaviours		
Recommendations	What the programme did	What the programme could do better
1. It can't all come from the top or the bottom	A lot of technical installations were made to improve energy efficiency. The very few behaviour changes were eg turning off lights when not in use. Meetings and education were mainly done with higher management.	Ongoing mentoring is very important which needs to involve the staff but also very importantly, the person in the middle of the organisation who will often be in charge of implementing the change (e.g. energy or building manager)
2. Benchmark your heart out	The project included cooperation and networking between the companies, and some healthy competition has awoken.	
3. It's all about the people	The project and coaching was directed towards the management, leaving bottom-up perspectives.	Especially small businesses are often more people-focussed and it is important to identify, and target the champions in the organisation. Even though there is often more competition in this sector, peer to peer learning is also hugely important especially if it can be provided by a trusted intermediary in a 'safe' setting.
4. I want what you want, so let's do it	Unfortunately, the programme does not state any clear goals about mobilising towards shared goals.	Shared goals, including for reforms or industry-wide changes need to be identified (again, collaborative shared learning workshops are great vehicles for this). The Collective Impact Approach , which will be trialled in the Task 24 extension could provide the right framework to ensure this is managed well.
5. Don't be afraid to lose the nay-sayers	The EE project in Eskilstuna did not undertake surveys to understand the reasoning behind SMEs who did not respond to or take up any audits.	Change can be scary and it is important to listen to people in the organisation or organisations who are against it, they may have good reasons. It is also important not to get disheartened by losing some of them as it may entrench social norms in the businesses that stay and the Diffusion of Innovation curve will mean the laggards will ultimately be engaged. It is in the early and late majority that most of the potential lies.

6. Nudging is what it is: a nudge, not a life saver	The EE project in Eskilstuna did not use nudging.	Nudges used as external stimuli to make it easier for SMEs or their employees to embed changes are a good idea but not too much importance should be put on their effectiveness. Strong interpersonal support from the top, staff champions and the implementer in an organisation, as well as continued mentoring and involvement with a trusted intermediary and other peer organisations will be more valuable to change norms and practices.
7. Show who's a leader	The EE project in Eskilstuna did not provide any type of certification.	Showing successful organisations' impacts and changes to their peer groups would also be an important aspect, including maybe putting a gamification element with competitions and leaderboards into the mix.
8. Tailoring is essential	Tailoring was done during the EE project in Eskilstuna, addressing each company differently and undertaking investigation of potential energy monsters.	Shared learning workshops can help identify areas where individual tailoring to SMEs may be essential.
9. They lead - others follow	The programme reported that small companies were able to learn from bigger ones within the programme. It did not report any support for innovators.	Supporting innovators is very important, either by celebrating them or providing them with awards or further financial support, if needed
10. Consultants don't care as much as your staff	The consultants of the EE programme did well and educated the companies in how to take control and reduce their energy usage.	
11. Trust is everything	The EE project in Eskilstuna used a representative from the municipality to take lead and educate the SMEs.	Continuing support and mentoring by these trusted advisors can embed practices and habits across an organisation.

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 intended 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 12 members from Sweden on the expert platform (2 Government officials, 8 researchers, 1 industry member, 1 NGO representative).

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 way to break down silos between disciplines or sectors and the every-present tendency towards jargon
- ✓ a valid social science tool, using narratives
- ✓ something innately 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 initial 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 the Task 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 embrace 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

Sweden's involvement going forward

The Swedish Energy Agency will coordinate an extension of Task 24, which will most likely focus on the building retrofit domain. As Sweden already has a strong network of Behaviour Changers from all sectors, a lot of whom know (of) each other, we will have our first workshop in Stockholm in June, where the new [framework](#) of understanding the energy system from the 'human' perspective²⁴, including that of the different Behaviour Changers can be trialled in a field research setting.

²⁴ See Task 24 [Extension Proposal](#) and Work Programme

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 BEHAV 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	Hyères, FR	450+	45	IEEE 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)^
- Implementation 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

Swedish DSM interventions (from 2014 IEA DSM Annual Report)

DSM Developments and Priorities in Sweden

Examples of DSM-related activities in Sweden 2014

The Swedish government has commissioned the Swedish Energy Agency to be responsible for, and manage the National Energy Research program. The Agency therefore finances various R&D and demonstration projects with an annual budget of 1.3 billion SEK, focusing on renewable energy sources and energy efficiency. Additionally a number of private companies and organizations co-finance these projects. The Swedish Energy Agency handles about 40 R&D programmes and around 900 projects. The work with R&D is currently organized in six thematic areas: Energy System Studies, The Buildings as an Energy System, Energy-intensive Industry, The Power System, The Transport system and Fuel-based Energy Systems.

Examples of running R&D programme activities with DSM-oriented perspectives

The Swedish Energy Agency has together with different stakeholders, initiated several programmes, here are some examples:

- The Swedish Energy Agency has allocated 140 million SEK (2013–2017) for a research and innovation program together with the building sector, called *Energy Efficient Buildings and inhabitants*, and the building sector will allocate at least the same amount of money during the period. This program is concerned with both energy efficient buildings as well as the inhabitants and their lifestyles related to energy use.
- Swedish Energy Agency collaborates and co-finances an R&D programme with the solar energy sector; it has a total budget of 21 million SEK (2013–2017).
- *Fjärrsyn* is a research programme to strengthen district heating and cooling. The programme is interdisciplinary as well as multidisciplinary and encourages competitive business and technology and efficient and flexible solutions for future sustainable energy systems. It is co-financed by the Swedish Energy Agency and the Swedish District Heating Association. The programme has a total budget of 66 million SEK (2013–2017).
- *Energy, ICT and Design* is a research and development programme where the Swedish Energy Agency has allocated 60 million SEK (2013–2017). The programme combines behavioural science, design and information technology (ICT) in order to meet the challenges in the future energy area and in particular stresses the importance of interdisciplinary collaboration, design elements – such as ease of use and attractiveness.
- *SweGRIDS* (Phase 2) has been approved in 2014, to run for 4 years, with an expected cost of around 206 million kronor. SweGRIDS is a programme for driving Electric-Grid oriented energy research at KTH and Uppsala. The sponsors are the Swedish Energy Agency and the industry partners, which also are involved actively to the research projects.
- *Energy efficiency in the transport sector* (2014–2017). The programme's overall goal is to contribute to the build-up and development of knowledge regarding energy efficiency mainly in land and sea transport by supporting research and development concerning energy efficiency relating to the transport system and its actors (and aspects such as logistics, transport integration, planning, organization, IT, influencing behaviour).

Smart cities – R&D examples

- *Nordic Built* – was initiated by the Nordic Ministers for Trade and Industry – is a Nordic initiative to promote the development of sustainable building concepts. The Swedish Energy Agency is, together with the Swedish research council Formas, the funding partners from Sweden. <http://www.nordicinnovation.org/sv/nordicbuilt/>

- Through *JPI Urban Europe*, member countries of the European Union generate European solutions by means of coordinated research. The aim is to create attractive, sustainable and economically viable urban areas, in which European citizens, communities and their surroundings can thrive. <http://jpi-urbaneurope.eu/>

Other news of interest for DSM

- *Smart grid Coordination council*. The Swedish government has since 2012 appointed the Swedish Coordination Council for Smart Grid with representatives from authorities, organizations, the business community and various research settings. The Council's role is to inform, encourage, and plan for the development of Smart Grids that contribute to more effective and more sustainable energy use. One important task for the Council is to develop a road map (for the years 2015–2030) that is to be presented the 8th December this year, with recommendations on how to stimulate the deployment of smart grids. <http://www.swedishsmartgrid.se/>
- The Swedish Energy Agency co-finances, at the moment, three smart grid pilots in Sweden (were for example possibilities for demand side participation are investigated.) For further information on these projects use the links below:
www.malmo.se/English/Sustainable-City-Development/Climate-smart-Hyllie.html
<http://www.stockholmroyalseaport.com/en/>
<http://www.smartgridgotland.se/eng/about.pab>

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.'²⁵

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:

- o How am I motivated or approached or seduced to respond or change my behaviour?
- o Why should I do this?
- o What do I need to do and what will others do?
- o What will it take or what will it 'cost' me?
- o Will I get help?
- o What behaviour needs to change and how much will I need to change?
- o Will it be difficult?
- o What will I gain? What is in it for me?
- o 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.

²⁵ 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)

A Story on Norm Activation Theory informed transport interventions

We know you care about your wheels, but you also care about the planet/other drivers/your boss/your kids...

You like to help, even if there isn't any money in it for you

You like to feel that you are doing the right thing, and some of that you may have learned from others in society

You may even feel guilty if you don't do the right thing

We can activate your altruistic nature by making you aware of the consequences of your own actions for others

But you will weigh up the personal costs of acting, which may stop you from taking responsibility

A Story on Cialdini's Social Psychology informed transport interventions

We know you care about your wheels, but you also care about the planet/other drivers/your boss/your kids...

You like to help, even if there isn't any money in it for you

You like to feel that you are doing the right thing, and some of that you may have learned from others in society. **Some of that is what you feel ought to be done.**

If other drivers around you are speeding, you may do the same. If you see a police car up ahead, he will probably reduce your speed.

If we tell you how much the 'average' driver consumes in fuel, it should make you want to change. However, if you use a lot less fuel you may be inclined to increase your use!

Norms can mediate between your own identity and that of a group. But your car as a status symbol may over-rule social motives and instead make you feel more powerful and better than others

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 (Dwl) 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

A Story on Design Theories informed smart metering interventions

We will design a product or technology which will also design your behaviour

Don't worry, in most cases this doesn't mean we will blatantly manipulate you in order to get data or other valuable information for utilities or to push a technology on you that's pretty useless to you!

Trust us, we know what is best for you and the economy. Oh, and the planet of course!

So, we may need to stop thinking like engineers cause then we only design for other engineers - you may not be as interested in graphs or kWh as we are

We know you like design that is clean, easy to understand, engaging and fun

The more fun it is, the more you will engage with it and the more energy you will save

Energy doesn't need to be boring or invisible anymore, a key goal is to show you when you are using energy and how (much)

Feedback needs to be in a prominent position, so the design of the feedback system will impact on where it is located in the house - we need to design something you want to have hanging on your best wall

And we need to make sure you will want to keep checking it automatically and alter your behaviour, even after its initial fun factor has worn off

If we could only design something as clever and engaging as Apple products - everyone would love saving energy then, right?

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

A Story on collaborative learning approaches in smart metering interventions

This will only work if you actively participate and engage with us on the project

We want to make sure that we build on your learnings, so we're trying to keep you open-minded so you can see the learnings and past mistakes and don't repeat them

It is important that you trust us and the other people you are learning with so you are happy to share the good and maybe not-so-good stories

The 'horror stories' are often the ones we can all learn the most from but no one likes to look like a fool... especially not public servants!

Trust us - we're not trying to patronise you, we are really interested in hearing what you say, think, feel

We can make you change your habits easier in a group setting - by freezing and unfreezing them

Learning from your peers can be both good and bad, competition with your neighbours can be healthy... or really annoying!

We don't need all the fancy technology to create learning opportunities - it is much more important that we involve your whole household, your kids and your neighbours

You'll be a significantly tougher nut for us to crack if you are not already motivated to save energy or the environment. But we'd be smart to make sure we at least learn from your misgivings or issues with our project

We understand that you have too much other important stuff to deal with than to have time to learn about energy efficiency, which is why it's up to us to design it so it's fun for the whole family

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 behaviours²⁶.

²⁶ 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
		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
		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

Swedish Stakeholder Feedback

No specific stakeholder feedback was collected in Sweden.

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 CONVINCING 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 New Zealand '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 intermediaries. **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?

IEA Demand Side Management Energy Technology Initiative

The Demand-Side Management (DSM) Energy Technology Initiative is one of more than 40 Co-operative Energy Technology Initiatives within the framework of the International Energy Agency (IEA). The Demand-Side Management (DSM) Energy Technology Initiative, which was initiated in 1993, deals with a variety of strategies to reduce energy demand. The following member countries and sponsors have been working to identify and promote opportunities for DSM:

Austria	Norway
Belgium	Spain
Finland	Sweden
India	Switzerland
Italy	United Kingdom
Republic of Korea	United States
Netherlands	ECI (sponsor)
New Zealand	RAP (sponsor)

Programme Vision: Demand side activities should be active elements and the first choice in all energy policy decisions designed to create more reliable and more sustainable energy systems

Programme Mission: Deliver to its stakeholders, materials that are readily applicable for them in crafting and implementing policies and measures. The Programme should also deliver technology and applications that either facilitate operations of energy systems or facilitate necessary market transformations

The DSM Energy Technology Initiative's work is organized into two clusters:

The load shape cluster, and

The load level cluster.

The "load shape" cluster will include Tasks that seek to impact the shape of the load curve over very short (minutes-hours-day) to longer (days-week-season) time periods. Work within this cluster primarily increases the reliability of systems. The "load level" will include Tasks that seek to shift the load curve to lower demand levels or shift between loads from one energy system to another. Work within this cluster primarily targets the reduction of emissions.

A total of 24 projects or "Tasks" have been initiated since the beginning of the DSM Programme. The overall program is monitored by an Executive Committee consisting of representatives from each contracting party to the DSM Energy Technology Initiative. The leadership and management of the individual Tasks are the responsibility of Operating Agents. These Tasks and their respective

Operating Agents are:

Task 1 International Database on Demand-Side Management & Evaluation Guidebook on the Impact of DSM and EE for Kyoto's GHG Targets – *Completed*

Harry Vreuls, NOVEM, the Netherlands

Task 2 Communications Technologies for Demand-Side Management – *Completed*

Richard Formby, EA Technology, United Kingdom

Task 3 Cooperative Procurement of Innovative Technologies for Demand-Side Management – *Completed*

Hans Westling, Promandat AB, Sweden

Task 4 Development of Improved Methods for Integrating Demand-Side Management into Resource Planning – *Completed*

Grayson Heffner, EPRI, United States

Task 5 Techniques for Implementation of Demand-Side Management Technology in the Marketplace – *Completed*

Juan Comas, FECOSA, Spain

Task 6 DSM and Energy Efficiency in Changing Electricity Business Environments – *Completed*
David Crossley, Energy Futures, Australia Pty. Ltd., Australia

Task 7 International Collaboration on Market Transformation – *Completed*
Verney Ryan, BRE, United Kingdom

Task 8 Demand-Side Bidding in a Competitive Electricity Market – *Completed*
Linda Hull, EA Technology Ltd, United Kingdom

Task 9 The Role of Municipalities in a Liberalised System – *Completed*
Martin Cahn, Energie Cites, France

Task 10 Performance Contracting – *Completed*
Hans Westling, Promandat AB, Sweden

Task 11 Time of Use Pricing and Energy Use for Demand Management Delivery- *Completed*
Richard Formby, EA Technology Ltd, United Kingdom

Task 12 Energy Standards
To be determined

Task 13 Demand Response Resources - *Completed*
Ross Malme, RETX, United States

Task 14 White Certificates – *Completed*
Antonio Capozza, CESI, Italy

Task 15 Network-Driven DSM - *Completed*
David Crossley, Energy Futures Australia Pty. Ltd, Australia

Task 16 Competitive Energy Services
Jan W. Bleyl, Graz Energy Agency, Austria / Seppo Silvonen/Pertti Koski, Motiva, Finland

Task 17 Integration of Demand Side Management, Distributed Generation, Renewable Energy Sources and Energy Storages
Seppo Kärkkäinen, Elektraflex Oy, Finland

Task 18 Demand Side Management and Climate Change - *Completed*
David Crossley, Energy Futures Australia Pty. Ltd, Australia

Task 19 Micro Demand Response and Energy Saving - *Completed*
Linda Hull, EA Technology Ltd, United Kingdom

Task 20 Branding of Energy Efficiency - *Completed*
Balawant Joshi, ABPS Infrastructure Private Limited, India

Task 21 Standardisation of Energy Savings Calculations - *Completed*
Harry Vreuls, SenterNovem, Netherlands

Task 22 Energy Efficiency Portfolio Standards - *Completed*
Balawant Joshi, ABPS Infrastructure Private Limited, India

Task 23 The Role of Customers in Delivering Effective Smart Grids - *Completed*
Linda Hull. EA Technology Ltd, United Kingdom

Task 24 Closing the loop - Behaviour Change in DSM: From theory to policies and practice
Sea Rotmann, SEA, New Zealand and Ruth Mourik DuneWorks, Netherlands

Task 25 Business Models for a more Effective Market Uptake of DSM Energy Services
Ruth Mourik, DuneWorks, The Netherlands

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