Guidelines and recommendations for New Zealand

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

New Zealand's Involvement in Task 24

New Zealand was one of the first countries to join Task 24 in early 2012. Dr Janet Stephenson, from Otago University's Energy Cultures research project, was appointed as (in-kind) national expert. The Executive Committee member, the National Energy Research Institute, the Ministry of Business, Employment and Innovation and the Energy Efficiency and Conservation Authority were the main supporters and top 'Behaviour Changer' audience for Task 24. In 2014, a major lines company, PowerCo, also joined the Task, providing support for undertaking the NZ case study for Subtask 2 and financial co-funding with Government for the Task 24 extension (starting January 2015). In NZ, we thus have a very strong collaboration between industry, government and research 'Behaviour Changers' that support Task 24 financially and with their expertise (see Table 1 for NZ

[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

experts involved in the Task). This is an ideal situation, where all the main stakeholders know each other and the Operating Agent, and the National Expert of the Task. We also held two highly successful workshops, which saw NZ Behaviour Changers from all sectors learn about, and engage in the Task.

*Table 1. New Zealand stakeholders involved in Task 24 (**in bold**: stakeholders that have contributed directly to the Task; *: non-NZ workshop attendees)*

Private companies	Research organisations	Non profit and administrations
Z Energy	**University of Otago**	**Ministry of Business, Innovation and Employment**
Genesis Energy	**National Energy Research Institute**	**Domestic Energy User Network**
PowerCo	**Victoria University**	**EECA**
NZ Post	**University of Canterbury**	**The Treasury**
Urban Trans	**EPEcenter**	**Greater Wellington Regional Council**
Gridspy	**Royal Society of New Zealand**	**Wellington City Council**
Transpower	Massey University	**Green Party Aotearoa**
EnerNOC	Lincoln University	**Sustainability Trust**
SEA – Sustainable Energy Advice	Waikato University	**Smart Grid Forum**
Mercury Energy	Landcare Research	**International Energy Agency DSM Programme***
Economic and Human Dimensions (US)*	Beacon Pathways Ltd	**Sanedi (South Africa)***
Sharp Corporation	BRANZ	**Grazer Energie Agentur***
Downer Transport	Norman Smith consultancy	**Swedish Energy Agency***
Home and Dry – Fletcher Building	Phil Hancock consultancy	Housing NZ Corporation
Insulpro	Phil Tate consultancy	Major Electricity Users Group
Negawatt Resources	EQO	Kapiti Coast District Council
East Harbour Energy	MOTU	Auckland Council
Separe Ltd	Kingston University (UK)*	Ministry of Transport
Copper Alliance (China)*	University of the West of England*	Hikurangi Foundation
	University of Copenhagen*	VTT (Finland)*
	Augsburg University*	
	University of Pretoria*	
	Task 16 Operating Agent*	

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New Zealand Country story (wider energy culture and contexts)

The NZ country story was told on two occasions as Pecha Kucha by our national expert, Dr Janet Stephenson - in our kick-off workshop in Brussels, September 8, 2012 and, together with Dr Sea Rotmann at the first NZ workshop (15 February, 2013). Another overview of the NZ DSM scenario can be found in Appendix 3. The NZ Country Story goes as follows:

Geography: New Zealand is a small country very far away from the rest of the world, surrounded by a big ocean. As islands, we do not share our electricity or gas network with any other country, and are dependent on transport fuel imports from far away lands.

Socio-economics: NZ has a small population (4.5m) which is spread over two long, thin islands with the main population center being in the North, and the main electricity supply (from hydro) being in the South. A rather tenuous cable in one of the most treacherous stretches of water, the Cook Strait, links the two islands and transfers supply to areas of high demand.

Energy supply: We have a lot of energy potential in this country, both fossil and renewable. We plan to make our electricity system 90% renewable by 2025 (already at almost 80%), which will mean we are at the top of the global leaderboard (after Norway and Iceland). Being situated in the 'Roaring 40s' means we have better wind and tidal energy potential than pretty much any other country in the world. Being a geologically young and highly active country that is located on the intercept of two tectonic plates and the 'Pacific Ring of Fire' means we also have huge geothermal

potential available to us (which you can smell and see as soon as you drive into one of our larger cities, Rotorua). Being blessed with a temperate climate, high rainfall and sunshine means we also have a lot of hydro and solar in our arsenal. However, our current government wants to develop our fossil (oil, gas and coal) resources, including offshore and in very treacherous and pristine deep sea environments, like the Sub-Antarctic.

Energy politics: This leads to many energy conflicts, around fracking, deep-sea drilling and mineral extraction, lignite and other mining in our national parks and other conservation land and the partial asset sale of our state-owned energy companies. We also have some of the highest electricity prices, with constant price rises belying our easy access to renewable generation. This puts many people into fuel poverty, and has even led to some horror stories where electricity companies turning off peoples' power due to being behind on their payments, led to some very unfortunate deaths. And of course we are very vulnerable to geopolitical conflicts as our energy security in terms of transport fuels depends on getting the black stuff from faraway lands to the bottom of the earth.

Institutional: We have a split in our demand-side and supply-side energy governance in the Energy Efficiency and Conservation Authority and the Ministry of Business, Employment and Innovation. The Energy Minister also has an in-built conflict of interest in that s/he is the main shareholder of the Crown-Owned energy companies, in charge of mineral and resource exploration, the economic development portfolio (with a strong component arising from energy supply) and energy efficiency and conservation (in the moment, he is also the Associate Minister of Climate Change, adding another conflict to the portfolio). This leads to some built-in 'schizophrenia' which our Ministers, most of whom have no expertise in the energy area and often change portfolios, are not always able to balance that well...

Policy: There is also a level of 'policy schizophrenia' that follows these in-built institutional and governance conflicts, in that we have rather weak demand side policies (as shown in the last NZ Energy Efficiency and Conservation Strategy) and a very generic overall energy strategy (NZ Energy Strategy). Much more government funding is given to resource exploration than demand side research and programmes.

Programmes and initiatives: Our main demand side programmes are centered around information (particularly the 'Energy Spot' TV campaign); Products in terms of Minimum Energy Performance Standards and Labels (in collaboration with Australia's Energy Star programme); Business information, grants and audits as well as a (voluntary) commercial building ratings scheme called NABERSNZ; Transport particularly around heavy vehicle efficiency, biofuels and vehicle labels and the very successful Residential Warm Up New Zealand insulation and clean heat subsidy programme. The overall approach to NZs demand side policy is firmly rooted in the neoclassical economic model which is based on the idea that if deficits in information and incentives are removed, behaviour change will follow as we are regarded as rational, utility-maximising individuals under this model. There are examples of some significant modifications to this model in NZ demand side programmes, most notably the Warm Up New Zealand case study which is described in detail in the Subtask I 'Monster' and the most recent IEA publication on Capturing Multiple Benefits of Energy Efficiency. A good overview of the NZ energy efficiency and conservation situation (current and historical) is given here: http://www.climatechangelaw.co.nz/energy-efficiency-and-conservation/ - it also includes many useful reference links.

Consumption: NZs consumption profile has flattened since the GFC (2007), especially in the residential and industrial area although our rate of energy efficiency improvement lies well below the OECD average.

Residential Consumption: NZ has one of the lowest residential electricity consumption profiles in the OECD, however, we have the 4th highest vehicle ownership per capita and the highest transport use as % of household energy.

Infrastructure: NZ has very poor housing stock, more than 3/4 of houses are under- or not insulated, there is little double glazing and serious issues around lack of weatherisation, dampness and leaky building syndrome. Some student flats in Dunedin in the South were measured to be

colder than the inside of their fridges in winter (hence this WUNZ cartoon as drawn by our Spanish expert Juan Pablo Garçia). Studies on our WUNZ programme have shown that better insulation even leads to reductions of domestic violence and mental disorders! Who knew having a warm, dry home could really make your life so much better (it's not just about the wallet or greenhouse gases here in New Zealand). Our public transport infrastructure is rather poor, especially outside of the main population centers, so dependence on a private vehicle and vehicles for freight is high. The car is still king in this long, skinny country and flying between the major cities is common (there are often no good train services and driving a car and using a ferry between eg Auckland and Christchurch, for example, would take 2 days and cost 10x more than a flight).

Appliance Use: Most of NZs hot water use is electrical, not gas and even though there was a significant issue around clean heating particularly with the still-common use of open fire places (which had to be banned in some cities, like Christchurch, NZs second largest city due to their horrible emissions), a recent strong move towards more energy efficient and less polluting heatpumps has been beneficial (although it comes with its own issues, eg in Auckland, NZs largest city, with a subtropical climate where they are now increasingly used as air conditioners in summer, thus leading to a summer peak load issue). There is hardly any district heating, although some places, like Rotorua or Taupo would have direct access to geothermal heat. A significant appliance issue in NZ is the so-called 'beer fridge' culture, where highly inefficient or damaged fridges are often kept on standby in the garage. This is much more common than you think, leading to newspaper headlines such as 'Beer fridges are bad for the Nation'[5].

Energy Culture: Kiwis have quite a hardened approach to the temperate and often quite wild weather in New Zealand, especially in combination with our poor housing infrastructure. Generally, it is regarded as normal to 'put on another jumper' instead of turning on the heat and average temperatures inside houses were measured to be under 16C, which is below WHO recommendations. It is common to see Kiwis (particularly males) to walk around in shorts and 'jandals' in the middle of winter, which suggests they didn't get the memo that, although NZ is in the South Pacific, it is not a tropical island... The interesting flip-side of this is that we are highly dependent on merino and woolen underwear, so much so that it has been made into something of a 'sex symbol' (Figure 1):

Figure 1. Example of Icebreaker's *merino underwear campaign*

Distinct Residential Energy Culture: The Energy Cultures research project (which also used the Task 24 'story spine' method for storytelling very successfully here) found 4 distinct energy culture clusters in New Zealand (Table 2):

Table 2. Distinct Energy Culture clusters in New Zealand

[5] http://www.stuff.co.nz/national/481070/Beer-fridges-bad-for-the-nation

	Energy Economic	Energy Extravagant	Energy Efficient	Energy Easy
% of population	24%	19%	20%	31%
Demographics	Younger, poorer and smaller households. Students and Unemployed.	Families – dependent children aged under 50. Highest income.	Older – often empty nesters, part time work. Owner-occupied. Mostly in small centers/rural.	Middle-aged or older Europeans. Few children. Second-highest income, but many retired. Auckland and Wellington.

The Energy Cultures 'model of understanding behaviour' has been described in the 'Monster' and its main tenet has implications for policy design[6]. The implications for policymakers designing behaviour change interventions based on this, more detailed model of NZ energy user understanding, are described here. One of the most important findings on energy behaviour, which probably translates to other countries' energy cultures is described as follows: "Energy behaviour change can usefully be seen as a 3-stage process – desire, choose, and implement – each of which has different influences. The 'desire' stage is largely about a shift in norms which can be driven by a variety of external influences but particularly family and friends; the choosing phase is supported by independent, objective and trustworthy advice from trusted people; and the implementation stage is supported by financial assistance, advice and trustworthy tradespeople. Significantly, family and friends played an important role in relation to all three stages. Independent advice was also crucial in both the choosing and implementing stages".

Evaluation of Energy Behaviour: Until the new Energy Strategy was published in 2011, most successful outcomes of DSM programmes and policies were measured in total GWh (or PJ, not the nightwear!) savings and decreased energy and health investment (in NZD). The new regime seems to measure energy intensity (with BAU being regarded as strategic benchmark); number of houses insulated and to keep minimum energy labels in line with major trading partners. One excellent example of wider evaluation of our largest DSM programme is the Warm Up New Zealand evaluation, which showed $5 health benefit for every $1 invested in the subsidy.
The phases of Task 24 and behaviour change interventions

[6] Policy design should consider the triple role of norms, material culture (house structure and energy technologies) and energy practices in contributing to overall energy behaviour. The Energy Cultures framework draws attention to the three elements in energy behaviour. Each will respond differently to policy interventions. Policy design should consider which of the three elements to target for any given energy issue, while being aware that a change in any one element (e.g. material culture), is likely to lead to a change in others (e.g. practices and norms).

The phases of Task 24 and behaviour change interventions

THE DESIGN PHASE

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

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

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

It does not, however:

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

Subtask I - 'The Monster'

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

- That conventional approaches (providing information and financial incentives) towards energy behavioural change often fail to achieve a strong, lasting impact but are still widely used.
- That there are many promising experiments with end-user and context-tailored approaches that move beyond changing the individual into more societal, lifestyle and practice changes.
- That current experiences are very scattered and there is no overarching method to evaluate success (nor are there commonly agreed-upon metrics) and that this makes it difficult to replicate success elsewhere, which is why we need to investigate a more coordinated approach.
- That we need more empirical and in-depth case studies (including field research) in order to investigate how such a coordinated, whole-system approach could work in practice, in different (national) contexts.
- That there are still gaps in social science knowledge, for example, the use of narratives is being promoted, especially by marketers, but has not been researched in depth in the energy field.
- That there is still limited interaction between different relevant stakeholders and disciplinary and sector silos, due to their different mandates and system-imposed restrictions, which keep them from collaborating effectively.

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

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

THE IMPLEMENTATION PHASE

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

Subtask II – In-depth case studies

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

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

However, the case study analysis is not:

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

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

PowerCo Smart House

Background

The *PowerCo Smart House* Trial is described in-depth in the Subtask 2 case study analysis. PowerCo is New Zealand's second largest gas and electricity distribution company, with 30,000km of electricity network length and over 420,000 customers. The Smart House programme aims to accelerate PowerCo's understanding of and positioning for significant changes that may affect the business and consumers over the coming 5-10 years. It currently involves 3 houses in 3 geographical centers on the North Island of New Zealand - Tauranga, New Plymouth and Wellington. The pilot will run for at least 2 years. It is meant to model, for example, how consumers could respond to "critical peak pricing" prior to PowerCo changing pricing structures and to changes in heating technology, small-scale generation via solar PV, feedback and remote controlling of appliances. The work will determine if a valuable response can be achieved and be a basis to demonstrate to consumers how they can respond to and benefit from any potential price and technology change. Potentially, the lessons will contribute to developing new service offerings or products for consumers (whether by PowerCo or 3rd parties).

The experimental case study methodology is broadly informed by R K Yin (2009)[7] and PowerCo covers a multi-disciplinary approach here. Underpinning theories combine neo-classical economics (ie what can be financially incentivised), Energy Cultures (ie what non-economic factors are in play) and Technological Innovation Systems[8] (ie what is emerging that may break through and change the options). Transition theory[9] informs the view that understanding these may allow an incumbent player adapt with new offerings for consumers that maintain and build its relevance. 'Moments of Change'[10] is the theory of change that we believe may lead to long-term changes in energy habits and behaviours in the households.

A detailed assessment of wider contexts has been undertaken and the PowerCo intervention focuses on household behaviours; social norms; social practices; informing the instutional environment and also the physical infrastructure and technology.

Key lessons

The key lessons and recommendations can be summarised as follows:

Household politics are hugely important: involve all the household members in your intervention design and evaluation and don't ever disregard how little influence your 'champion' who might love the new energy saving or feedback widget may have when it comes eg to his/her daughters' showering habits.

Different attitudes may get the same outcome: despite differences in behaviours and practices within a household, different attitudes (eg one member being motivated by environmental issues, another by financial ones) can still lead to the same result. The closeness of household members (eg married partners vs flatmates) is also an indicator how much agreement can ultimately be found.

Waste can be a gateway to other energy efficiency measures: a discussion around waste and recycling often is a 'gateway' discussion into getting into more elaborate habit changes or investments.

Infrastructure locks you in: if an important infrastructure (eg easy access to public transport) is not available, there is not much point in trying to push someone into changing their driving habits. However, if the circumstances change, it is important to help embed new habits that are now possible or easier to achieve.

Stories are hugely powerful: get householders to tell their own stories and share them to illustrate issues that can easily get bogged down in too much technical jargon.

Moments of change can be the most powerful habit breakers: even a trial such as this provides a moment of change and it has been shown to be hugely successful in breaking in-grained habits and practices.

Tradition is everything, the way you grow up will effect you for life: another reason why it is important to collect householders' stories. Very often ingrained habits that seem to be 'irrational' make sense once it becomes clear where they stem from. Laddering interviews[11] are very good at getting to this information.

Seeing (energy) is believing: visualising energy, eg by showing feedback in the shower (polar bears drowing on ice floes is effective!) or PV output during a sunny day are very effective feedback mechanisms.

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[7] Yin, R.K. (2009). Case study research. Design and methods. 4th ed. Thousand Oaks, California

[8] http://en.wikipedia.org/wiki/Technological_innovation_system

[9] http://web.pdx.edu/~salp/salp_saga/mediawiki/index.php?title=Schlossberg%27s_Transition_Theory&redirect=no

[10] http://www.behaviourworksaustralia.org/wp-content/uploads/2012/09/HabitsRoutinesSustainableLifestylesEVO502FinalSummaryReportNov20112.pdf

[11] For an example see: https://www.dropbox.com/s/5unijwsesefb8j2/PDF_4_EECA%20Report%20Thorndon%20and%20Wadestown%20%28Stephenson%20et%20al%202010%29.pdf

Is doing the laundry the most variable energy-using behaviour in any given household? There seem to be many particularities and variabilities around laundry practices. This is something that could be investigated in more detail.

Convenience isn't everything, although it is a lot: convenience is one of the most important drivers (or barriers) for energy behaviours and habits and this is particularly the case when it comes to driving behaviours.

There isn't always an attitude-behaviour or value-action gap: particularly if people show a strong shift in attitudes or values during the trial, it is important to support their behaviour changes accordingly.

We all make trade-offs and rationalise our biggest energy 'sins': Even where there are very strong values, attitudes, knowledge and solid energy-saving behaviours elsewhere, we all have some boundaries for certain practices or technologies that we are not willing to cross. That is perfectly normal and good to bring to peoples' attention either way. Knowing and being able to explain and rationalise the things they do very well, and how, and the things they don't do so well and why not, is a big step towards greater energy literacy and engagement and will open the door for bigger trade-offs (both technology investment and behaviourally) in the future.

Peer to peer discussions are powerful, but not all powerful: very often we put more stock into what our family and friends tell us than an outside advisor. Having trusted intermediaries is thus very important and they can come from areas other than what is expected (eg hair dressers, church leaders...).

Big brother is watching you - and giving you energy: households will have very different attitudes towards their energy suppliers and how much control they want to give them over their technologies especially when they could impede comfort (eg temperature levels, see below).

Women are from Venus and Men are from Mars after all, at least when it comes to feeling the cold: biologically, women are predestined to feel the cold more than men and this is an important household dynamic that needs to be taken into account when trying to change heating technology or controls.

You can leave your home but you can't leave your culture: very often, we are influenced by the wider social norm and culture around us. This will be embedded in our upbringing but can change if we eg emigrate to another country. Understanding the social and cultural norms as an important context is thus an imperative when designing interventions or copying programmes that have worked elsewhere.

If it's not about me, I don't care: Unless polar bears are drowning! Often people say they have few environmental values until reminded of their impacts on animals, which they often love and cherish as pets. Making the abstractness of climate change more about direct examples of how it can affect charismatic species or even their own pets, is an important tool to 'bring the message home'

Health can be a bigger driver than environment or money: the WUNZ programme very clearly shows that. Making it about more comfort and a healthier environment for their family will be an important motivator for many households.

Knowledge IS power, but sometimes it's not enough: it is very important to tailor and design feedback according to the level desired by the household (and it may change between members of the household). Having different ways of delivering the feedback available makes this easier (eg real-time panels vs apps vs paper-based monthly feedback vs emails).

'Buttonpushers' vs 'pyros': people often fall into one or the other category when it comes to their heater preferences (eg convenience of pushing a button a heatpump vs the joy of seeing a flame) and it is important to find out which one they prefer.

Who you are determines how much power you use: the Energy Cultures segments clearly show distinct energy cultures which will inform their energy behaviours.

Trust is really important, if you break it it is difficult to re-gain: this is the overarching message that came up in all recommendations in all domains. A trusted messenger or intermediary is the single most important aspect of most behaviour change interventions.

The PowerCo Smart House pilot is constantly being evaluated and (re)assessed and will most likely change due to some of the recommendations provided by Task 24 and other (eg technical) evaluations. The biggest issue (and likely change) that will (have to) take place is concerning trust and ensuring the home owners' diverse needs and concerns are acknowledged satisfactorily. Having a trusted, constant intermediary between the company and the home owners is a big step towards this goal. Frequent (but not too frequent) feedback of how the technology performs, if and how the householders' behaviour changes are utilising the technology to its fullest extent and where they can still make some energy (or cost) efficiency gains is also hugely important. Understanding the complex household 'politics' and eg gender differences around technology or temperature are an important step towards a more successful - and tailored! - intervention when ultimately rolling this pilot out to a larger scale.

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[12]. 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[13]. We address all these issues in our Subtask 3 reports and factsheets and will go much further into an actual, standardised tool design in ST 8 and 9 of the extension.

Subtask III - Evaluation 'Tool'

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

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

However, it is not:

- ☒ fully possible in the scope of Phase I of Task 24

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

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

- ☒ 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).

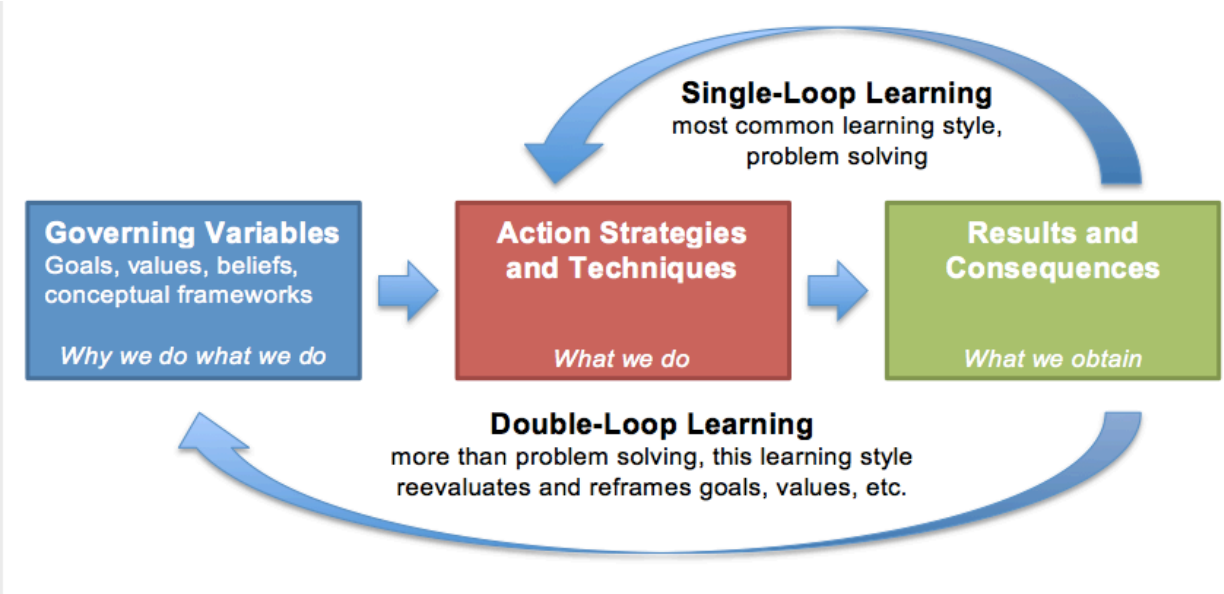


Figure 2: double vs single loop learning. Retrieved from http://www.afs.org/blog/icl/?p=2653

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

Table 3. Different learning types, indicators, questions and metrics for monitoring & evaluating behaviour change programmes

Learning type	Indicators	Questions for M&E	Metrics (examples)
Single-loop learning	Efficiency indicators: • 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.

New Zealand case studies – guidelines and recommendations

On finalising the Task, we are providing country-specific recommendations and to do's/not to do's from in-depth stakeholder analyses collected during workshops, from our National Experts and during case study analyses. This report forms part of the New Zealand summary and recommendations. The NZ stakeholder feedback from 2 workshops can be found in Appendix 5. Here we provide examples of how the case studies we looked at in Subtask 1 could be improved or changed following our learnings and recommendations:

Building retrofits

Programme: *Warm Up New Zealand: Heat Smart*[14]
Warm Up New Zealand: Heat Smart (WUNZ) is a Government programme providing house owners and tenants with grants for insulation and clean heat. A number of barriers existed to uptake of the improved insulation including cultural issues, alternative priorities, financial hurdles, implementation difficulties, insufficient knowledge, insufficient or contradictory regulations, and compliance problems. In response, the Government of New Zealand made the programme its flagship social effort and focused on improving uptake by the public, ensuring effective delivery, increasing third-party funding, changing behaviour on energy use, improving health benefits, and stimulating demand for further home improvements. These changes were achieved by expanding the programme to include stakeholders such as landlords and making the grants available for any house constructed before 2000, regardless of the residents' income.

The government has been able to ensure both a range of options for efficiency upgrades and quality by contracting with service providers and by setting quality standards and scrutinising performance via audits. Increased awareness and uptake has been achieved through widespread marketing on TV, internet and radio; encouraging service providers to inform their customers of efficiency options; and making the programme available to a large portion of the population. The government standards address requirements for insulation products and installation techniques through strengthened building codes. Indeed, the improved standards have led to the formation of an industry body which develops and maintains the installer training scheme. Finally, continual research and monitoring and evaluating the programme's key performance indicators will ensure continued success, i.e. that the scheme has created a market and skilled tradespeople so that it will soon continue to roll out in the absence of government intervention.

What can be seen in the description of the programme is that although it is mainly based on **neoclassical economic theory** (based on the belief of a rational, utility-maximising individual who needs incentives and information to change their behaviour), it also includes **social marketing** (marketing to achieve behavioural goals for a social good), **social norming** (group-held beliefs about how members should behave in a given context) and aspects of the **Theory of**

[14] http://www.eeca.govt.nz/eeca-programmes-and-funding/programmes/homes/insulation

Planned Behaviour (states that attitude toward behaviour, subjective norms, and perceived behavioural control, together shape an individual's behavioral intentions and behaviours).

The Australian Government undertook a similar project, but instead of the love story from New Zealand, it ended up being a horror story of quite epic proportions[15].

The WUNZ programme is unusual in that it is already quite best practice and follows many of the recommendations given in the 'Monster' (particularly, 4., 5., 6., 7. and 8., see below). Where it could still improve recommendations are given below of how the programme could be (re) designed or iterated:

Please note, that in the Tables that follow, a blue table indicates investment behaviours, and a green table, habitual behaviours as targets.

WARM UP NEW ZEALAND: HEAT SMART INSULATION PROGRAMME Domain: Building Retrofits Target: Individual Investment Behaviours		
Recommendations	**What the programme did**	**What the programme could do better**
1. Focus on the social side	The core model of this programme is still neoclassical economics which focuses on the individual, although in this context it includes the house(hold)	Utilising the **wider social context** of individuals, including other household members (for example, teaching children in school about the importance of clean, dry housing and how that can be achieved) and the wider peer group. For example, EECA could prompt people who got installations to talk about it to their family and friends, eg create a **facebook site** where feedback and photos can be shared and liked; create **a sticker** for each home or letterbox that says something like 'I am a warm and dry home'; give vouchers for referring a friend; use **trusted members of their community**, like church leaders or hair dressers to promote the message etc.
2. It's not just what we buy, it's what we do	To be truly effective, DSM programmes have to go beyond the (granted, very high potential) one-off investment behaviours like insulation and clean heat and change smaller, frequent purchasing behaviours, use and maintenance of technology and habits and routines as well. WUNZ is largely focused on the one-off investment behaviour but largely misses out on wider conversations around eg the weathertightness of a home, the age of appliances, how they are used or maintained at peak capacity etc	Although **energy audits** can be useful in addressing some of these issues, as are **moments of change** (eg when buying or selling a house or when a new baby or elderly family member arrives), the current programme misses out on utilising some very powerful intermediaries right there and then: the **insulation installers** and **public health nurses** who provide information on the subsidy scheme to the most needy tenants. Training these trusted intermediaries to be able to inform the householders on wider energy issues aside from insulation and clean heating would be a very important step into further behaviour changes that would help the most vulnerable (by improving their housing and health and reducing their energy (and health) bills).
3. Change lifestyles not just light bulbs	This leads into the bigger issue of changing lifestyles, attitudes and values around energy efficiency, not just installing a technology that is largely invisible and needs no further change from the householder. EECA has many other programmes that address energy efficiency but they are not as well funded as WUNZ, nor are they well integrated into this flagship scheme (which will also lose its funding in the near future).	Seeing there is limited funding in the Government agency for new large-scale programmes or national social marketing initiatives (other than the Energy Spot), the use of **trusted intermediaries** (especially the ones already gained as partners in the WUNZ programme) to further promote learning and support is essential.

[15] http://en.wikipedia.org/wiki/Energy_Efficient_Homes_Package

Recommendations	What the programme did	What the programme could do better
4. Think of the benefits of the end user as well	WUNZ is doing this well in terms of the health benefits and the wider social benefits being highlighted by the scheme.	
5. Focus your messaging, use trusted intermediaries	WUNZ already does this well in the regard of having a solid insulation training and audit regime, standards and a good market of installers. Where it can go further on this issue is beyond one-off investment behaviours (see 1. and 3.)	
6. Be a one-stop-shop	WUNZ is good at this seeing it takes a lot of the pain out of having to provide too much information, and often the money for insulation, up front (as opposed to some of the international insulation subsidies schemes described in the Monster). This can always be improved but the high uptake of the scheme shows that it is doing so successfully.	One area where improvement is needed is **landlords** and the split incentive/principal agent issue, which is an area of likely focus in the Task 24 extension (and could be tested in the Subtask 11 participation by EECA).
7. Use a toolbox of interventions and go beyond kWh targets	WUNZ is an international best practice example on this.	
8. Don't box people in too much	What's more important to people than energy? Many things, but especially their health and that of their families, and WUNZ is promoting this message very well also with a good collaboration with the health sector.	
9. Benchmark your heart out, measure not model	This is one area where WUNZ could have done a little better to begin with, as most of the metrics were based on modeled estimates and savings.	However, the shift of the focus to **health** and strong research and evaluation on this aspect have modified this critique somewhat. However, in general, a **minimum of 10%** of the total cost of a programme should be spent on monitoring and evaluation. The **installer audits** are a good example of monitoring but a **double-loop learning** evaluation among the wider group of Behaviour Changers and the end users' perceptions would be recommended (see ST3 report 'Do you behave as we designed you to?' and the Building Retrofits ST3 factsheet).
10. Learn from the unwilling	The programme was best practice in evaluating issues and outcomes that are more relevant to end-users, e.g. the opinion of residents and the reasons for (not) participating, the way in which residents are approached and by whom, and how they feel how they have been approached, the satisfaction of residents participating in the project and reporting on increased level of comfort and warmth. A focus on this type of evaluation allows to create more effective future programmes because important aspects other than economic and informational barriers are potentially identified, e.g. trust, comfort, warmth, wellbeing etc. The programme is designed to learn from different types of implementations and find success factors to be applied broadly in later stages. It works with voluntary participation and allows 14 participating cities to adjust the implementation to home owners' needs. Social learning between the programme developers and implementers is explicitly aimed for, incl knowledge exchange between various projects to gain insight into success factors.	The project did explicitly aim to learn from the unwilling and unsatisfied participants.

Transport

Programme: *New Zealand Post Driver Training*

There were two transport case studies collected for New Zealand, one on fuel efficient driving (discussed here) and one on mode switching (Wellington Regional Council's Active A2B programme, which will be discussed in more detail in the transport part of the Task 24 extension.

The New Zealand Post Fuel Efficient Driver Training Programme[16] is implicitly based on the **Value Action Gap theory**, which argues against psychological theories of reasoned actions that say behaviours are based on peoples' attitudes and can thus be predicted from their attitudes. However, pro-environmental attitudes do not necessarily translate into pro-environmental behaviours. The Value-action-gap theory builds on the argument that attitudes are not always a clear prediction of behaviour, and that what shapes behaviour is a complex process. Barriers that need to be tackled are social, individual and institutional constraints. The programme used selected contracted courier drivers as trainers to train other courier drivers in more fuel efficient driving behaviours. The prime motivation given to drivers was because it made economic sense, rather than for environmental reasons.

The programme (see presentation by Tom Croskery at our Wellington workshop here) has been done in-house, using in-house resources and was made possible by using trusted trainers from the drivers' own peer group (owner drivers from the NZ Post heavy truck fleet). The NZ Post Sustainability Group designed a set of training materials and made it as compulsory as they could within the constraints of the contractor-employer relationship. They own the materials, can change them as they need it, and it has been written in their language. The results, however, are monitored centrally. There is some class room activity, but the main efforts happen in the car. It starts with training drives to show current fuel consumption. What is particularly appreciated by the drivers is the one-on-one nature of the training. It was also hugely important to remind the drivers that the fuel cost is actually their own, not NZ Post's. The Senior Manager in the Transport Group of NZ Post personally wrote to all drivers to improve uptake of the training, which really worked. In order to get over the 'Don't tell me how to suck eggs' issue of telling life-long drivers how to drive better by using trusted peers with 'street credit', who are hugely respected by the other drivers, as trainers. Competitions would have been a good idea, as drivers want to be compared with others to see how well they are doing. An issue to overcome here is how to not be too 'mean' although NZ Post is considering to 'name and shame' the laggards.

The results were significant: 50 drivers (with another 120 to be trained) showed differences of between 3% to 40% (!) in their driving before and after the training (an average of 20% reduction on the day of the training). The sustained, ongoing reduction was 5% which led to a positive return of investment (in terms of the cost for training) and is the most cost-effective initiative NZ Post could do in terms of transport fuel reductions. Ongoing changes will include self-learning, web-based tools, communicating the high return of investment (for drivers doing at least 300km a day), and adding fuel efficiency into other training packages for eg motorcycles and vans. If the performance of heavy truck drivers drops off, a re-training exercise will be run.

The NZ Post Fuel Efficient Driver Training Programme is also doing rather well on several recommendations given in the 'Monster' (see Appendix 6 for detailed descriptions)

THE NZ POST FUEL EFFICIENT DRIVER TRAINING PROGRAMME Domain: Transport Target: Individual Habitual Behaviours		
Recommendations	**What the programme assumes to do**	**What the programme could do better**
1. Don't take away their wheels	Focus on what is meaningful for the drivers. NZ Post did this very well by reminding them that it was their own fuel cost that they could save by driving more efficiently, not NZ Post's.	

[16] http://www.nzpost.co.nz/sites/default/files/uploads/shared/annual%20reports/2013-annual-review.pdf

Recommendations	What the programme assumes to do	What the programme could do better
2. Cars reflect lifestyles	Obviously, driving a heavy truck all over the country is not equated with energy efficiency. However, by making it about safety and reducing their own fuel costs, NZ Post did show that more efficient driving can be meaningful to its drivers.	
3. Risk messages can be risky		NZ Post did not make too much of the fact that **increased safety** is a side effect of more fuel efficient driving, although in long-haul truck driving, this could actually be a valid co-benefit (aside from monetary savings).
4. You're never alone when you are driving	Again, NZ Post is doing very well in this regard by creating a sense of community amongst its drivers.	**Social marketing** can be used very successfully in this area.
5. You need more than one tool to fix a car (or its driver)	NZ Post did well in utilising several important tools in their toolbox: trusted trainers from their own peer group; a letter from a Senior Manager asking for compliance; a central monitoring regime; both classroom and field training	They acknowledge themselves that **competitions, leader boards** and potentially also (good natured?) **naming and shaming** would be useful tools. **Incentives** such as a bonus for the top 5% of most improved drivers, plus the most efficient '**driving champion'** with some **awards** and featured stories on intranet could also work nicely.
6. Trust is everything	Driving is very habitual, so to change these habits, training is essential. Telling seasoned drivers that what they are doing is wrong is a recipe for disaster, so NZ Post did very well by using trainers from their own peer group that had a lot of 'street credit' as astute business men.	
7. Be smart, drive smart	Showing how 'normal' it is to drive differently is important. A great story told by Tom was about the driver who was shown to be 41% more efficient after his training than before.	He became one of the greatest supporters of the training and could be used effectively to convince other drivers by posting a **video of his story** on eg the intranet.
8. New car/licence is a great time to change	This may be already happening?	Any new driver joining the NZ Post fleet should be put through fuel efficient driver **training** as part of their **contract**.
9. It's about much more than just the car	Institutionalisation of the new norm, plus associated changes in infrastructure and technologies is important.	NZ Post has a lot of power over its fleet and is one of the largest fleet operators in the country, thus also having **lobbying power** with central and local government. In addition, NZ Post can take part in **freight sharing programmes**, where empty container loads can be filled by others using eg apps to find where and when they are traveling around the country.
10. Money ain't everything	In this case, reminding the drivers that it was their money that they would save by better driving was probably the right message.	However, to embed ongoing fuel efficient driving habits, it would be good to **tailor the message** to different drivers. Some may be interested in safety aspects, some may be swayed by altruistic messages around corporate responsibility, social responsibility (it is not just safer for them but other road users as well) and environmental responsibility.

EECA has a programme for the heavy vehicle fleet, as has Downer Transport, one of NZ's largest fleet owners (and other great case studies are given on the EECA website, above). A lot of these programmes are based on many of the recommendations above. There was also a presentation by EECA on their own issues regarding the design of more fuel efficient driver programmes (in the light vehicle fleet), which was workshopped in Wellington in 2013. The light vehicle fleet is a lot more difficult to address by a top-down intervention than the heavy vehicle fleet. People are not interested in attending training or courses, even if it is free; it is only about a cup of coffee a week that they can save by driving more efficiently; car maintenance is time consuming and some people feel they don't have the capability; and most people think they are already in the top 5% of best drivers. In addition, New Zealand's fleet is generally very old and inefficient and the Government has

limited reach when it comes to individuals' driving behaviour. The feedback from the workshop was useful for EECA: 1. segmentation and tailoring is important before starting a national programme; 2. social marketing utilising different messages around safety and using feedback from their passengers (eg kids in the back with parachutes bailing out when mom drives too erratic!); 3. go beyond raising awareness eg by using fuel efficient driving apps that use the phone's accelerometer and give incentives eg by reducing the car insurance if safe driving behaviours can be shown via the apps; 4. regular feedback in the car that appeals to altruistic values such as being a good citizen; 5. change the messaging, make it more positive about something people feel proud about; 6. gamification and normative feedback or using driving simulators; 7. pimp up the airpump corner in the fuel station and use the forecourt attendant's to teach people how to maintain their tyre pressure. This feedback was also written up in more detail.

Smart Meter/Feedback

Pilot: The *Time of Use Tariff*[17]

We collected two smart meter/feedback case studies from NZ, one will be discussed in detail under ST2. In New Zealand, the wholesale price of electricity varies enormously by time of day but most retail pricing is set on flat rate pricing. This presents problems for power companies who can lose money on sales at peak periods. Shifting some demand from peak to off peak periods would help alleviate these issues. The time of use tariff study shows experimental evidence of the household response to weekday differentials in peak and off-peak electricity prices and is based on **neoclassical economic theory**. The data come from Auckland, New Zealand, where peak residential electricity consumption occurs in winter for heating. Peak/ off-peak price differentials ranged over four randomly selected groups from 1.0 to 3.5.

This project was built on **economic and marketing theories** and assumed people would react either to the pricing signals or the information provided. On average, there was no response except in winter. In winter, participant households reduced electricity consumption by at least 10%, took advantage of lower off-peak prices but did not respond to the peak price differentials. Responses varied with house and household size, time spent away from home, and whether water was heated with electricity. Despite a strong liking for the scheme there was a strong resistance to changing meaningful behaviours that influenced the amount of electricity consumed in total or the proportions used off and on- peak. In contrast, a significant response was obtained from the information provided to participants. To compare and contrast, there was also a ToU tariff project from Italy discussed in the 'Monster'.

Genesis Energy, one of the largest electricity retailers discussed industry's smart meter/feedback issues at the Wellington 2013 conference. Insights from a feedback technology developer was also given on the workshopped issue of how to provide better feedback. He particularly refers to feedback that can be delivered via 'nagging' (but which may be annoying to a lot of consumers) or via technology they are already comfortable with (eg tablets or smart phones). A very strong point is made around the issue of needing to provide disaggregate feedback on the various technologies' energy uses and immediately provide a one-stop-shop where support can be provided straight away (eg access to tradespeople or subsidies to improve energy efficiency). Three areas were particularly outlined: 1. automated auditing (see above); 2. competition between different households (but privacy is an issue) this includes gamification where the system gives you advice and points, with leaderboards and promotion; 3. motivate the power company to contact you at a particular time, to save energy by doing X and getting money for it (during load shaving periods).

The not very successful ToU tariff case study illustrates some of the inherent downfalls with the neoclassical economic model and its over-reliance on price as the main motivator for behavioural change. Regarding the recommendations given in our ST1 analysis, many can be shown to have been missed in this intervention design (for the detailed list of recommendations, see Appendix 6):

[17] http://www.business.otago.ac.nz/econ/research/discussionpapers/DP_1116.pdf

New Zealand TIME OF USE Your Energy Moment TRIAL Domain: Smart Meters/Feedback Target: Individual Habitual Behaviours		
Recommendations	**What the programme assumes to do**	**What the programme could do better**
1. Time isn't always money	This project assumed that people react rationally when stimulated with the right (financial) triggers, however, it was clear in this case that even though there was a 5-fold difference in price, 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 NZers are generally not that trusting that their gentailers won't 'rip them off'?	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		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 not interested 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. How am I doing compared to my neighbours	The normative feedback as to how a household was doing compared with their neighbours was missing	Use **normative feedback** (eg Cialdini) to show how well they are doing not only in comparison to their own use, but also that of their neighbours

SMEs

Programme: *The EECA Crown Loan Scheme*[18]

Two SME case studies were provided by NZ Government and Otago University. However, the Energy Cultures Timber Drying example was not included in the 'Monster' analysis, thus, the EECA Crown Loan Scheme is discussed in detail here: The Energising Business Programme was launched in 2010. It was a $1.46m programme. It was designed to provide energy management expertise and assistance to Small and Medium Enterprises (SMEs) with an annual energy spend of less than $300,000. Priority was given to food production and tourism. It estimated that there were over 250,000 SMEs in New Zealand with the potential to save over $400 million over the next 8 years (between 10-20% of their operating costs). SMEs with an energy spend of less than $300,000 pa per site could qualify for 33% of the cost of an energy assessment and 33% of the cost of investing in the recommended improvements up to a total of $30,000. 11 Service Providers were contracted to provide the services and two councils, the Wellington City Council and the Auckland Council provided support for the programme.

The approach was to: Identify the potential, understand the barriers to natural uptake, design and deliver a cost-effective programme, raise market awareness and demand (information), enhance industry capability (training programmes) and fast track uptake of efficiency projects (financial assistance). Large third party providers didn't perform as well as expected. Smaller ones were successful one-on-one but did not reach many businesses. Only one small provider had some success as they stuck to one industry (wine growing). The industry association was the most successful: over 80 business signed up over 2 years, some achieved a 40% saving of total energy costs, in the first year a total of 175MWh were saved, in year two 1GWh. Those companies that participated in the project succeeded in making energy savings and the benefit to cost ratio was 4:1. However, the uptake of the programme was not as high as EECA anticipated at the outset of the programme and so the agency finished it at 30 June 2013.

In this programme it was seen that not having the 'right' facilitators did not lead to a high uptake of the Crown Loans, which were based entirely on the **neoclassical economic incentive deficit model**. Only when **collaborative learning** was fostered by the intermediary, a trusted manufacturing association that could bring businesses it personally knew together in a workshop environment, did uptake significantly increase. The programme did a lot right, by shifting its focus from top-down deficit model to a shared learning model using a trusted intermediary. It is therefore a shame that it was cancelled before it could be shown to unfold its full potential, especially by rolling it out to other industries in the SME sector.

Specific recommendations (detailed list given in Appendix 6) in relation to the EECA Crown Loan Scheme are discussed below:

EECA's CROWN LOAN SCHEME FOR SMEs Domain: Small to Medium Enterprises Target: Individual Investment Behaviours		
Recommendations	**What the programme did**	**What the programme could do better**
1. It can't all come from the top or the bottom	CEO involvement was mandatory for the first workshop of the successful industry association's programme. This leadership is essential, especially if leadership gets enthused and becomes a strong advocate.	**Ongoing mentoring** is very important which needs to involve the staff but also very importantly, the person in the middle of the organisation who will often be in charge of implementing the change (e.g. energy or building manager)
2. Benchmark your heart out	The EECA scheme did a good job in comparing between SMEs and celebrating successful companies, including providing case studies and telling their stories.	

[18] https://www.youtube.com/watch?v=Mc6iES7E9y4&index=27&list=UU_p3PlWDpLyDBh8TwUBmVHQ

Recommendations	What the programme did	What the programme could do better
3. It's all about the people	Social learning has been shown to be much more successful, as has the ongoing mentoring support.	Especially small businesses are often more people-focussed and it is important to identify, and target the **champions** in the organisation. Even though there is often more competition in this sector, **peer to peer learning** is also hugely important especially if it can be provided by a **trusted intermediary** in a 'safe' setting.
4. I want what you want, so let's do it	The programme, once it was iterated, did well to identify common goals during workshops organised by the Industry Association	Shared goals, including for reforms or industry-wide changes need to be identified (again, collaborative shared learning workshops are great vehicles for this). The **Collective Impact Approach**, which will be trialled in the Task 24 extension could provide the right framework to ensure this is managed well.
5. Don't be afraid to lose the nay-sayers	EECA did not undertake surveys to understand the reasoning behind SMEs who did not respond to or take up any audits	Change can be scary and it is important to **listen** to people in the organisation or organisations who are against it, they may have good reasons. It is also important not to get disheartened by losing some of them as it may entrench social norms in the businesses that stay and the **Diffusion of Innovation** curve will mean the laggards will ultimately be engaged. It is in the **early and late majority** that most of the potential lies.
6. Nudging is what it is: a nudge, not a life saver	The EECA scheme did not use nudging.	**Nudges** used as external stimuli to make it easier for SMEs or their employees to embed changes are a good idea but not too much importance should be put on their effectiveness. **Strong interpersonal support** from the top, staff champions and the implementer in an organisation, as well as continued **mentoring** and involvement with a **trusted intermediary** and other **peer organisations** will be more valuable to change norms and practices.
7. Show who's a leader	EECA did very well in providing something to gain, like the 'Eco Warranty' and ISO14001 certification.	Showing successful organisations' impacts and changes to their peer groups would also be an important aspect, including maybe putting a **gamification** element with competitions and leaderboards into the mix.
8. Tailoring is essential	Especially seeing SMEs are such an eclectic mix, it is important to address them by sector using associations as intermediaries who already have strong links with and understanding of that sector. EECA learned this lesson during the trial.	**Shared learning** workshops can help identify areas where individual **tailoring** to SMEs may be essential.
9. They lead - others follow	EECA Awards are a good way of showcasing best practice, as are its case studies on the internet (including videos)	**Supporting innovators** is very important, either by celebrating them or providing them with awards or further financial support, if needed
10. Consultants don't care as much as your staff	EECA had to use intermediaries and consultants as they do not have the in-house capacity to undertake the audits themselves	Where possible, it would be good to support internal staff taking on roles as champions and implementers rather than relying on consultants. The **Task 24 ESCo Facilitator paper** gives some more in-depth recommendations around this issue.
11. Trust is everything	Industry associations and peer groups already are closer to their members and have already trusted advisors that are frequently in touch with the businesses, something EECA found with this project.	Continuing support and **mentoring by these trusted advisors** can embed practices and habits across an organisation.

Possible Pilots and Research Questions for each Domain

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

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

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

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

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

THE DISSEMINATION PHASE

A huge part of an intervention's ongoing success lies in its dissemination - both of (tailored) feedback to its 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 38 members from New Zealand on the expert platform (13 Government officials, 11 researchers, 7 industry members, 4 community group representatives, 1 funder and 4 media

and web support people). Attendance at both NZ workshops was very high (>50 people in both) and interest in the Task is obviously strong.Her proposed research looks at Eco-Visualisation of smart grid feedback and would fit very well with Phase 2 of Task 24.

NZ Workshops and dissemination

Task 24 has held two major workshops in New Zealand in Wellington, one on 15 February, 2013 and one on 17 March, 2014. Both were held in conjunction with the (international) NERI conference (see all presentations), and once also with an IEA DSM ExCo meeting. Both workshops were highly successful, with over 50 participants from all Behaviour Changer sectors in each and very positive feedback from participants (as collected in feedback surveys on the day of the workshops, also see Appendix 5). Presentations from both workshops and the NERI Task 24 presentations can be found here. The first workshop concentrated on presenting an overview of Task 24 and different behavioural models of understanding, an overview of common 'bloopers' in current behaviour change interventions, the NZ energy country story and several interesting case studies that were presented in the Subtask 1 analysis (NZ Post's driver training transport behaviour; EECA's Crown Loan scheme for SMEs and Time of Use Tariffs evaluated by Otago University). We also workshopped 3 of our domains' main issues and stakeholders - smart meter rollout and Industry and how to better design feedback; how to design better transport behaviour change interventions in Government; and how to engage the 'energy extravagant' householders and Research. An analysis of stakeholder feedback collected by 42 responses can be found here.

The second workshop was part of the IEA DSM ExCo meeting in Wellington in 2014 and was run with the theme 'Storytelling in DSM'. It was a highly energetic and fun day and the participants' feedback was extremely positive (see also Appendix 5). In this workshop, we heard from Behaviour Changers all over the world (all videos can be seen here), but some excellent Kiwi behaviour change and DSM stories were told as well: We started with Task 24's Hitchhiker's Guide to DSM; heard the Government's Warm Up New Zealand insulation love story; our former leader of the Green Party told Icarus' cautionary fairytale of NZs solar water heating programme; our transmission industry told us about the Kiwi Number 8 wire frontier spirit; a DSM consultant told us an analogy of DSM and the All Blacks; our largest fuel supplier gave us a sci-fi tale of Transport of Tomorrow (aka 'Car Wars'); a 'Bond girl' Treasury official told us the political thriller of getting DSM on the political agenda and, being New Zealand, we naturally could not go past a Lord of the Rings (or DSM) analogy from our researchers. We also collected a large amount of energy stories from our workshop participants and discussed our experts' own energy stories video.

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

New Zealand' involvement going forward

New Zealand has agreed to join the Task 24 extension, starting January 2015. We have the exciting opportunity to delve deeper into the very important topic of smart house technology and feedback from smart meters and various ICT with the help of our co-funder, PowerCo (a lines company). In addition, the Energy Efficiency and Conservation Authority has indicated it will join the voluntary Subtask 11, where an actual real-life project will be developed collaboratively, implemented and evaluated using the tools developed in Task 24. As we have such a strong group of stakeholders from all sectors in New Zealand, a lot of whom know (of) each other, we will start here with the workshops where the new 'model' of understanding the energy system from the 'human' perspective[19], including that of the different Behaviour Changers can be trialled first in a field research setting.

[19] See Task 24 Extension Proposal and Work Programme

Appendix 1

Task 24 Expert Workshops, webinars and stakeholder meetings

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

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

Seminars and conferences Task 24 was presented at

Date	Place	Total # Experts	# of countries	Type of meeting
8/5/12	Linköping, SE	20	2	Presentation to University
29-31/8/12	Basel, CH	~300	15+	Task Presentation at 3rd Intl Sustainability Conference
19/9/12	Helsinki, FI	20	3	Task Presentation to Finnish Experts
20-21/9/12	Helsinki, FI	~250	15+	Task Presentation and session chairing at 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

New Zealand DSM interventions (from 2014 IEA DSM Annual Report)

DSM Developments and Priorities in New Zealand

General statement

- Information and analysis regarding New Zealand's energy sector is published annually on the website of the Ministry of Business, Innovation and Employment (see: http://www.med.govt.nz/sectors-industries/energy/energy-modelling/publications/energy-in-new-zealand). This includes statistics on supply and demand by fuel types, energy balance tables, pricing information and international comparisons.
- Information updated on a quarterly basis can be found under the heading Energy Data at: http://www.med.govt.nz/sectors-industries/energy/energy-modelling/data
- From an electrical energy perspective, the summary of electricity supply and demand at the June quarter 2014 states (from New Zealand Energy Quarterly, Issue 26, September 2014):

Generation

- The amount of electricity generated in the June 2014 quarter was 0.7% lower than the same quarter last year. New Zealand's share of electricity production from renewable resources rose to 78.5% from 68.1%, when comparing this quarter with the June quarter 2013. Renewable generation rose due to increased geothermal and hydro generation.
- Geothermal generation increased by 17.9% in the June quarter 2014 when compared with the June quarter 2013. This was mainly due to Contact's new Te Mihi geothermal plant operating at full capacity. Quarterly hydro generation was up 14.7% from the last June quarter. Quarterly thermal generation continues to decline, down 33.0% from the same quarter last year.

Consumption

- New quarterly consumption data from June 2013 onwards is presented in the graph below. Total consumption increased 0.4% in the June quarter 2014 when compared to the June quarter 2013. Over this period, residential consumption increased 3.3% while commercial consumption decreased 4.3%.

Specific areas of priority

Demand-side management continues to be an area of focus in New Zealand, with initiatives including:

- New Zealand Smart Grid Forum: The NZSGF was established in early 2014 with its first meeting being held on 3 April 2014. The Forum has a total of 22 members drawn from across all aspects of the electrical energy sector from generators to consumers. Its objective is to advance the development of smart electricity networks in New Zealand through information sharing and dialogue, supported by analysis and by focussed work-streams where these are considered to be appropriate. Further information about the Forum and its workplans can be found on the website at: http://www.med.govt.nz/sectors-industries/energy/electricity/new-zealand-smart-grid-forum

In addition to the NZSGF, the Green Grid Project, a government-funded research project,…

- is a wide-ranging investigation into how New Zealanders use power, how this demand can best be met using renewable sources, and how the national grid can be made smarter and

more efficient. This involves measurement of current household energy use and renewable generation, as well as extensive modelling and simulation of future power systems and demand. In particular, research will be carried out into the impact of increased levels of wind and solar generation on the grid, and how their variability can best be managed. Further details of the Green Grid Project can be found at: http://www.epecentre.ac.nz/greengrid/

- Demand Response: The New Zealand System Operator, Transpower, trialled a commercial demand response programme in the second half of 2013, involving 8 participating companies with 134MW of demand response registered. Following this successful pilot, Transpower is running a further programme in 2014 which is now in its fourth registration cycle. Full details can be found at: https://www.transpower.co.nz/projects/demand-response-project/demand-response-programme-2014.

In addition to Transpower, the company EnerNOC has a major DR programme in New Zealand. Further information is available on the EnerNOC website at: http://www.enernoc.com/for-businesses/when-you-use-it/demand-response/in-new-zealand

- Energy Efficiency: Greater efficiency remains a priority in New Zealand, with the government's Energy Efficiency and Conservation Authority (EECA) estimating that across all energy forms New Zealand spends approximately $18 billion on energy each year. We estimate that annual savings of around $2.4 billion could be realised from targeted energy efficiency programmes. (EECA Annual Report 2013/14. See: http://www.eeca.govt.nz/sites/all/files/eeca-annual-report-web-2013-2014.pdf).
- The National Energy Research Institute focused its annual conference in 2014 on energy efficiency and dovetailed the event with the March 2014 meeting of the IEA DSM Executive Committee in Wellington. The Committee members were able to learn more about initiatives in New Zealand as well as present work being done in other member countries.
- Behaviour change: Linked to the work of EECA as reported above, behaviour change across all areas of energy consumption remains a high priority, with particular focus on the transport and domestic housing sectors. New Zealand has recently confirmed its participation in the extension of Task 24 of the DSM IA, and is seeking to develop tools and approaches specifically targeted at changing energy consumption behaviour.

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.'[20]

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.

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

A Story on an economic theory-based approach in retrofitting

Money makes the world go round

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

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

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

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

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

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

You will save money for a nice weekend to the Bahamas

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

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

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

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

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

Money still makes the world go round

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

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

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

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

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

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

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

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

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

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

What are the upsides of this economic approach?

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

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

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

They:

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

A Story on a more system-based approach in retrofitting

Together we will make the world go round

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

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

We will create a supportive material, institutional and social environment

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

Your life will change

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

Quality matters and we will keep learning and sharing

If we need to be flexible we will

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

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

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

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

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

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

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

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

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

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

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

A Story on value Action Gap informed transport interventions

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

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

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

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

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

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

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

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

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

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

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

A Story on Theory of Planned Behaviour informed transport interventions

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

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

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

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

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

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

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

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

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

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

A Story on Murray & Sachs descriptive theory informed transport interventions

We know your car makes your world go round

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

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

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

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

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

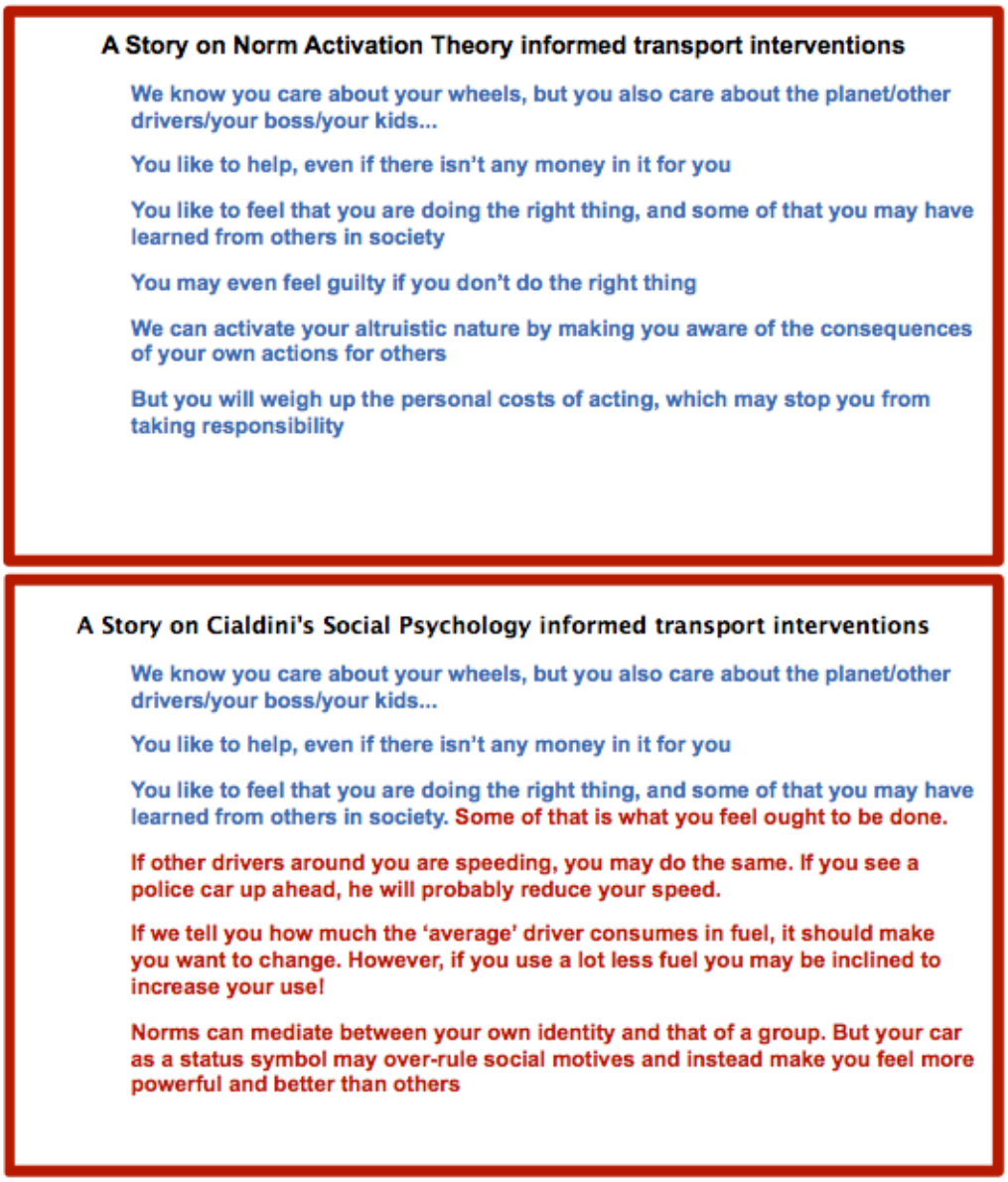
Don't worry, only your driving will change, the car stays the same, you might even pimp it with the savings you yield!

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

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

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

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



Influence of economic theories on smart metering interventions design

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

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

Influence of psychological theories on smart metering interventions design

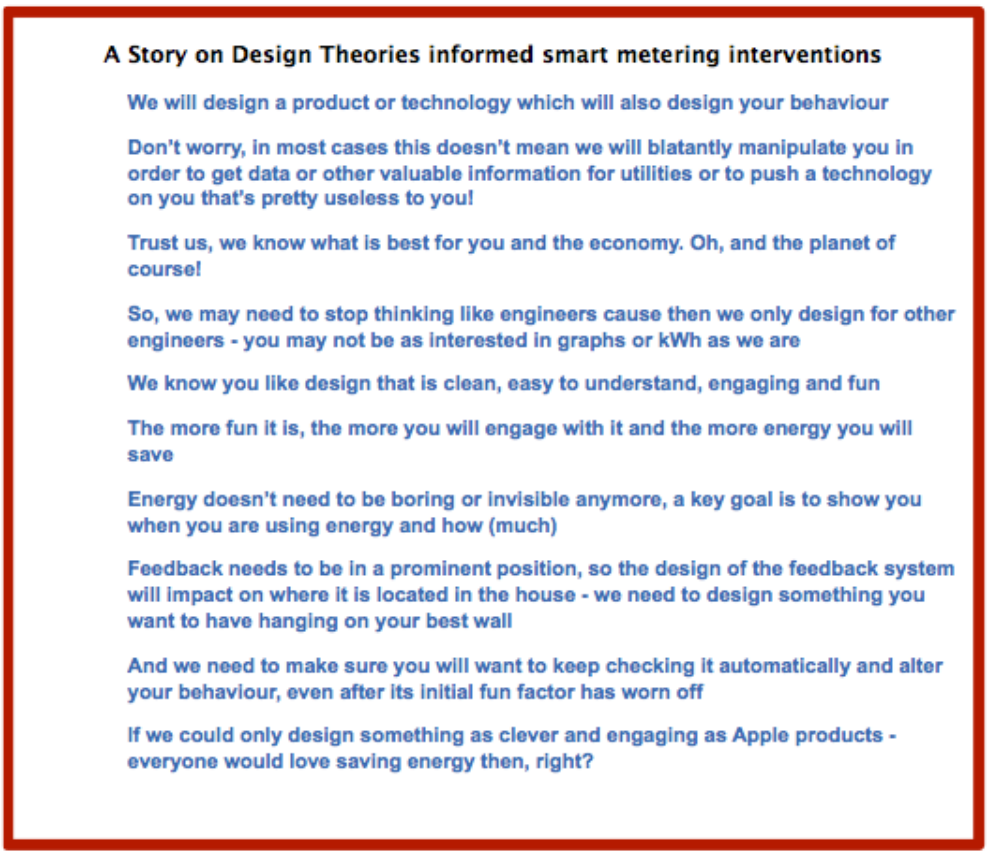
The design characteristics of programmes based on psychological theories such as value action gap theory were already discussed under the theme of transport. Smart metering specific design characteristics of interventions based on psychological theories are as follows:

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

Influence of design theories on smart metering interventions design

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

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



Influence of collaborative learning theories on smart metering interventions design

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

- piloting and building on previous experiences
- participation matters

The influence of Nudge on SME interventions

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

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

Influence of using social norms approach on SME interventions

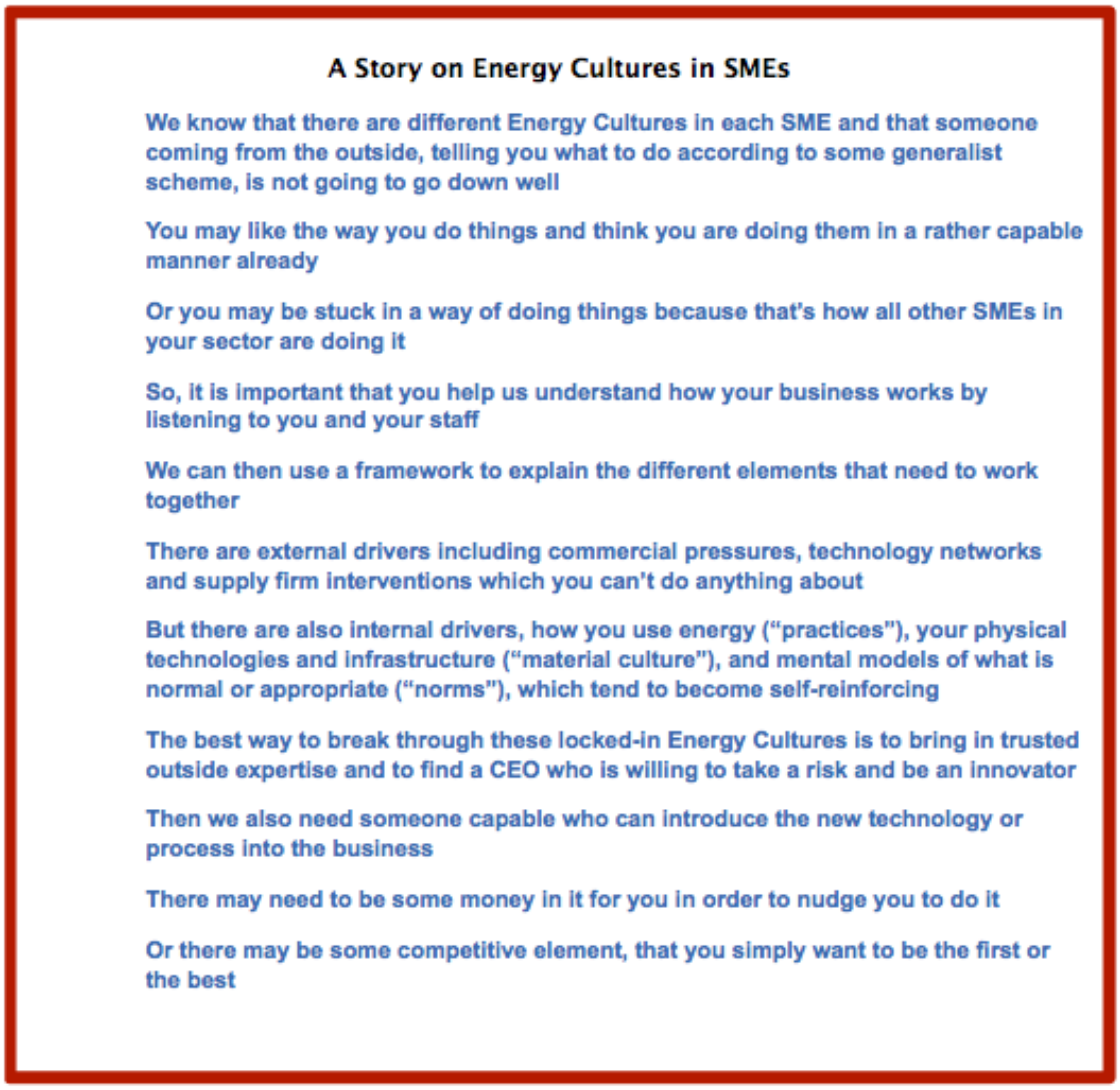
SME-specific design characteristics of interventions based on social norms theories and approaches:

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

Influence of the Energy Cultures approach on SME interventions

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

- Energy cultures differ from company to company



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[21].

[21] 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

New Zealand Stakeholder Feedback

Several rounds of stakeholder feedback were collected in New Zealand. The detailed feedback from the stakeholder analysis is summarised below.

Two rounds of stakeholder feedback were collected in New Zealand. The detailed feedback from the first Wellington workshop can be found here, and from the second here.

Top Issues

Some top level behaviour change issues described by NZ stakeholders from business, local and central government, research and NGOs were (in bold the most commonly mentioned):

Transport: reduce energy use generally, modal shifts to public transport and active transport, driver behaviour, vehicle purchasing behaviour
Housing: residential heating efficiency, insulation, efficiency of energy use generally
Rental housing: split incentives of landlord/tenant, need to improve quality
Energy poverty
SMEs: lighting and heating, building service managers, change industry mindset of striving towards minimum standards
Electricity grid: integrated and resilient grid, uptake of DG, demand response, ToU pricing
Consumption generally: need to reduce consumption & its impacts, reduce (hot) water use, decarbonise economy
Energy use generally: reduce energy use (conservation), change behaviour and understanding
Information, awareness, engagement: Improve levels of knowledge and awareness, engage citizens, improve visualisation of energy use/waste
Government: need for leadership in DSM, regulatory incentives for EE, measurement and accountability

What are the main barriers to resolve these issues?

- Lack of awareness among consumers and government
- disorganised/fragmented approach
- need bipartisan agreement to solution, not political football
- stop blaming the other sector/s and silo thinking, collaborate
- conservative BAU approaches to decisionmaking
- car as status symbol, still seen as necessary
- more effective communication with end users
- Funding! Competition for investment eg with political drive for fossil fuels
- Pay back period of EE measures, and the fact other things aren't measured by RoI
- EE not visible, important or a stand-alone business case
- Energy infrastructure in the hands of companies with little interest in eg DG
- Leadership, trust
- Split incentives

How would you overcome these barriers?

- better, coordinated messaging, showing industry benefits
- research into societal norms, pilots
- active demonstrations
- incentives
- regulation
- public education, empower the consumer
- catalysing bottom-up change
- visionary collaboration
- carbon pricing, market incentives
- collaborate with industry and other sectors

How to measure successful behaviour change outcomes in these areas (detailed metrics can be found in the associated document)?

Transport:

- o Reduction in fuel use, achieved through driver behaviour, improved vehicle efficiency, reduction in vehicle km travelled, modal shifts to public and active transport, increased vehicle occupancies
- o Fuel shifts to low carbon fuels
- o Freight shifts to rail
- o Improved provision of public and active transport infrastructure
- o Reduced cost and/or increased service per energy unit for consumers

Housing, including rental housing: reduction in energy use via

- o Retrofits – improve uptake of insulation, insulate walls, cylinder wraps, efficient heating systems, mature renovation market
- o New builds – higher standards for thermal performance

➔ improve health, reduce hospitalisations, doctors visits, sick days

Business/retail: reduce energy use, reduce energy waste, active management of energy, improve profitability, decouple energy use and economic growth

Electricity supply and grid management: increased uptake of DG (PV especially), decrease reliance on grid, increase local energy storage, uptake of demand response

➔ Reduce consumption: lower carbon emissions, less water use, less energy use, less reliance on imported goods

Behaviour: active or automated demand response, improved feedback, improved information

Awareness: increased knowledge, increased engagement in energy, get away from social norm of cold houses, buy-in for EE products

Government role: Building WOF/energy labelling, minimum standards for rental housing, more investment in public and active transport, policies with stronger focus on sustainability/low carbon in all areas, government leading by example in its own buildings

What this Task could help with (detailed feedback can be found in the associated document):

- Reframing the issues
- Improved knowledge and understanding amongst stakeholders
- Improved engagement, development of new aspirations
- Improved political buy-in and policy
- Addressing funding and/or policy disconnects
- Improving business/industry approaches
- Help with specific initiatives

Over 90% of attendees found the workshops useful or very useful. The storytelling approach was almost uniformly regarded as ‘great’ and ‘ok’. There was also almost universal agreement that ample opportunity to network was provided and the comments people left on the forms suggest that there is a lot of appreciation for this field of research and this Task in NZ.

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