Subtask 4 - Guidelines and recommendations for Italy

Task 24 – Phase I

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

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Contents

Do's and Don'ts for Italian Behaviour Changers

Intervention Phase	DO	DON'T
DESIGN PHASE	– 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	– 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 automatons, 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	– 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	– 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	– 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	– 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	– (re)iterate your intervention often – learn from your mistakes – listen to your collaborators and end users	– ignore your evaluation – hide your mistakes and horror storries, they are often the ones we can learn the most from
DISSEMINATION PHASE	– understand your audience, collaborators and stakeholders, tailor your dissemination accordingly – tell stories, use social media and word of mouth – use trusted intermediaries to tell your story	– 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:** Netherlands, New Zealand, Sweden, Norway, Switzerland, Belgium, Italy, Austria
- **9 countries gave in-kind (expert) support:** the UK, Spain, Portugal, UAE, France, Australia, South Africa (which was meant to join but didn't do so in time), Canada and the US.
- **227 behaviour change** and DSM experts from **21 countries** participate in Subtask 5, the invite-only Task 24 Expert Platform (www.ieadsmtask24.ning.com).
- 15 successful expert workshops/webinars have been held to date[3]
- **145 videos and presentations** of these events on the Expert Platform
- 1000s of experts in 30 conferences and seminars have heard about Task 24
- **Over 40 publications** have been created and disseminated[4]
- **Almost 60 case studies** showing the successful (or not so successful) use of diverse models of understanding behaviour in the areas of transport, SMEs, smart meters and building retrofits have been collected to date from **16 countries** in a Wiki.

Involvement of Italy in Task 24

Italy joined Task 24 in mid 2013. Simone Maggiore from RSE Milan was appointed as national expert. Several Italian academic institutions and relevant organisations such as Opower were the main supporters and top 'Behaviour Changers' audience for Task 24. We held a small workshop in Milan in October 2014.

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

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

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

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

The Italian Country story (our wider energy culture and contexts)

The Italian country story was told at the Milan workshop as by the Italian funders from RSE. It has been supplemented with other sources[5] and goes as follows:

Geography: Italy is a long, thin country with a large coastline. Its climate is predominantly Mediterranean, it is Alpine in the far north and hot and dry in the south.

Socio-economics: Italy has a rather large population of over 61 million people with a median age of 44.5years and a very low population growth rate (0.3%).

Energy supply: Italy has some crude oil and natural gas reserves, some minor biofuel prodution and some hydroelectricity (it is the world's 14th largest hydroelectricity producer, amounting to 18% of national production). It produces 300b kWh electricity per year, mainly through fossil-fuel powered plants and consumes slightly more (307b). For Italy it is a priority to create an internal liquid and competitive market which is fully integrated with other European countries. Italy intends to go beyond the objectives of renewable energy production in Europe ('20-20-20'), contributing significantly to the reduction of emissions and to the objective of energy security. The electricity sector is in a period of profound transformation, determined by a number of changes; just to mention the most obvious: the slowdown in demand, high (overabundant) availability of thermoelectric generation capacity and the increase of renewable energy production, which occurred at a much faster pace than anticipated in earlier planning documents. In this context, the basic choices will be oriented to maintain and develop a free electricity market, efficient and fully integrated with Europe, both in terms of infrastructure and of rules, and with prices gradually converging with those in Europe. It will also be essential to fully integrate renewable energy produ ction in the market and in the electricity grid.

Energy Consumption: In Italy, primary energy consumption has shown a growing trend up to 2005 (with a 6.4% increase from 2000 to 2005). In that year consumption reached its highest level, equal to 197,776 ktep. From 2005, a constant decrease in consumption has been observed, and it does not seem to stop. In 2009, a very significant drop in consumption, equal to -5.7% compared to 2008, was observed, which was mainly due to the economic crisis that hit the industrialised countries, strongly influencing the energy sector. If, in particular, the primary consumption of energy is analysed by source, it can be noted that from 2000 to 2013 consumption of crude oil decreased 35.8%. This reduction, particularly pronounced in the second five-year period (-15.4%), is mainly due to the energy policies implemented in Italy that have privileged natural gas as the primary source of energy for the civil sector and for the generation of electricity. In fact, from 2000 to 2005 the consumption of natural gas increased by 22% registering a peak of 71,169 ktep in 2005.

Energy politics: Italy has released an Energy Strategy in March 2013 that addresses the main issues. Tackling the main problems facing the sector will entail an important structural reform for the country. To achieve this, some important challenges need to be addressed:

- Energy prices for businesses and families that are higher than in other European countries
- Security of supply that is by no means optimal at peak loads, especially as regards natural gas, and a high dependence on imported fossil fuels.
- Economic and financial difficulties experienced by a number of operators in the sector.

Italy is also serious about environmental sustainability, having signed up to the European 2020 objectives and the Roadmap 2050 for a low-carbon Europe.

Institutional: Italy has one of Europe's highest final electricity prices. In particular, unlike all other countries, price per kWh tends to be lower for lower consumption levels. This policy aims at encouraging energy saving. Higher final prices are also a consequence of the extensive use of natural gas, which is more expensive than other fossil fuels, and the expenses from renewable energy incentives, which is expected to reach a total cost of more than €10 billion in 2012. The

[5] http://www.indexmundi.com/italy/#Geography, https://en.wikipedia.org/wiki/Electricity_sector_in_Italy, Energy Policies of IEA Countries: Italy (2009), http://www.eniscuola.net/en/2014/11/10/the-energy-scenario-in-italy-2/, http://www.odyssee-mure.eu/publications/national-reports/energy-efficiency-italy.pdf and Italy's National Energy Strategy: For a more competitive and sustainable energy (March 2013).

electricity sector in Italy, private until then, was nationalized in 1962 with the creation of a state-controlled entity named ENEL, with a monopoly on production, transmission and local distribution of electric energy in the country. The new entity incorporated all the previous private companies operating in Italy since the end of the 19th century. The belief of a more efficient sector with a public monopolistic company progressively reversed since the 1980s. Enel was made into a joint-stock company in 1992, however still fully owned by the Ministry of Economy. The liberation of the electricity sector from government control started in late 1990s following European Union directives.

Policy: The National Energy Strategy (2013) sets very clear signals on the importance of energy efficiency. Energy efficiency contributes to the achievement of all energy policy objectives: reducing energy costs thanks to savings in fuel consumption, reducing environmental impact (energy efficiency is the mosteconomical way for emissions reductions, with a return on investment that is often positive for the country, and that should be preferred to achieve the environmental objectives), the improvement of security of supply and reducing dependence on imported energy; economic development generated by a sector with a strong positive impact on the national value chain, in which Italy has numerous leadership positions which can also be projected in the rapidly expanding market abroad.

Energy efficiency: The strong impulse to energy efficiency will absorb a substantial portion of expected increases in energy demand by 2020, both in terms of primary supply and final consumption. In this context, the sector will have to deal with a scenario in which overall demand will likely remain steady, at levels comparable to those of recent years. The energy efficiency, measured by ODEX index, improved by 15.1% in the period 1990-2010. The households sector contributed the most to this result with an improvement of 34.0%, followed by industry with +13.8%, while transport sector showed a slow progress of 2.6%. The improvements for industry and transport were especially observed in the last years. Households keeps on increasing the energy efficiency, even if more slowly in the last years because of a larger diffusion of electrical appliances such as airconditioner. Transport sector showed the bigger and faster increases in 2000-2010, +2.1%, caused by the efficiency improvement in cars transport due to new cars. The energy efficiency in the industrial sector is speeding up in the last years: +10.7% in 2000-2010 and +6.8% since 2005.

Programmes and Initiatives: Italy is one of the world's most energy-efficient countries with energy intensity 14% lower than the EU average in 2010. The introduction of the energy efficiency plan for end uses (e.g. tax rebates, White Certificates, minimum requirements for buildings and electricity equipment) had a lot to do with this. RSA is one of the organisations that carries many of the Italian research prorammes and initiatives, particularly on time of use tariffs, and EU projects *Energy@Home* and *Smart Consumer, Smart Customer, Smart Citizen* and many past IEA DSM Tasks (see presentations from October 2014 workshop).

Energy Culture: One of the most interesting aspects of Italian energy culture is the progressive residential electricity pricing scheme[6]. It is not regarded officially as an energy efficiency policy, but could be arguably regarded as an energy sufficiency programme. The lowest pricing index limits a household to 3kW, if that is exceeded, the fuse blows and needs to be reset. This affects 94% of Italian households, even though they can choose to switch to a higher limit. It is very easy to exceed this limit, eg by running the AC and a dishwasher and Italian households have become very good at minimising peak load issues, accordingly (see this blog, for example). An interesting discussion occurred with the Italian stakeholders during the Milan workshop, where it became apparent that they weren't aware just how unusual such intimate knowledge of the consumption of various energy appliances, and how to demand-manage them to avoid overload, actually is. For example, in Italy, electric kettles are basically unheard-of, as they just draw too much power at once. Italians mainly use gas to heat water and it is perfectly normal energy culture to do so.

[6] http://proceedings.eceee.org/papers/proceedings2011/2275_Dehmel.pdf?returnurl=http://proceedings.eceee.org/visabstrakt.php?event=1&doc=2-275-11

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 Swiss case studies from the 'Monster' and assess the recommendations from each of the domains, and how the individual cases may be 'redesigned' to lead to potentially more effective behaviour change outcomes with these learnings.

THE IMPLEMENTATION PHASE

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

Subtask II – In-depth case studies

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

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

However, the case study analysis is not:

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

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

Italy unfortunately did not have the relevant capacity of resources by its National Expert to write up the Subtask 2 case study analysis. Below are excerpts of the interview and report template collected.

The Time of Use case study – Smart Meter/feedback

The Italian Time of Use case study has been described in the Subtask 1 'Monster' analysis. The project has the main goal of monitoring and analysing the effects of the mandatory enforcement of a Time of Use electricity rate among the residential customers that have not moved to the free market in Italy. Said tariff has two rate periods: "peak hours" and "off-peak hours" during which the price of electricity is, respectively, higher and lower than the previous flat tariff. The research project was jointly initiated by RSE and the Italian Regulatory Authority for Electricity and Gas (AEEG) and consists of the analysis of the monthly consumptions of 28,000 residential customers (a panel of randomly selected families), starting from July 2009, i.e. one year before the introduction of the ToU tariff. Such data are measured by smart meters during both peak and off-peak hours, so as to allow for an analysis of the change of consumption behaviour before and after the introduction of the ToU tariff.

Even though there has been a limited shift of consumption from peak hours to off-peak hours in the period following the introduction of the mandatory ToU tariff, the change in the behaviour of the users is not negligible because about 60% of the customers have modified their consumption habits according to the dictates of the ToU tariff.

The Energy@Home case study

The Energy@Home case study was meant to be the Subtask 2 in-depth case study. We have received the programme director's report, presentation and undertook an interview with them during the Milan 2014 workshop. From their abstract: The goal of the research is to assess evaluations of the innovative smart monitoring system Energy@home for domestic electricity consumption. Aim of the Energy@home system is to provide householders with a persuasive tool that improves awareness of energy behaviour in their homes and allows them to manage their energy consumption more efficiently. A combination of persuasive communication strategies such as graphical real-time and historical feedbacks and comparison tools to encourage competitiveness against "similar" households are provided to users through domestic user-friendly interfaces and coped with personalized energy saving prompts sent via email-newsletters. The Energy@home system was tested on 52 users selected among volunteers all over Italy, participating to the first trial phase. In each of the "trial" house, the Energy@home kit was installed, consisting of the Enel SmartInfo device that communicates with the electric meter, a Smart Appliance (washing machine) and 5 Smart Plugs. The trial was managed in order to test the system both under the technical and user experience point of view. During the trial qualitative and quantitative data were collected. From the qualitative standpoint, the system was evaluated easy to use and useful for 95% of interviewed people. The average evaluation on a 1-to-10 scale is 7.8. From the quantitative standpoint, the Energy@home system motivates domestic consumers to change their energy behavior and generates a savings of more than 9%. Furthermore it is an effective tool to persuade users to reduce the stand-by consumption on average above 15%.

Highlights from the interview:

- *Collaborating in an energy 'eco-system':* An interesting aspect was the acknowledgement that new business models are necessary. The time for doing things in silos is well and truly over and players need to collaborate in this new 'energy eco system'.
- *Don't design without the end user:* Including the end user much more to help them understand how they can best use energy (not just save it but also use it to eg match PV peaks or ToU tariffs) is a very strong feature of this smarter, new way of doing things.
- *Service vs product oriented cultures, you need both:* The project director pointed out some interesting issues around the difference between eg a Telecom, which has a very service-oriented culture and a whiteware manufacturer which has a very product-oriented culture. By creating eg washing machines with much stronger user interfaces, the product and service cultures start overlapping.
- *Prove that you either reduce the cost or increase the service:* Benefit creation is still a big issue, it is important to either reduce the cost to the consumer or increase other services. Both energy suppliers and end users found it very useful.
- *Gender differences:* An interesting aspect was that males saved more energy, as they generally used technology more than females.
- *PV is a great behaviour and habit changer:* The greatest appreciation and push for behaviour change came with the installation of PV (same findings as in NZ and NL case studies!), because it was such an initial high investment and because there is no point selling power back into the grid, it is obviously much smarter using it yourself, thus kick-starting different user behaviours, including habits and routines which are usually difficult to break.
- *If you use more you can save more:* People with higher energy profiles were more satisfied as they could save more.

- *You need to design your widgets well or they are useless:* Negative feedback was given on the aesthetics and usefulness of the smart plugs. A lot of energy from appliances wasn't measured as the plugs didn't fit behind the furniture.
- *You need to include social scientists in designing and evaluating your intervention:* Interesting learnings were that not including enough social scientists in evaluation meant missing out on interesting insights related to user behaviour and needs.
- *Make end users feel like co-creators not just consumers:* People want to be given attention and made to feel as if they are valued participants, not just consumers.
- *No one cares about kWh, you need to go beyond kWh:* People want to see value creation in € not kWh and be shown how they saved the energy, not just that they saved it. Knowing how much energy they use alone doesn't tell them how to change their behaviours to save it.
- *Multiple benefits are essential:* Energy needs to be sold together with other services, it isn't sufficient on its own, needs to be shown as having multiple benefits.

The Dutch case studies Jouw Energie Moment and Power Matching City also both are part of the Energy@home trials. The New Zealand PowerCo SmartHouse trial also has similar approaches and findings.

THE EVALUATION PHASE

Surely one of the most important, yet often most neglected phases of a successful behaviour change intervention. In best practice, about 10-15% of the total cost of an intervention should be spent on evaluation and it should be undertaken ex ante, ex durante and ex post. In real life, these numbers hardly ever add up and there is no standard way or data collection in the literature of evaluating how a behaviour change has led to a change in eg kWh before and after an intervention[7]. To complicate things even more, different stakeholders (and the end user) have different perceptions of what should be a successful behaviour change outcome and there are many different metrics of how these can be measured[8]. We address all these issues in our Subtask 3 reports and factsheets and will go much further into an actual, standardised tool design in ST 8 and 9 of the extension.

Subtask III - Evaluation 'Tool'

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

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

7 See Karlin et al's 'Beyond kWh' Methodological Review for Subtask 3

8 See the different evaluation metrics in the 'Monster'

- ✓ 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).

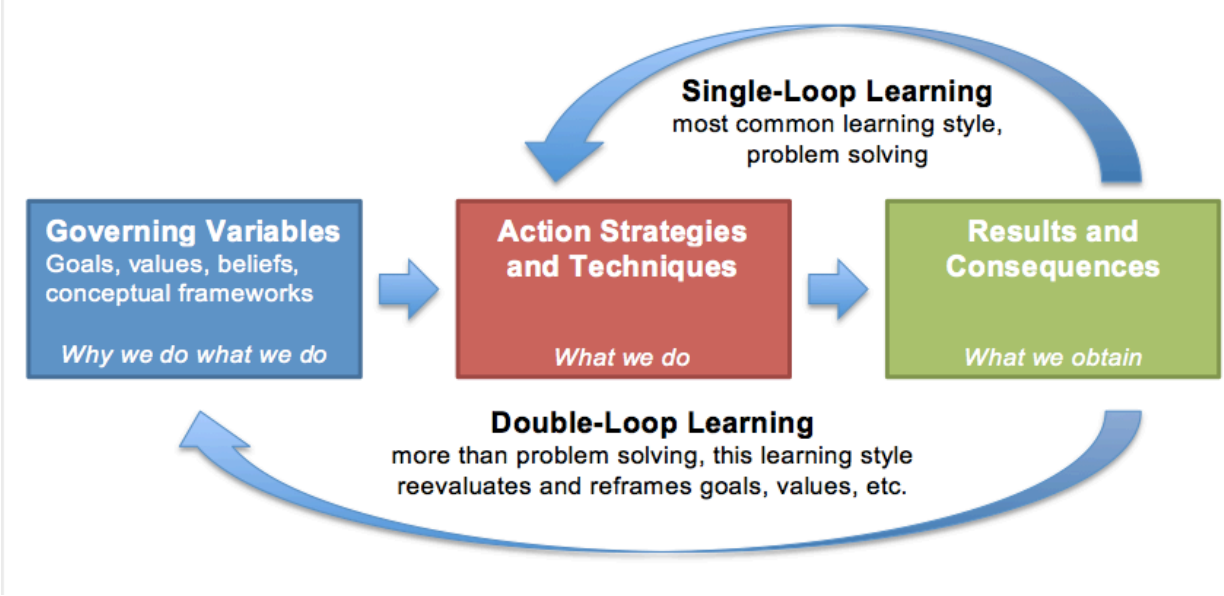


Figure 3: double vs single loop learning. Retrieved from http://www.afs.org/blog/icl/?p=2653

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

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

Learning type	Indicators	Questions for M&E	Metrics (examples)
Single-loop learning	Efficiency indicators: • Cost-effectiveness • Lowering the total energy consumption	• Was the intervention cost effective? • Are the goals reached within the time and within the allocated budget?	• Costs and benefits (eg RoI or NPV) • Pre-set goals • Available time and time needed • Budget and costs

	Effectiveness indicators: • Reaching the intended goals • Lowering the total energy consumption	• Are the goals reached? • Is the total energy consumption lowered (per household? by sector?)	• Energy savings • Energy consumption before and after intervention
Double-loop learning	Process indicators: • 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	• 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?	• 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
	Content indicators: • 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)	• 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?	• 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 overal, global conclusions (eg the do's and dont's)
- ✓ based on input from the country experts and their specific knowledge

However, it is not:

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

Italian 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. With the Energy Strategy under way, the revision of the energy legislation and regulations in Italy is taking place already.

Smart Meter/Feedback ToU Tariff Roll-Out Impact Assessment

Italy's Time of Use Tariff is a typical hero story, promising a silver bullet technology and rational economic approach (smart meters plus time of use tariff to encourage peak load shifting). Projects based on neoclassical or behavioural economics assume that people react 'rationally' when stimulated with the right triggers, such as financial benefits or threats. However, often it is clear that economic gains or losses are not necessarily the only, or the best trigger. For example, it was concluded that old consumption habits are hard to change; and that low monetary incentives are not enough to modify customers' behaviour; but that customers' education towards energy efficiency should not be neglected.

This project shows that 'benchmarking' is extremely important and effective way of determining the actual behavioural change before and after, providing data which would not have been available through mere questionnaires and surveys. In addition, what this type of monitoring provides is insight not only into how many savings or, in this case, peak load shifting was achieved compared to real metered previous behaviour, but also what % of people shifted. The shortcoming of merely metering, however, is that the reasons behind the behavioural change are not questioned, and thus it is not clear if the financial trigger, or the increase in awareness, or a different reason triggered people into shifting their consumption. Here, there has been a limited shift of consumption from peak hours to off-peak hours in the period following the introduction of the mandatory ToU tariff, even though the change in the behaviour of the users was deemed important as about 60% of customers modified their consumption habits. For these type of projects, therefore, the key indicators usually are the metered shift.

ToU Tariff IMPACT ASSESSMENT (IT) Domain: Smart Meters / Feedback Target: Individual Habitual Behaviours (End Users)		
Recommendations	**What the programme assumes to do**	**What the programme could do better**
1. Time isn't always money	This project assumed that people react rationally when stimulated with the right (financial) triggers, however, it was clear in this case the trigger didn't work.	Understand their target audiences' **drivers and motivations** to save energy (or money) better. **Segment** them and **tailor feedback** to different audiences.
2. Technology isn't everything	A smart meter on its own isn't that meaningful, so the most important issue in making it work is the feedback to the customer. The price signal alone as feedback obviously was not sufficient and may have been too complicated to be easily understood.	Provide feedback with more than just the financial or kWh savings (eg **altruistic or health/comfort** outcomes)
3. Make sure there is clear value for the customer	Even though there should have been a clear value to the consumer in shifting their time of use, that message somehow did not come through in this trial. Could it be that it was regarded with some level of distrust as Italian electricity prices are already so high?	Use **trusted intermediaries** (eg electricians) as the 'Go-Between' messengers to ensure people don't immediately distrust trials just because they are initiated by their power company.
4. Automatons don't teach as well as real people	Technology isn't everything: end users will not be more economical with their energy consumption solely due to Smart Metering	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	If even your self-selected households don't respond to the trial, there is little chance that uninterested households would show greater behavioural changes.	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	Which intermediaries have been used when installing and explaining the new technology and feedback mechanisms. Were they trusted by the homeowners?	Use **trusted intermediaries** (eg electricians) as the 'Go-Between' messengers to ensure people don't immediately distrust trials just because they are initiated by their power company.
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, but it needs to be done with more than graphs and feedback in kWh and dollar metrics.	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	**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 feedback given here was related to overall kWh and monetary savings as well as changed patterns of use during different times of day	Talking about wastefulness rather than saving money could be more effective in the feedback.
12. Tell me how I'm 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's studies) to show how well they are doing not only in comparison to their own use, but also that of their neighbours

Possible Pilots and Research Questions for each Domain

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

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

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

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

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

THE DISSEMINATION PHASE

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

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

However, it is not:

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

Subtask V - The Expert Platform

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

changed when going forward with the extension. It is particularly important to enable easier file sharing, although the new IEA DSM website, plus the Task 24 Wiki may be sufficient to do so.

We currently have 3 members from Italy on the expert platform (1 Government official, 1 researcher, 1 industry member). Attendance at the Italian workshop was relatively high (>15 people) but we suffered from the lack of resources the Italian National Expert had to put into this Task.

Italian expert workshop and dissemination

Task 24 held its Italian expert workshop in Milan, on October 4th, 2014. The objectives and key elements of RSA's research were presented and the Italian country story was told, informally by Walter Grattiere. The University or Rome was present as well as Opower which gave a presentation on their ongoing EU work.

Storytelling Methodology

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

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

However, it is not:

- ☒ a reason to bypass 'proper' analysis.

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

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

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

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

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

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

The Task 24 Extension

Italy's involvement going forward

Italy will not join Phase II of Task 24.

Appendix 1

Task 24 Expert Workshops, webinars and stakeholder meetings

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

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

Seminars and conferences Task 24 was presented at

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

Appendix 2

Task 24 Publications, films and reports

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

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

Online sharing and administration of Task 24

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

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

Appendix 3

Italy's DSM interventions (from 2014 Annual Report)

The mechanism of Energy Efficiency Certificates (EEC – also known as "White Certificates") has been running in Italy for ten years. This mechanism involves an official assessment/certification of the energy savings produced by eligible energy efficiency projects. Chance is also to trade these certificates in a dedicated market.
White Certificates offer a number of practical benefits for all parties involved. For regulatory authorities, they can be an easily-verifiable way to track compliance with policy targets. For parties obliged to comply with targets, they offer a means to achieve compliance at least cost, and also offer the flexibility to comply either through 'in-house' action, by contracting with other obliged parties of with other market parties for their supply. For those able to create and sell certificates, they offer an additional revenue stream which is independent of their other business activities, thus offering hedging and risk-management benefits in addition to direct financial rewards.

The main attained results through the use of the White Certificate mechanism are at present:

- about 40 pre-defined procedures to evaluate the eligible savings of end-uses in the household, service, industry, agriculture and transport sectors;
- allowance for projects not considered by these procedures (but they need a preliminary appointment by the scheme administrator);
- a global quantity of 20 Mtoe of saved primary energy by means of the above EE measures;
- about 4,300 accredited Energy Service Companies authorized:
  - to present energy efficiency projects,
  - to apply for their certification,
  - to gain corresponding amount of White Certificates
  - to negotiate them with the operators obliged to own assigned EEC volumes in order to fulfill the energy saving targets

A target of additional 15 Mtoe of primary energy savings by means of EEC is required within 2020. RSE has been involved in the national scheme on White Certificates since the beginning (2004), supporting the Regulatory Authority for Electricity and Gas in charge of its definition and management. RSE has been entrusted of the appointment of the eligible energy saving projects and related EEC since 2012, on behalf of the present scheme administrator (GSE).

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.'[9]

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

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

Influence of economic theories on building retrofit intervention design

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

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

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

A Story on an economic theory-based approach in retrofitting

Money makes the world go round

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

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

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

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

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

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

You will save money for a nice weekend to the Bahamas

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

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

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

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

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

Money still makes the world go round

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

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

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

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

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

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

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

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

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

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

What are the upsides of this economic approach?

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

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

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

They:

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

A Story on a more system-based approach in retrofitting

Together we will make the world go round

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

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

We will create a supportive material, institutional and social environment

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

Your life will change

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

Quality matters and we will keep learning and sharing

If we need to be flexible we will

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

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

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

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

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

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

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

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

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

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

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

A Story on value Action Gap informed transport interventions

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

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

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

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

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

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

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

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

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

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

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

A Story on Theory of Planned Behaviour informed transport interventions

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

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

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

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

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

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

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

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

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

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

A Story on Murray & Sachs descriptive theory informed transport interventions

We know your car makes your world go round

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

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

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

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

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

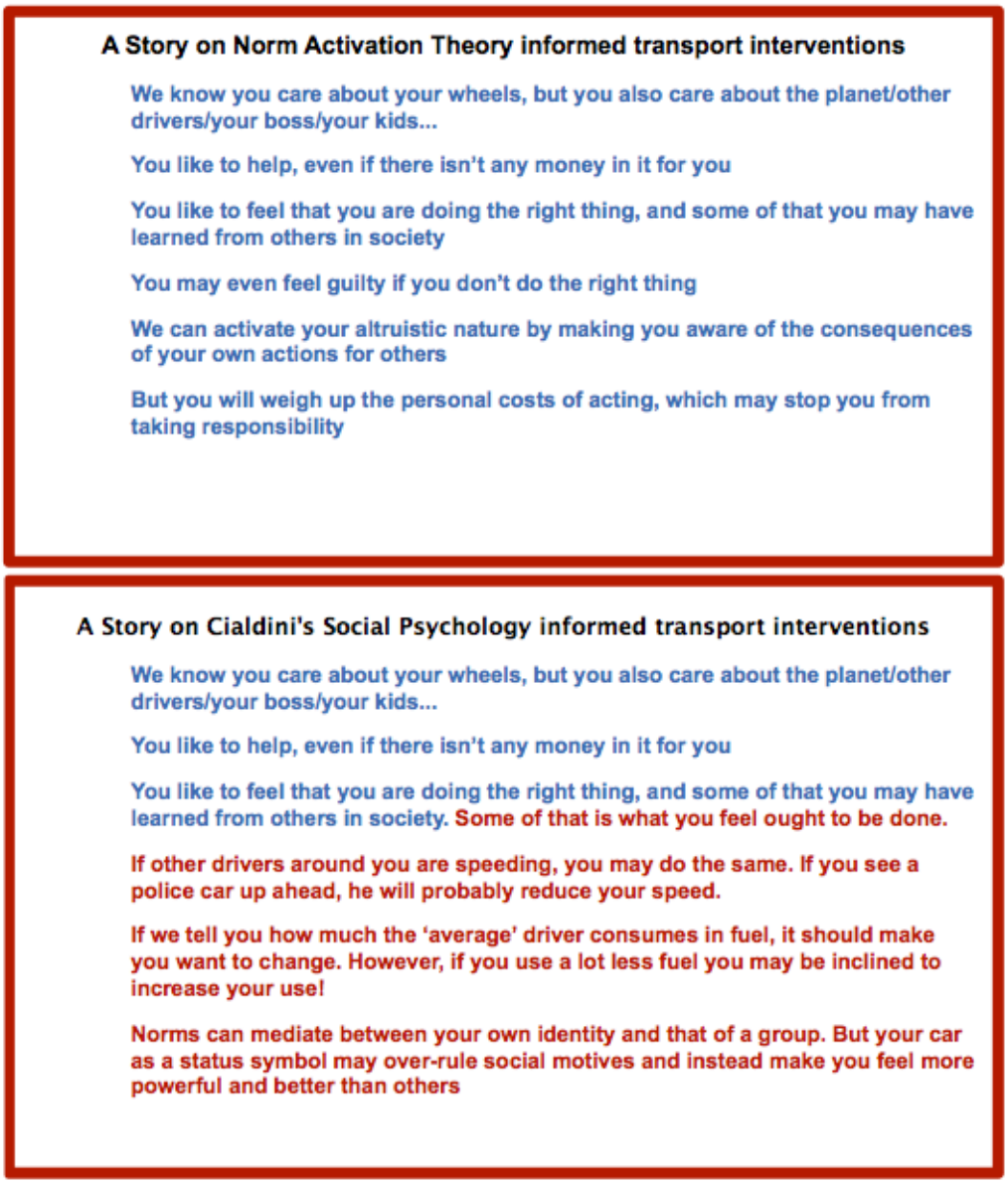
Don't worry, only your driving will change, the car stays the same, you might even pimp it with the savings you yield!

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

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

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

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



Influence of economic theories on smart metering interventions design

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

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

Influence of psychological theories on smart metering interventions design

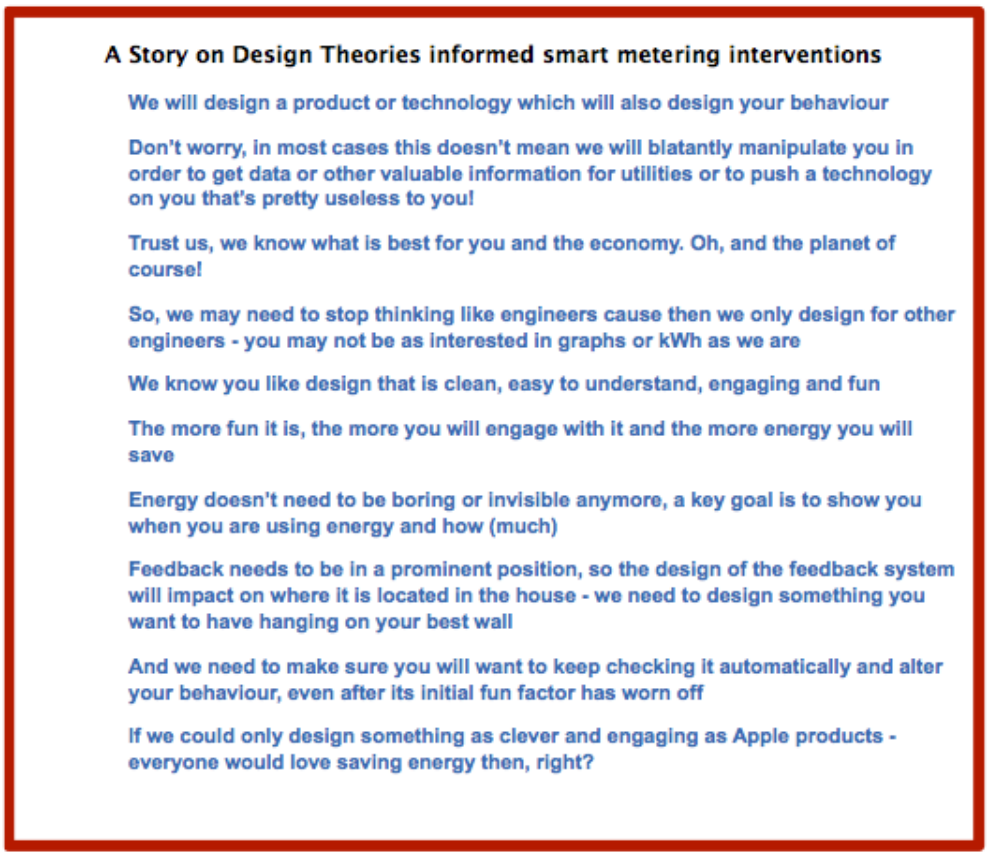
The design characteristics of programmes based on psychological theories such as value action gap theory were already discussed under the theme of transport. Smart metering specific design characteristics of interventions based on psychological theories are as follows:

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

Influence of design theories on smart metering interventions design

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

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



Influence of collaborative learning theories on smart metering interventions design

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

- piloting and building on previous experiences
- participation matters

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

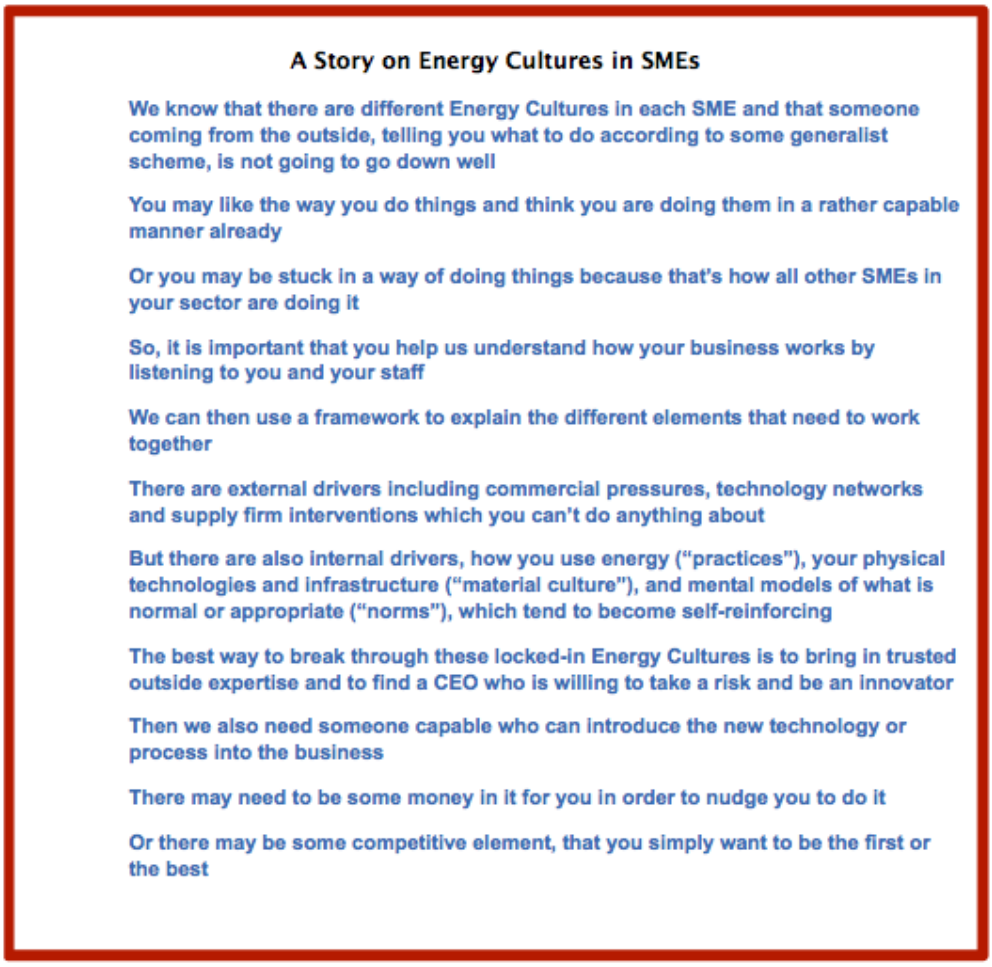
SME-specific design characteristics of interventions based on social norms theories and approaches:

- 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



Influence of using Collaborative learning approaches on SME interventions

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

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

Table 1. Example of interventions (both regulatory and non-regulatory) available to policymakers when trying to change light bulb purchasing behaviours[10].

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

Box 2. Ladder of Interventions[1,6]

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

Appendix 5

Italian Stakeholder Feedback

Feedback from Italian Behaviour Changers was collected via a surveymonkey poll and can be accessed here:
https://www.surveymonkey.com/analyze/browse/M9GaY2SwvVKHDVzqWZe_2Bmk2gUYJNMOFPfyj22Bqqeb4_3D?respondent_id=3682977155

Appendix 6

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

Building Retrofit Recommendations:

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

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

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

Transport Recommendations:

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

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

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

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

Smart meter/feedback recommendations:

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

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

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

SME recommendations:

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

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

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

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

Appendix 7

Future research questions collected in Task 24

Building Retrofits

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

Transport

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

Smart Metering/Feedback

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

SMEs

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

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, FECSA, 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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