



## Guidelines and recommendations for Switzerland

### *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 Swiss Behaviour Changers .....	4
A summary of Task 24 .....	5
Some numbers of Task 24.....	5
Involvement of Switzerland in Task 24.....	5
The Swiss Country story (our wider energy culture and contexts).....	6
THE DESIGN PHASE.....	8
Subtask I - 'The Monster' .....	8
THE IMPLEMENTATION PHASE.....	9
Subtask II – In-depth case studies.....	9
THE EVALUATION PHASE .....	15
Subtask III - Evaluation 'Tool' .....	15
THE (RE)ITERATION PHASE.....	18
Subtask IV: Country-specific recommendations .....	18
Swiss case studies – guidelines and recommendations.....	18
Possible Pilots and Research Questions for each Domain .....	27
THE DISSEMINATION PHASE .....	27
Subtask V - The Expert Platform .....	28
Storytelling Methodology.....	28
So... what's the story of Task 24 so far?.....	30
The Task 24 Extension.....	30
Switzerland's involvement going forward.....	30
Appendix 1 .....	31
Task 24 Expert Workshops, webinars and stakeholder meetings.....	31
Seminars and conferences Task 24 was presented at .....	32
Appendix 2 .....	33
Task 24 Publications, films and reports.....	33
Online sharing and administration of Task 24.....	33
Appendix 3 .....	35
Swiss DSM interventions (from 2014 Annual Report).....	35
Appendix 4 .....	37
Examples of different models and interventions.....	37
Influence of economic theories on building retrofit intervention design .....	37
Influence of other theories (psychology and sociology) on building retrofits design.....	39
Influence of psychological theories and models on the design of transport interventions.....	40
Influence of economic theories on smart metering interventions design.....	42
Influence of psychological theories on smart metering interventions design .....	42
Influence of design theories on smart metering interventions design.....	43
Influence of collaborative learning theories on smart metering interventions design.....	43
The influence of Nudge on SME interventions.....	44
Influence of using social norms approach on SME interventions .....	44
Influence of the Energy Cultures approach on SME interventions .....	44



Influence of using Collaborative learning approaches on SME interventions .....	45
Appendix 5 .....	47
Swiss Stakeholder Feedback .....	47
Appendix 6 .....	48
Detailed recommendations for each domain (from the 'Monster') .....	48
Smart meter/feedback recommendations: .....	50
SME recommendations: .....	51
Appendix 7 .....	53
Future research questions collected in Task 24 .....	53
Building Retrofits .....	53
Transport .....	53
Smart Metering/Feedback .....	53
SMEs .....	54

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

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

## A summary of Task 24

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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’<sup>1</sup>. 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)<sup>2</sup>. However, there is no behaviour change ‘silver bullet’, like there is no technological silver bullet that will ensure energy efficient practices. Designing the right programmes and policies that can be measured and evaluated to have achieved lasting behavioural and social norm change is difficult.

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

### Some numbers of Task 24

- **July 2012 - March 2015:** Official start and end dates
- **8 participating countries:** Netherlands, New Zealand, Sweden, Norway, Switzerland, Belgium, Italy, Austria
- **9 countries gave in-kind (expert) support:** the UK, Spain, Portugal, UAE, France, Australia, South Africa (which was meant to join but didn’t do so in time), Canada and the US.
- **227 behaviour change** and DSM experts from **21 countries** participate in Subtask 5, the invite-only Task 24 Expert Platform ([www.leadsmtask24.ning.com](http://www.leadsmtask24.ning.com)).
- **15 successful expert workshops/webinars** have been held to date<sup>3</sup>
- **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<sup>4</sup>
- **Almost 60 case studies** showing the successful (or not so successful) use of diverse models of understanding behaviour in the areas of transport, SMEs, smart meters and building retrofits have been collected to date from **16 countries** in a [Wiki](#).

### Involvement of Switzerland in Task 24

Switzerland joined Task 24 in early 2012. Dr Vicente Carabias-Hütter from the [Institute of Sustainable Development](#) at [ZHAW Zurich University of Applied Sciences](#) was appointed as national expert on behalf of the [Swiss Federal Office of Energy \(SFOE\)](#). Several Swiss academic institutions and relevant organisations, such as the Energy Agency of the [Economy](#) (Energie Agentur der Wirtschaft, EnAW), EWZ (Electricity supplier of the city of Zurich), the Federal Energy Agency and Swisselectric, were the main supporters and top ‘Behaviour Changers’ audience for Task 24. In CH, we thus have a strong collaboration between industry, government and research ‘Behaviour Changers’ that support Task 24 financially and with their expertise. There was also a successful workshop held in October 2013, which saw CH Behaviour Changers from all sectors

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<sup>1</sup> UK The Parliamentary Office of Science & Technology (2012). Energy Use Behaviour. Number 417.

<sup>2</sup> Described in detail in Darnton, Andrew (2008). GSR Behaviour Change Knowledge Review. Reference Report. 83pp.

<sup>3</sup> See Appendix 1 for all workshops, conferences and seminars that Task 24 organised and partook in

<sup>4</sup> See Appendix 2 for a list of all reports and publications

learn about, and engage in Task 24. This workshop was written up very favourably by a journalist who attended it<sup>5</sup>.

## The Swiss Country story (our wider energy culture and contexts)

The Swiss country story was told at the Luzern workshop as [Pecha Kucha](#) by the Swiss funders from BFE. It goes as follows:

**Geography:** As a landlocked and mountainous country, Switzerland's supply reliability is strongly depended from an exchange of energy between its neighbouring countries and in particular from the acquisition of base-load energy. However, the economic, ecological and regulatory demands have increased strongly, inside the EU as well as in Switzerland itself. In the face of these challenges, Switzerland must balance its own energy policy carefully.

**Socio-economics:** Switzerland has a small population of 8.0 m, the majority of which live in the densely populated midlands. This corresponds to a population density of approximately 190/km<sup>2</sup>.

**Energy supply:** Without any doubt, hydropower is the most important energy source. In addition, biomass, wind, solarpower, ambient heat, nuclear and wood make a contribution towards its potential. In 2013, approximately 20% of the national energy use originated from renewable sources (Kaufman, 2014).

**Energy politics:** With the Energiestrategie 2050 under way, the revision of the energy legislation and regulations in Switzerland is taking place already. The first measures take into account the decision for phasing out nuclear power and the second stage of the electricity market liberalisation. The path chosen for this strategy is difficult: With the danger of costly diversion or misguided investments, it is important for the legislative body to systematically and correctly prioritise the different energy political and energy technology efforts. Also, as mentioned earlier, political and regulatory changes inside the EU affect the Swiss national energy policy strongly, further increasing uncertainties for all involved stakeholders (Graf, 2010).

**Institutional:** Until only a few years ago, customers did not have the option to choose their energy provider. The geographical location basically determined (and still does) the energy supplier. In all, approximately 1,000 electricity companies owned and operated the transmission and distribution grid. Network operators were regulated and owned by cantons and communities, which meant that it was a long path between decision and execution of even simple measures. Only at the beginning of this century has power generation, trading and supply been unbundled, shortly after the markets in Europe where partly liberalised. The current situation with regards in Switzerland is that only bulk consumers beyond 100,000 kWh per year are free to choose their supplier, and producers of renewable energy receive funding through a compensatory feed-in remuneration, commonly known as "KEV" (Paetsch, Boeck, & Frauendorfer, 2009). A full opening of the market is currently not expected until 2018 because the draft bill still is being debated in parliament.

**Policy:** In order to face the numerous and challenging issues regarding the future energy supply of Switzerland, the Federal Council has developed a long-term energy policy (Energy Strategy 2050), which is based on the revised energy perspectives. The measures in the first scheme address security of supply, energy-related GHG emissions, cost – and benefit analysis of generation, trading and supply as well as socio-economic and ecological implications (BFE, 2013).

**Programmes and Initiatives:** The overall measures of the Energiestrategie 2050 – which obviously include demand side programmes as well – are described in the first scheme (Erstes Massnahmenpaket). The latter describes implementation concepts regarding retrofitting measures, mandatory efficiency targets for bulk consumers, incentives for more efficient road vehicles and public transports, regulations for electric appliances, measures for the grid and many more (Grossenbacher, Jud, & Meile, 2012).

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<sup>5</sup> Jürg Wellstein (2013). Energieeinsparung dank Energieeffizienz- Contracting: Kunden müssen aber wollen! HK-Gebäudetechnik 12/13 [in German]

**Consumption:** With an increasing population (but not only due to this factor) the overall energy consumption in Switzerland has steadily increased since the 1960's. It is estimated that this trend will continue, even though recent numbers show that the actual electricity use has slightly declined in the past 2 – 3 years. Nevertheless, the overall energy consumption has increased between 2012 and 2013 by 2.5 %, particularly due to a larger demand for petroleum products (SFOE, 2013).

**Residential:** Consumption figures of the first decade of this century show a significant increase in the overall energy consumption in Swiss Households. Oil fuels for residential heating have been partly replaced by natural gas, while ambient heating, solar energy and wood have increased as well. In total however, the energy consumption has increased from 238.9 PJ (66'361 GWh) in the year 2000 to 272.7 PJ (75'750 GWh) at the end of the decade (Kemmler, 2011).

**Infrastructure:** Approximately 2 million building structures (residential and industry) exist in Switzerland, which consume almost 50% of the overall energy consumption. Regarding GHG contribution, these buildings are responsible for approximately 40% of the emissions. It has been estimated that the energy consumption for buildings could be reduced by 50% until the year 2050, meaning that there is still a huge potential here (Schweizerische Energiestiftung, 2015). The public transport system in Switzerland is – without exaggeration - among the best in the world regarding network capabilities, reliability and comfort. In order to maintain and further improve this capable and high-quality public service, efforts are and must be ongoing.

**Appliance Use:** Switzerland has more defined seasons, with a mostly temperate central European climate, however, south of the Alps a slightly Mediterranean climate is more prevailing. Because of this, the energy consumption for heating varies. Most houses have heating oil systems (over 50%) and natural gas heating (20%), only a small fraction (8%) use electricity for heating, which includes electrically-operated heat pumps as well. The rest use wood, ambient heating, solar and a tiny bit of coal to generate heat (Kemmler, 2011). Air conditioning, however, is not very widely spread.

**Energy Culture:** In the aftermath of the Fukushima disaster, the subject of saving energy and the risks of nuclear energy were very present for quite some time. This also might have pushed the Federal Government to decide to phase out nuclear energy in the medium future. With regards to changes in attitude and behaviour, there was also an ascertainable "Fukushima Effect". For instance, more residential home owners decided to have solar energy or electrical heat pumps installed. LED lights, appliances to measure individual energy consumption and energy management systems have also become more popular. Recent studies, however, show that the "Fukushima Effect" has slightly deflated over the recent years, meaning that environmental friendly behaviour has declined even though the general willingness does not have seem to (Schaub, 2013). Main Task 24 recommendations for behaviour change interventions.

**Distinct Residential Energy Cultures:** Currently, the studies covering segmentation of energy consumers in Switzerland are not very numerous. In a study made by the ETH Zürich, different energy consumer segments were identified that are of sufficient significance to be targeted in energy conservation campaigns (Suetterlin, B., Brunner, T. & Siegrist, M. 2011):

- The idealistic energy saver (15.6%)
- The selfless inconsequent energy saver (26.4%)
- The thrifty energy saver (14%)
- The materialistic energy consumer (25.1%)
- The convenience-oriented indifferent energy consumer (5.3%)
- The problem-aware well-being-oriented energy consumer (13.6%).

Most of the studies and research projects focus rather on the purpose of energy use, its source and of course the quantification of emissions and usage. Some of these have been discussed in the bullet points above. Also, there are several models developed in social science which are trying to reflect different lifestyles, but these not necessarily refer specifically to energy consumption.

# 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](http://www.ieadsmtask24wiki.info)) have been developed. A short storybook version of the ‘Monster’ report is also available. The different models of understanding behaviour and theories of change, as well as some examples for intervention design can be found in Appendix 4. In summary, the case studies in the ‘Monster’ show:

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



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

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

## THE IMPLEMENTATION PHASE

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

### Subtask II – In-depth case studies

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

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

However, the case study analysis is not:

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

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

#### *The 2000 Watt Society Switzerland – an “Integrated Formula” for Sustainable Living (CH)*

##### The Concept

At the end of the 1970's the “Physical Quality of Life Index” was introduced. It shows the relationship between energy consumption and quality of life. This index estimated, that peoples' quality of life increases with the rise of energy consumption, but only up to the level of 2000 Watt per person that is constantly supplied. Above this level of energy consumption, the quality of life did not significantly increase anymore.

Based on this research and similar studies, researchers from the Swiss Federal Institute of Technology (ETH) in Zurich developed the concept of the 2000 Watt Society in the 1990's. They calculated what amount of energy can be sustainably delivered on a global level. The conclusion was that it is 2000 Watt per person, which was at that time approximately the global average energy consumption per capita. 2000 Watt is a continuous power which corresponds to the energy of 17500 kWh per year (respective to a power of twenty 100W bulbs or 1750 liter mineral oil per capita per year). This amount of energy used should not be allowed to increase further.

Two goals: primary energy and CO<sub>2</sub> emissions

The two overall 2000 Watt Society goals, which should be achieved by the year 2100, are:

- the reduction of the primary energy<sup>6</sup> to a constant supply of 2000 Watt per person and year,
- the reduction of the emissions of CO<sub>2</sub> equivalent gases (greenhouse gas emissions) to 1 ton per capita and year.

Since 2000 Watts of primary energy per person was the global average energy consumption per person in the 1990's, it means that the 2000 Watt Society doesn't demand a reduction of the global energy consumption, but a re-distribution to the world population. Therefore, industrialised countries have to lower their consumption to 2000 Watt per person while developing countries should have access to 2000 Watt per person<sup>7</sup>.

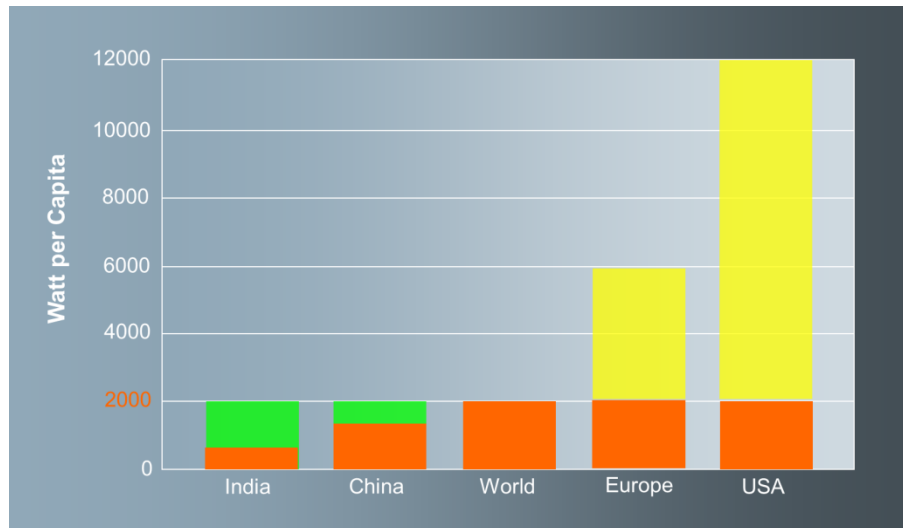


Figure 1 Energy consumption over the world (Source: PSI, [www.novatlantis.ch](http://www.novatlantis.ch), access: 20.2.2015)

For Switzerland, the average energy consumption has currently an amount of 6500 Watt per person and is therefore roughly three times higher than the world average and slightly higher than the European average (cf. Figure 1). People in some Asian and African countries only need fractions of that, on average. The vision of a 2000 Watt Society enables a balance between industrialised and developing countries and thus makes it possible for all people to enjoy a good standard of living.

The goal of reducing the global emissions of CO<sub>2</sub> equivalent gases (greenhouse gas emissions) to one tonne per person of the world population is according to the IPCC (Intergovernmental Panel on Climate Change) necessary in order to limit the temperature increase, which is caused by human beings and related to the greenhouse effect. The +2°C limit of global warming was agreed in December 2009 in the Copenhagen Accord<sup>8</sup>.

The reduction of primary energy consumption targets the finite nature and the shortage of energy resources, whereas the rise of greenhouse gases (CO<sub>2</sub> equivalent gases) in the atmosphere has to be limited in order to prevent disastrous climate change. There has been a debate amongst specialists in certain fields whether priority should be given to either energy or CO<sub>2</sub>. But on the overall society level, it is widely agreed that energy and CO<sub>2</sub> emissions are equally important goals and that they are interconnected and “work together”. Interventions in either field overlap with each other and should therefore go hand in hand<sup>9</sup>.

<sup>6</sup> Primary energy: The 2000 Watt Society specifies that when calculating our primary energy needs, we should also consider the energy consumed at upstream stages of the process, including the energy used to extract, convert and distribute the used energy sources.

<sup>7</sup> cf. information on [www.2000watt.ch](http://www.2000watt.ch), access: 20.2.2015

<sup>8</sup> NOVATLANTIS 2010, FACHSTELLE 2000-WATT-GESELLSCHAFT (2014), <http://www.2000watt.ch/die-2000-watt-gesellschaft/weg/>, <http://www.novatlantis.ch/forschung/2000-watt-gesellschaft/die-vision/>, access: 20.2.2015

<sup>9</sup> *ibid*

In summary, the 2000 Watt Society is a concept for moving forward to a sustainable energy future. It is the vision of a society in which the world's raw materials are used in a sustainable and fair manner. The [case study](#) has been presented in the last Task 24 workshop in Graz.

Three Strategies: Efficiency, Consistency, Sufficiency

To achieve these goals, the entire society – these are mainly the private individuals, industry and the public authorities – needs to contribute according to the 3 main strategies:

- **Efficiency:** Less energy used for the same purpose!
- **Consistency:** Renewable energy resources instead of non-renewable resources!
- **Sufficiency:** The right quantity for a better quality of life!

It is important to understand that the 2000 Watt Society is a vision and a model for sustainable development. It is not an intervention like e.g. the Dutch case *PowerMatching City: Power to the people?*, but an overall concept and a guideline for many different interventions. There are five main fields of activities as described in the Subtask 2 report.

Switzerland's Roadmap to the 2000 Watt Society

For Switzerland, the goals of the 2000 Watt Society would mean returning to the same level of energy consumption that applied in 1960, i.e. when the country had just entered a sustained period of solid economic growth.

The reductions would be<sup>10</sup>:

- 3 times less primary energy
- 8 times less CO<sub>2</sub> equivalent gases

These goals are to be achieved in 2100. The *Roadmap to the 2000 Watt Society* formulates intermediate goals and serves as a guideline for the cities and municipalities. To be ecologically viable, the energy mix had to be significantly changed in favour of renewable energies, as the 2000 Watt Path explains in Figure 2.

In 2050 e.g. every person will use 3500 Watt of total primary energy, from it 2000 Watt of non-renewable primary energy and 2 tonnes of CO<sub>2</sub> equivalent will be at his/her disposal (from today's 9 tonnes)<sup>11</sup>.

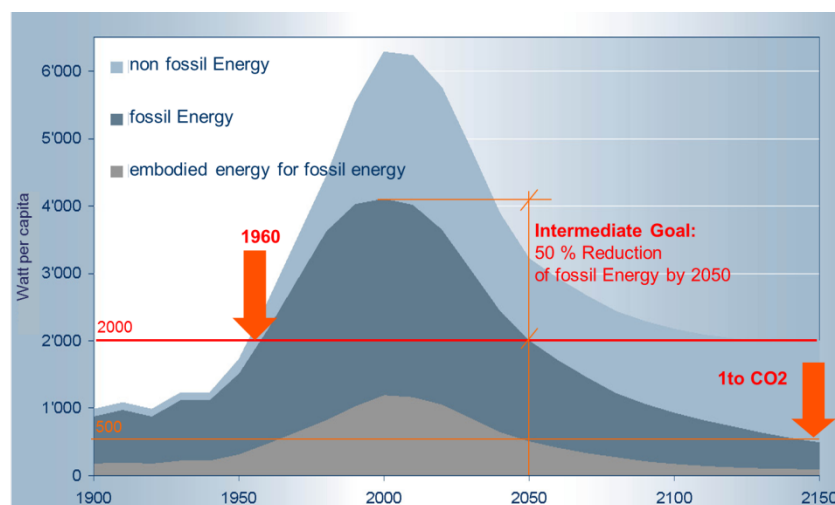


Fig. 2: Swiss Roadmap to the 2000 Watt Society (Source: [www.2000watt.ch](http://www.2000watt.ch), access: 20.2.2015)

<sup>10</sup> Ibid

<sup>11</sup> Ibid

The primary energy consumption and the energy-related CO<sub>2</sub> equivalent emissions defined according to the 2000 Watt Society concept are caused by the end-use<sup>12</sup> energy consumption of the Swiss society (industry, public authorities, private individuals). When the energy used for the production of imported goods and services is considered as well (embodied energy), the total average primary energy consumption in Switzerland is approximately 8300 Watt per person and the CO<sub>2</sub> equivalent emissions about 12.8 tonnes per person. The goals for the total primary energy consumption and the corresponding CO<sub>2</sub> equivalent emissions are the same as for the 2000 Watt Society. However these goals have to be reached 50 years later, in the year 2150.

#### Lighthouse Projects

Following below are three examples for lighthouse projects closely explained, among them two cities (Zürich and Basel) that are pioneers on the way to the 2000 Watt Society.

#### **The 2000 Watt Site Greencity**

The example of a 2000 Watt Site is the *Greencity* in Zürich on the former ground of Sihl-Manegg with the old papermill and an extent of 8 ha. It is the first neighbourhood in Zürich to have been consistently developed in line with the objectives of the 2000 Watt Society. In “Greencity”, home, work and sustainable, environmentally aware behaviour are combined to form a new urban lifestyle. Apartments for singles, couples, families and seniors, plenty of shops, a school and attractive service buildings together constitute an inspiring and future-oriented neighbourhood. All of the buildings were constructed by *Losinger Marazzi AG* to the very latest energy standards. The aim for residential buildings is the *Minergie-P-Eco label*, and for offices the *Lead Platinum label*. The site has a small hydroelectric station of its own to supply both sectors with carbon-neutral power. “Greencity” is very well developed with public transport and the energy supply derives 100% from renewable energy. With “Greencity” a vision becomes reality, it is a showcase project for Switzerland<sup>13</sup>.

#### **City of Basel (Canton Basel-City)**

The first projects started in 2001 with the City of Basel. The city authorities were ready to cooperate with *Novatlantis* but only for concrete implementations for buildings or transportation projects. They were not interested in purely academic theoretical studies. It all started with a *Future Transportation Lab* with several (sub-) projects for new car technologies, organisational means and other questions. Step by step, more projects followed in the field of buildings and transportation. Basel's approach could be called bottom-up because it started with several smaller projects and only afterwards the vision of the 2000 Watt Society was really placed on the strategic level of the municipality (NOVATLANTIS, 2010).

The first 2000 Watt Site under construction is in the *Erlenmatt West* site of Basel on the scale of 25,000 m<sup>2</sup>. 574 dwellings in total are to be built by 2016 on four sites. This figure will include family homes, small private and rental flats and terraced housing. There will also be a centre for senior citizens with 63 apartments, 56 care places and a public restaurant. This visionary and future oriented site will be constructed by the general contractor, *Losinger Marazzi AG*, in conjunction with the landowner, *Bricks Immobilien AG*. Work on the senior citizens centre began in May 2013. The whole of the Erlenmatt site is scheduled to be provided with site heating. Photovoltaic installations are also planned. Also the Erlenmatt West site will be relying 100 percent on renewable energy produced by IBW for heating and for preparing hot water. Grey Energy – i.e. the energy used for the production of building materials – will be kept to a minimum. The site has good connections with the public transport system and will be equipped with mobility facilities, as well as charging stations for electric cars and E-bikes.

In parallel, the Basel-City canton is building a primary school with a kindergarten and triple sports hall. Over the next two years, the canton will be completing the 40,000 m<sup>2</sup> *Erlenmatt Park*, an improvement which will considerably improve the quality of life in the site.

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<sup>12</sup> End-use energy: energy that is directly available to users in private households, industry or transportation, for instance heating oil, electricity, gasoline)

<sup>13</sup> LENEL 3.9.2012, Intep Integrale Planung GmbH, Factsheet Greencity Zürich 2014, [www.2000watt.ch](http://www.2000watt.ch)

In March 2013, the *Energiestadt Label Commission* awarded the Erlenmatt project its «2000 Watt Site» certificate, a mark of recognition for the demonstrable and exemplary steps taken in the development of the site<sup>14</sup>.

## City of Zürich

The approach in Zürich was more top down. The City had projects for sustainable development similar to those in Basel. They agreed with Novatlantis to put them under the name of "2000 Watt Society" to create more awareness. In November 2008, the people of Zürich voted, with a large majority, in favour of sustainable development of their city. In concrete terms: the goal of the 2000 Watt Society is now in the municipal code (HÄNGGI, 2011).

Soon after that, the Zürich City Council moved to place the initiative "Sustainable City of Zürich – on the Way to the 2000 Watt Society" on its main agenda for the 2006-2010 legislative period, thereby underscoring its intention to begin the work of implementing suitable environmental, energy and climate policies. For the first four years, there was a 2000 Watt Commission in which 4-5 of the 7 city councillors took part and met every other month with scientists of Novatlantis to coordinate the work.

As a complement to this resolve at the level of city government, the citizens of Zürich have also demonstrated their concern to secure an intact environment for future generations. In a referendum held in the fall of 2008, the citizens of Zürich voted, by over 75%, in favour of writing the objective of the 2000 Watt Society into the city's constitution. According to the provisions that have now been entered into the municipal code, per capita energy consumption is to be reduced by a factor of three and CO<sub>2</sub> emissions by a factor of four to six by the year 2050. The city has since established the **Minergie** standard as the minimum standard – both for new buildings and renovations.

A number of showcase projects are underway: the new *Triemli city hospital* and the *Trotte retirement home* are among the first projects in Switzerland that fulfil the comprehensive sustainability requirements of the 2000 Watt Society.

Further implementation measures relating to the 2000 Watt path in the area of real estate development include publicly funded consulting programmes for homeowners and an energy-coaching programme that is available free of charge to prospective homeowners and planners.

The establishment of an environmentally sustainable electricity power supply for the city of Zürich is also a major step along the 2000 Watt path. This supply is to be secured without the use of nuclear power and is to be provided essentially by renewable sources of energy such as water, solar, geothermal heat, wind, and biomass. (NOVATLANTIS 2010, S.23)

The city's public transportation network and infrastructure for "slow traffic" are to be continuously developed. Planning and feasibility studies are being carried out in preparation for the implementation of a traffic plan that is compatible with the 2000 watt agenda. The city is also intensifying its measures to inform and sensitise the public to the issue of sustainable mobility (NOVATLANTIS 2010, S.23). The city of Zürich has set itself ambitious targets regarding municipal buildings: almost all new constructions such as housing estates, school buildings and retirement homes, correspond to the **Minergie** standard (for low-energy housing). Among the model examples for this are the construction of a new city hospital which was built to **Minergie Passive** (zero energy building) standards. The energy consumption of all municipal buildings has also been made transparent thanks to the implementation of building certificates<sup>15</sup>.

Findings and conclusions, strengths and weaknesses of the case study

Switzerland is definitely somewhat prepared for the way towards the 2000 Watt Society:

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<sup>14</sup> Factsheet Erlenmatt West Basel 2014, [www.2000watt.ch](http://www.2000watt.ch), access: 20.2.2015

<sup>15</sup> [www.stadt-zuerich.ch/2000watt](http://www.stadt-zuerich.ch/2000watt), access: 20.2.2015, HÄNGGI 2011

- The necessary technical equipment mostly exists, and further progress is expected
- Efficiency potentials are very high
- The Swiss population as private individuals is directly involved in using of almost two-thirds of the total energy (mainly for heating and mobility)
- There is a lack of information about the goals and the field of activities of the 2000 Watt Society – especially in small municipalities.

But:

- The energy consumption is too high and Switzerland is far off being a 2000 Watt Society
- The success of reaching the goals of the 2000 Watt Society mainly depends on the behaviour of each individual person and its willingness to change their behaviour in a more energy-efficient manner
- The concept of the 2000 Watt Society has to be propagated much more to the Swiss population as it is planned with the *Energy Strategy 2050*.

#### **Strengths:**

- The *2000 Watt Society* concept is a widely applicable concept (cities, municipalities, regions), and covers all types of energy consumption and greenhouse gas emissions.
- One strength of the global formula of the 2000 Watt Society lies in its ability to include nearly all ideas and activities that strive for more sustainability and quality of life.
- Furthermore, the ethical foundation seems to be appealing. People can identify themselves with it and may see themselves as a part of a great global change and as pioneers or role models (see interview).

#### **Weaknesses:**

It needs a lot of work to break down the general concept to binding and clear locally adapted measures. For example:

- Since the concept of the 2000 Watt Society is not known very well in the Swiss population, it needs a strong propagation. Once it is well known it will be more easily accepted: Most of the referenda about issues of the 2000 Watt Society resulted in exceptionally high majorities (75-80 percent, normally it is 45-54 percent) in favour of the concept or concrete implementations according to 2000 Watt standards (see interview with Roland Stulz).
- The implementation has to be done in a step-by-step and very pragmatic approach. It needs pioneers and lighthouse projects. A rather technical approach can make things easier at the start: Nobody is against better buildings and more efficient technology. The first lighthouse projects were in the field of housing and mobility (two of the main fields of high energy consumption, see interview with Roland Stulz).
- Although the vision of the 2000 Watt Society is widely accepted, people in Switzerland have a rather vague notion of what that would mean for their lifestyle and concrete everyday behaviour. By giving people advice for concrete action and by showing them role models and landmark persons, positive effects on their behaviour of energy consumption can be expected. Examples and advice should be tailored to particular groups of people and expressed in their particular language. Rebound effects should be avoided (see interview with Roland Stulz).
- It needs the support of a community standing behind the vision 2000 Watt Society from different fields of society – especially from the public authorities. With voluntary action programmes, incentives instruments and regulations they have an important influence on peoples' behaviour. Overall, they can provide the financial means for the implementation of the 2000 Watt Society.

## 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<sup>16</sup>. 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<sup>17</sup>. We address all these issues in our Subtask 3 [reports](#) and [factsheets](#) and will go much further into an actual, standardised tool design in ST 8 and 9 of the extension.

### Subtask III - Evaluation ‘Tool’

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

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

However, it is not:

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

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

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

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<sup>16</sup> See Karlin et al's ‘Beyond kWh’ Methodological Review for Subtask 3

<sup>17</sup> See the different evaluation metrics in the ‘Monster’

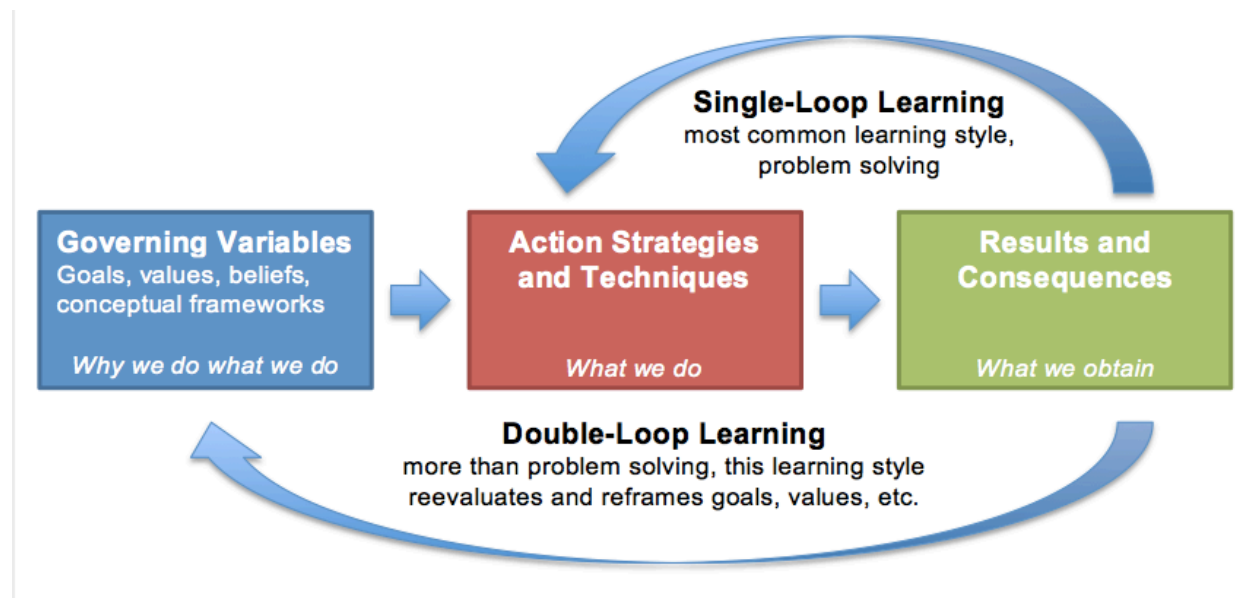


Figure 3: double vs single loop learning. Retrieved from <http://www.afs.org/blog/icl/?p=2653>

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

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

Learning type	Indicators	Questions for M&E	Metrics (examples)
Single-loop learning	<b>Efficiency indicators:</b> <ul style="list-style-type: none"> <li>• Cost-effectiveness</li> <li>• Lowering the total energy consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Was the intervention cost effective?</li> <li>• Are the goals reached within the time and within the allocated budget?</li> </ul>	<ul style="list-style-type: none"> <li>• Costs and benefits (eg RoI or NPV)</li> <li>• Pre-set goals</li> <li>• Available time and time needed</li> <li>• Budget and costs</li> </ul>
	<b>Effectiveness indicators:</b> <ul style="list-style-type: none"> <li>• Reaching the intended goals</li> <li>• Lowering the total energy consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Are the goals reached?</li> <li>• Is the total energy consumption lowered (per household? by sector?)</li> </ul>	<ul style="list-style-type: none"> <li>• Energy savings</li> <li>• Energy consumption before and after intervention</li> </ul>



Double-loop learning	<p><u>Process indicators:</u></p> <ul style="list-style-type: none"> <li>Realising a network of a heterogeneous set of actors with different definitions of success</li> <li>Interaction and participation by the target group (so that they can learn about their own behaviour and consequences for energy consumption)</li> <li>Interaction and participation with a diverse set of stakeholders since the design phase</li> <li>Learning as an explicit aim of the intervention</li> <li>Record new lessons for future interventions</li> <li>Making use of lessons that are learned during previous interventions</li> <li>Perspectives of intermediaries before and after a intervention</li> <li>Changes in assumptions, norms and beliefs</li> </ul>	<ul style="list-style-type: none"> <li>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?</li> <li>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?</li> <li>How was learning during and after the intervention ensured?</li> <li>How did the perspectives, assumptions, norms and beliefs of intermediaries and other stakeholders change during the programme?</li> </ul>	<ul style="list-style-type: none"> <li>Diversity of actors that are involved in the design and implementation of the intervention</li> <li>Definitions of success that were co-created and used</li> <li>The way end-users were involved in the design and implementation of the intervention</li> <li>Perceived self-efficacy</li> <li>Perceived impact and benefit of the intervention</li> <li>Learning strategy</li> <li>Perspectives, assumptions, norms and beliefs of stakeholders before, during and after the intervention</li> </ul>
	<p><u>Content indicators:</u></p> <ul style="list-style-type: none"> <li>Alignment of the expectations of the stakeholders</li> <li>Reflection upon the function of evaluation/monitoring together with stakeholders</li> <li>Learned lessons during the intervention are translated into (re)designs</li> <li>Improving the capacity of own or similar organisations to perform successful DSM interventions</li> <li>Creation of new networks and institutions that support the newly formed behaviour and its outcomes</li> <li>Lasting changes (behavioural or practice change)</li> </ul>	<ul style="list-style-type: none"> <li>To what extent were the expectations of stakeholders aligned? How is this done?</li> <li>How did reflection upon the function of M&amp;E with stakeholders take place?</li> <li>Which lessons learned during the intervention are translated into (re)designs?</li> <li>Is the capacity of own- or similar organisations improved to perform successful DSM interventions?</li> <li>Are new networks and institutions created that support the newly formed behaviour and its outcomes?</li> <li>Did lasting changes take place?</li> </ul>	<ul style="list-style-type: none"> <li>Collective impact approach to co-develop metrics to measure this</li> <li>Main lessons learned by different stakeholders</li> <li>Perceived success of collaboration and intervention design and implementation</li> <li>Short- and long-term effects</li> </ul>

## THE (RE)ITERATION PHASE

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

### Subtask IV: Country-specific recommendations

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

- ✓ a main drawcard of Task 24, providing specific recommendations to countries depending on their contexts
- ✓ a collection of country-specific contexts, based on the country stories
- ✓ different for each of the countries
- ✓ but with some similarities and overall, global conclusions (eg the do's and don't's)
- ✓ based on input from the country experts and their specific knowledge

However, it is not:

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

### Swiss case studies – guidelines and recommendations

On finalising the Task, we are providing country-specific recommendations and to do's/not to do's from in-depth stakeholder analyses collected during workshops, from our National Experts and during case study analyses. With the Energiestrategie 2050 under way, the revision of the energy legislation and regulations in Switzerland is taking place already. The measures in the first scheme take into account the decision for phasing out nuclear power and the second stage of the electricity market liberalisation. The following report aims at giving a more insightful view on how these transformations towards a more economical and ecological provision and distribution of energy is taking place and what experiences have been made so far, even though these transformation processes are still ongoing:

#### *Building retrofits*

The Swiss building retrofit programme promotes retrofits of buildings and investments in renewable energy, use of waste heat and optimisations in building technology. The programme gives financial incentives (aid money) for house owners to retrofit their buildings in an energy efficient way<sup>18</sup>. The successful programme started in 2010 and will last 10 years and is part of the Swiss energy and climate policy. It is aimed to reduce the CO<sub>2</sub> emissions of Switzerland, yet it is not accompanied by a study on the behaviour of house owners concerning their investments in energy saving measures. Instead, the amount of paid aid money, the insulated area and the calculated reduced CO<sub>2</sub> emissions are monitored.

The legal basis for the programme is the Federal Act on the Reduction of CO<sub>2</sub>-emissions (1999, "CO<sub>2</sub>-Law" Bundesgesetz über die Reduktion der CO<sub>2</sub>-Emissionen (CO<sub>2</sub> Gesetz), 2000). This law enforces a fee on combustibles. A maximum of one third of the revenues of the fee are used for the Federal Building Retrofit Programme. Cantonal subsidies complement this amount. In 2011, roughly 136 million Swiss francs were used for building retrofits and 75 million Swiss francs to

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<sup>18</sup> The amount of aid money is 10-30 CHF/m<sup>2</sup> of retrofitted building part, depending on type of measure (window, wall ceiling, ...)

facilitate investments in renewable energies, use of waste heat and optimisations in building technology (BAFU, 2011).

To get subsidies for a renovation you have to submit a detailed application of the planned renovation measures. This application is checked by the authorities. If the measures do comply with the requirements, your application is accepted and you can get the money after you have realised the measures and proven their realisation with a final documentation. This has to happen before 2 years after you have gotten the acceptance of subsidies. The realisation of the measure is randomly audited on site.

<b>SWISS BUILDING RETROFIT PROGRAMME (GEBAEUDEPROG. VON BUND UND KANTON)</b> <b>Domain: Building Retrofits</b> <b>Target: Individual Investment Behaviours</b>		
Recommendations	What the programme did	What the programme could do better
1. Focus on the social side	The programme focuses on house- or building owners as individuals.	Maybe it would be worthwhile to also enable tenants access to the programme, for instance for new more efficient windows. Most of the people in Switzerland live in rentals, so it is important to figure out a bottom-up approach and deal with the landlord split incentive issues. However, funds are limited and the programme tries to focus on the most promising and economically feasible measures first.
2. It's not just what we buy, it's what we do	An improved insulation will benefit not only the house owner, but also help reduce GHG emissions. However, it is a one-off investment and, without further measures, will not lead to ongoing behaviour change especially not in routine behaviours.	The programme is not accompanied by a study on the behaviour of house owners concerning investments in energy saving measures or more importantly on habitual behaviour patterns. For example, the intermediaries who put in the insulation or explain the subsidy scheme to home owners, could be used to also make them aware of other energy efficiency and conservation measures they can undertake at the same time.
3. Change lifestyles not 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.	Providing capital alone will not be enough. Aspects like smaller, frequent purchasing behaviours, use and maintenance of technology and habits and routines as well need to be addressed. Again, the intermediaries who sell and/or install these products, services and appliances in peoples' homes are the best means to create bottom-up change.
4. Think of the benefits of the end user as well	Rather than only emphasising the monetary savings, the programme also offers professional advice throughout the retrofitting process. Also, homeowners are made aware of an improved living comfort and better indoor air quality, noise protection and radon emissions	This can always be taken further, but the programme is doing well already.
5. Focus your messaging, use trusted intermediaries	Regarding its information policy for owners, developers, builders and the public, the retrofitting programme does a good job already.	As stated above, these intermediaries can always be used better to inform and instill energy behaviour change messages and information during 'moments of change' ie when people are already thinking rationally of changing their building envelope.
6. Be a one-stop-shop	This programme in particular is not making it easy for people to gain access to the subsidies. A lot of information and money has to be paid upfront thus directly opposing the neoclassical economic 'deficit' model the programme is based on.	It needs to be exceedingly easy for people to gain access to such a programme. One agency undertaking all the paperwork (such as in the <i>Warm Up New Zealand</i> Programme) will cut down on issues around inconveniencing home owners.

Recommendations	What the programme did	What the programme could do better
7. Use a toolbox of interventions and go beyond kWh targets	The programme does this by emphasising on the benefits for home owners' well-being and health. In addition, there are other aspects which the programme covers. For instance, many endangered birds and bats are dependent on buildings providing them important habitats. To retain these, a few simple measures are quite often sufficient.	What would be good to add is more monitoring and evaluation of metrics that show that these co-benefits have indeed improved peoples' wellbeing and health etc
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 the programme is promoting this message very well.	
9. Benchmark your heart out, measure not model	The effectiveness of the measures regarding GHG emissions depend strongly on the type of measures made (windows, roof, walls, application of renewable technologies) and also the heating system used prior to renovation. Sometimes, a total reconstruction of the building might be more meaningful. But these questions are being addressed by counselling offered before and during the retrofitting process.	Setting up actual (individual) benchmarks might not be fruitful. Rather than this, the focus on the overall improvement and a lower national dependency from fossil fuels should be emphasised.
10. Learn from the unwilling	Whether ultimately enough homeowners can be motivated for energy refurbishment and the use of renewable energy depends not only on the financial incentive from the programme but also on external factors. Oil prices and the economic situation have a substantial impact as well.	The amount of money for subsidies is limited. So the demand seems to be higher than the supply. Solutions on how to raise the funding money, including for landlords who may not benefit directly from reduced ongoing energy costs are being discussed in politics.

### *Transport - GHG emissions targets for private transportation*

This specific measure relates to the tightening of GHG emission targets for passenger vehicles, delivery vans and light trucks (from today approximately 130 g per kilometre down to 95 g per kilometre by 2020 according to EU guidelines).

The draft bill of legislation states that "importers of vehicle will have to pay a penalty of CHF 120.- per gram emission exceedance, if the average consumption of the total cars sold exceeds the 95 g limit". Also, buyers of powerful cars with high emissions will have to pay an add-on, while owners of cars with smaller emissions will receive a sales discount. Obviously, vehicle distributors will be affected economically by these measures, meaning that they will have to adapt the configuration of their offers. In other words, car distributors might be forced to either try to sell more cars with emissions below the limit or they will increase the prices for vehicles with higher emissions (BFE, 2013). There are therefore obliged to make a detailed evaluation on their options for actions respectively of the resulting consequences in order to avoid costly sanctions or other unwanted effects such as reputation damage. According to Jenny et al (2013) rebound effects for car dealers are neglectable.

Besides all the psychological factors relevant to a purchase decision of car owners, such as pricing, social norms and status stated by Jenny et al (2013), the question arises whether emission targets actually do affect the purchasing behaviour of new car owners. Also, how effectively will these emission targets actually be with regards to the desired outcome? It has been shown that consumers have up to now not fully comprehended the relationship between fuel consumption, the choice of their vehicle and driving behaviour (Peter; de Haan, Müller, Peters, & Hauser, 2007). However, when consulting the webpage <http://www.autoumweltliste.ch>, which enables a comparison of newly registered cars, vans and minibuses with a total weight of max. 3.5 tonnes, it

becomes clear that already, there are cars available on the market with emissions considerably below 130g/km.

As pointed out correctly by de Haan (2007), there is a big difference between a motorist and a buyer of a new car. One might also have to take into consideration that, for emission reduction purposes, most of the people driving cars in Switzerland are not actual buyers of new vehicles, instead, the author assumes that during the lifespan of a vehicle its ownership changes at least twice. Furthermore, most of the buyers of new vehicles are on average around 50 years old with a monthly income of approximately CHF 8'000 – 10'000.-, a fact that might be of relevance when considering the target groups for specific measures (Peter de Haan, 2007). In the case of consumers, it seems difficult due to the complexity and influencing factors to formulate generally valid statements on possible rebound effects (Jenny, Karlegger, Montanari, Ott, & Madlener, 2013).

<b>GHG emissions targets for private transportation</b> <b>Domain: Transport</b> <b>Target: Energy Service Providers and Individual Habitual Behaviours</b> <b>(End Users)</b>		
Recommendations	What the programme assumes to do	What the programme could do better
1. Don't take away their wheels	Importers of vehicles will have to pay a penalty of CHF 120.- per gram emission exceedance, if the average consumption of the total cars sold exceeds the 95 g limit.	What needs to be made more clear to customers is that this draft bill is not restricting their freedom of driving the car they want. They still have all the choices, but more fuel inefficient vehicles will be more expensive.
2. Cars reflect lifestyles	Consumers should shift to buying more energy efficient cars. However, cars with lower fuel consumption and less powerful engines are often perceived as "less worthy".	Consumers need to be made aware of the fact that the technological development in the last couple of years has made engines more powerful and economical at the same time. Therefore, the choices on model, efficiency and size need to be reconsidered.
3. You need more than one tool to fix a car (or its driver)	Tightening the emission values, factors such as driving behaviour and purchase decisionmaking are not being addressed enough	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 vehicles / drivers, plus the most efficient 'driving champion' with some awards. However, it is uncertain on which level these efforts could be introduced.
4. Trust is everything	Car dealers generally don't have a very good reputation when it comes to being trusted...	It is important that car distributors and dealers are informed specifically and in time to avoid uncertainties regarding the adjustments of the emission targets. Their messaging is very important, both for their business reputation and to send the right messages.
5. Be smart, drive smart	This programme did not take driving behaviour into account.	It has been shown that consumers have up to now not fully comprehended the relationship between fuel consumption, the choice of their vehicle and driving behaviour. This interrelation needs to be made more visible and accordingly addressed as well.
6. A new car/licence is a great place to start change	Buyers of new cars will make the number of efficient cars on Swiss roads increase. This is one of the 'moments of change' where very important and long-lasting decisions are made.	Most of the people driving cars in Switzerland are not actual buyers of new vehicles, instead, the author assumes that during the lifespan of a vehicle its ownership changes at least twice. This again results in the importance of trusted intermediaries who will sell the most fuel efficient second vehicles.
7. It's about much more than just the car	Do emission targets influence the purchase decision of car owners? Would people care more if they knew the impacts on health from air pollution and wider global emission impacts?	More work needs to be done to both assess how much these financial schemes actually influence purchasing behaviour and how much more people could be influenced if other aspects, such as respiratory health or global climate change impacts were communicated more strongly.

Recommendations	What the programme assumes to do	What the programme could do better
8. You're never alone when you are driving	There will be a peer pressure effect once people become more aware of the impacts of fuel inefficient vehicles on wider societal and environmental (and ultimately, macro-economic) measures.	How can you make a fuel efficient vehicle more 'sexy'? We need to study current purchasers of hybrid and electric vehicles to understand their motivations better and potentially target different customer segments with what we have learned. This is an area where celebrities, sports and TV personalities could have a lot of influence if they are seen and talking about the importance of driving more efficient vehicles (and more efficiently).
9. Risk messages can be risky	Car dealers are being obliged to make a detailed evaluation on their options regarding the choice of cars respectively the resulting consequences in order to avoid costly sanctions or other unwanted effects such as reputation damage.	It is important that car distributors and dealers are informed specifically and in time to avoid uncertainties and reactance effects regarding the adjustments of the emission targets. A financial scheme like this can often backfire if the relevant information and social norm change has not happened in time.
10. Money ain't everything	Do emission targets influence the purchase decision of car owners?	Already now there are cars available on the market with emission considerably below 130 g which are not necessarily more expensive to comparable models – something that needs to be brought to attention more. Cars are status symbols, and more fuel efficient, hybrid or electric cars can become 'cool and sexy' if the wider implications of driving inefficiently become better known to society and social norms change.

### Smart Meter/Feedback Roll-Out Impact Assessment

The Swiss Federal Office of Energy has launched a study in which a cost / benefit analysis for a nationwide and extensive introduction of Smart Metering as part of the effort for the development of the existing infrastructure to a Smart Grid, which is part of the measures to be taken in the Energiestrategie 2050 (BFE, 2013). In the actual study, five different implementation scenarios over a maximum period of 10 years (2015 – 2035) were defined, assessing the ecological, economic, legal and social factors resulting from a nationwide rollout for each stakeholder group (Baeriswyl et al., 2012).

**Table 2: Smart Meter rollout scenarios as discussed in the smart metering impact assessment (Baeriswyl et al.; 2012)**

Status quo	No introduction of Smart Metering; existing infrastructure still in use; business as usual regarding efficiency measures and campaigns
Status quo +	No introduction of Smart Metering; existing infrastructure still in use; increased effort for efficiency campaigns and measures, optimization of existing ripple control
Selective introduction	20 % of measuring points equipped with Smart Metering by 2030; Installation of Smart Metering if requested; Adaptation of the existing infrastructure to an extensive Smart Metering capable environment; DSM for heat supply; Introduction of at least 2 time of use (TOU) pricing schemes
Extensive introduction	80% of measuring points equipped with Smart Metering by 2030; Extensive rollout of approx. 400'000 Smart Meter per year; Infrastructure is Smart Meter capable; Several TOU pricing schemes; DSM for heat supply
Extensive introduction +	Includes the scenario "extensive introduction" but includes: Dynamic rates and pricing signals; data capture and communication in 15 min intervals; DSM for household appliances optional

The groups interviewed for this study included representatives from the energy sector, the industry, from the scientific community as well as consumer protection agencies. In addition to these interviews, an extensive literature research (including an evaluation of Smart-Meter pilot projects), and cost / benefit validation with implication on the production / network side was conducted.

The overall conclusion is that a Smart Meter rollout is, from an economical point of view, recommendable for Switzerland. Even though this assumption is highly speculative, the chances outweigh the risks by far, according to the authors. Results of this study showed further that households, industrial and commercial enterprises could certainly be regarded as the main benefactors from a nationwide rollout (extensive introduction +). Network operators, energy providers and producers, on the other hand, would have higher costs and reduced revenues given the current regulations and norms. Therefore, the latter would need to be adapted in order to develop solutions acceptable for all stakeholder groups, thus balancing the “Split Incentives”. Nevertheless, the economy could, overall, benefit from slightly positive impulses for its value added. Summarised, an extensive rollout seems for these reasons more expedient than other rollout scenarios discussed in the report.

The stipulation of a certain timeframe is regarded as an important aspect. Replacing existing measuring points with Smart Meters within approximately 10 years could help to prevent large losses due to premature replacement. In order that these ambitious replacement goals are reached during the given time, sanctions for not reaching the desired objectives are to be considered (however, it is highly advisable to learn from the Dutch, who tried to threaten 6 months jail terms to anyone refusing to install a smart meter, and who learnt that this was a very bad idea indeed...). However, it has been emphasised that the various network operators should be able to choose freely their optimal rollout plan, thereby avoiding milestones or intermediate objectives. But technology isn't everything: end users will not be more economical with the energy they consume solely due to Smart Metering. Specific and targeted promotion for efficiency measures, possibly coupled with incentives, needs to be envisaged in the new regulatory framework.

In which ways can a Smart Meter rollout be regarded as a key element for the Energiestrategie 2050? In a nutshell, there are several aspects which suggest that this conclusion is more than just hypothetical. First of all, with the introduction of Smart Meter issues regarding energy efficiency and consumption patterns will receive wither attention. Then, as mentioned earlier, an open field for the creation of innovative solutions on issues of demand side management and decentralised feed-in will gain momentum (i.e. virtual power plants). In addition, one of the main findings of the study refer precisely to the latter: Electricity consumption could be cut by a modest 1.8%, on the other hand the load shifting potential for end customer loads accumulate up to 10% from today's values. Expressed in financial terms, this would mean additional costs of approximately CHF 1 bn. compared to savings between CHF 1.5 and 2.5 bn (Baeriswyl et al., 2012).

<b>SMART METER IMPACT ASSESSMENT (CH)</b> <b>Domain: Smart Meters / Feedback</b> <b>Target: Energy Service Providers and Individual Habitual Behaviours (End Users)</b>		
Recommendations	What the programme assumes to do	What the programme could do better
1. Time isn't always money	It was regarded as expedient to not install all new smart meters at once. Losses due to premature replacement are a concern voiced by network operators which needs to be taken serious.	Replacing existing measuring points with Smart meters within approximately 10 years could help to prevent large losses. Regulatory guidelines need to take that into account.
2. Technology isn't everything	Main benefactors of a nationwide rollout are said to be households, industrial and commercial enterprises. A balanced “Split Incentive” is important so that no stakeholder feels discriminated.	When speaking of “Split Incentives” and (possible) fees, the stakeholders must be made constantly aware of the overall benefits. Also, the nature of communication regarding price changes is essential due to different perception of prices, values and units (kWh, Swiss Francs etc).

Recommendations	What the programme assumes to do	What the programme could do better
3. Make sure there is clear value for the customer	For most end users, it is still not obvious in which way they can actually profit from the installation of Smart Meters, especially with regards to the installation cost which are likely to be passed on to them.	Electricity savings are fairly modest on individual household levels, but the overall advantages need to be made more clearly visible to end users (such as service provider switching, transparency regarding billing and additional provision of services). It is also very important to address any issues around risk and distrust, eg to do with privacy concerns.
4. Automatons don't teach as well as real people	Technology isn't everything: end users will not be more economical with their energy consumption solely due to Smart Metering	Specific and targeted promotion for efficiency measures, possibly coupled with incentives, needs to be envisaged in the new regulatory framework, which needs to be accompanying the rollout and continued in the future.
5. Find and convince the 'luddites' that your technology will work for them	If even your self-selected households don't respond to the trial, there is little chance that uninterested households would show greater behavioural changes.	The key here is, as stated before, to make the additional value generated by Smart Metering for customers more evident. If this can be done with the "luddites", the work is already half done. What is needed is an overview of cost – benefit relevant factors backed accordingly with scientific evaluations and studies from sources perceived as trust-worthy. It is also important to learn from mistakes created by too rapid smart-meter rollouts overseas (eg Italy, NL, UK)
6. The home and the household dynamics hold your key	This project did not directly look at household dynamics.	It is important to keep end users motivated beyond the initial euphoria, also due to the fact that the perception of benefit and risk most probably will change over time. It is also important to understand that there are significant gender and age differences that can cause inter-household frictions and may need to be adequately tailored and addressed.
7. Social cues are more powerful than technology	With the introduction of Smart Meter issues regarding energy efficiency and consumption patterns will receive wider attention in the public perception, maybe lead event to a "benchmarking" in consumption patterns.	An overall social norm change, such as envisaged by the 2000 Watt Society is necessary to understand how smart meters can be useful to save energy, money and the planet.
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.	Most home owners already assume that they are using their home and energy smartly and in the most appropriate way. It is important to provide tailored advice that supports their needs and assumptions. Eg, feedback related to electricity prices and time seem to be perceived as more acceptable then feedback in monetary units and kWh or percentage.
9. Focus not on individuals but their practices	This is not done in this project	More work needs to be undertaken to understand the wider implications of peoples' practices and energy cultures, for example, around laundry drying or heating practices. Especially once control over appliances such as washing machines and heaters may become remote or automated, serious issues can arise if the home owners aren't fully included in the co-design.
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	<b>Co-create</b> the interventions with your audience and enable <b>shared learning</b> (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	Feedback related to electricity prices and time seem to be perceived as more acceptable then feedback in monetary units and kWh or percentage.
12. Tell me how I'm doing compared to my neighbours	The normative feedback as to how a household was doing compared with their neighbours was missing	Use <b>normative feedback</b> (eg Cialdini's studies) to show how well they are doing not only in comparison to their own use, but also that of their neighbours



## *SMEs – Energy-Model and SME-Model from Energy-Agency of the Economy (EnAW)*

The Energy Agency of the Economy (Energie Agentur der Wirtschaft, EnAW) is an association of the most important inter-trade organisations of the Swiss economy and has a public-private-partnership-agreement with the Swiss Federal Office of Energy (SFOE). The Agency's target is to reduce energy consumption and CO<sub>2</sub>-emissions of Swiss enterprises by voluntary and profitable measures of the companies themselves. The Agency has mainly three different programmes to support companies in this area. One is for companies, who use a lot of energy (called Energy-Model), two are particularly for SMEs (called SME-Model and Benchmarking-Model). Because the Benchmarking programme is not promoted anymore, we will describe here only the two actual programmes (Energy-Model and SME-Model). The Evaluation was mostly done for all three programmes together.

Both programmes help companies to define goals and corresponding measures concerning the reduction of energy and CO<sub>2</sub>-emissions. Facilitators from the EnAW are consulting the enterprises in defining specific goals and corresponding measures for the enterprise. They take into account the particular situation of the company. To set the reduction goals, pay-back-time of potential measures is analysed. Measures with a pay-back-time of less than 4 years (for industrial processes) and less than 8 years (for measures concerning building and facility management) respectively are considered effective, thus defining the goal. Targets of the participating firms are controlled and monitored by the Agency and by the Swiss Federal Office of Energy (SFOE).

Companies participating in the Energy-Model programme who reach their audited targets get a certificate, and they are allowed to ask for reimbursement of the CO<sub>2</sub>-tax from combustibles they have used (according to the Federal Act on the Reduction of CO<sub>2</sub> Emissions). This exemption of the fee for CO<sub>2</sub> emission is a high incentive for enterprises to join the energy model (BFE, 2007).

In the beginning of the programme a lot of companies (mainly high-energy-consuming companies) joined up. The SME-Model (mainly on voluntary base) exists only since 2006 and doesn't represent a large amount of emissions compared to the Energy-Model, but has a big potential and the number of participating companies is growing by 20-30 percent a year. The voluntary actions reducing overall energy consumption/CO<sub>2</sub>-emissions were, at least until 2007, too low to meet the targets of the CO<sub>2</sub>-law. With the establishment of a partnership between economic and governmental organisations the EnAW is a good institution to promote energy efficiency in enterprises, and thereby is a more potent stakeholder to meet the specified targets. Facilitators from the Agency engaged in the target-setting and the suggestion of measures in the companies are well accepted. With their technical and process-related knowledge they contribute to higher energy efficiency in the target groups.

Additional incentives (e.g. money for CO<sub>2</sub>-savings, lower electricity prices) of foundations and/or power utilities increase the motivation of enterprises to participate. Obviously, strengthening of the image as an ecologically and socially responsible company is an important driver for participants as well. Target-setting related to energy and CO<sub>2</sub>-savings was not very ambitious, especially in the beginning (until 2004/2005) and was tightened afterwards (for agreements with new enterprises). This caused unequal conditions for earlier and later agreements, which is a major negative aspect of the programme.

Funding is provided the participating enterprises itself (85%), by partners (9%) and federal institutions (6%). The large contribution from the industry towards the financial resources can be interpreted as a commitment and indicate that activities of the EnAW are highly valued by the companies.

Key indicators:

- number of enterprises involved in a programme: 2232 (2011)
- energy saved through measures: 6,181,500 MWh (2011)
- CO<sub>2</sub>-emission reduced through measures: 1,427,721 t (2011)
- CO<sub>2</sub>-intensity of the involved enterprises was lowered since 2000 (until 2011: by ca. 35%)
- Energy efficiency of the involved enterprises has increased since 2000 (until 2011: by ca. 23%)

# EFFICIENCY CONCEPTS FROM THE ENERGY-AGENCY OF THE ECONOMY (EnAW)

## 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	By establishing a partnership between economic and governmental organisations the EnAW can be seen as an intermediary between the interests of all groups involved.	Business representatives can and do influence politics and legislation up to certain extent. This is one of the few reasons why it must be emphasised that equal conditions for all programme-participants are important (over the whole time period of programme).
2. Benchmark your heart out	The programme is providing comparisons between SMEs and celebrating successful companies, including providing case studies (Pro Kilowatt seminars) and telling their stories on the webpage of EnAW.	Measuring the success of such programmes is very difficult, because it is often not very clear which amount of savings is directly saved because of the programme. For a better evaluation, there has to be done a more detailed analysis of different enterprises or the data comparability with all enterprises in Switzerland has to be improved.
3. It's all about the people	There seems to still be the perception that the programme is for larger companies only.	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
4. I want what you want, so let's do it	It is one of the most cost-effective programmes of all the energy-related programmes of the SFOE. The impact of the programme lies often in an earlier realisation of measures that are already in the investment planning of the firms, but also in newly explored potentials.	When defining the reduction goal, pay-back-time of potential measures is analysed. The timeframes of 4 or respectively 8 years are simply too tight and exclude many measures that might have a significant larger effect.
5. Don't be afraid to lose the nay-sayers	There are no studies or surveys which are trying to understand the reasoning behind SMEs who did not respond to or take up any audits. However, the exception of the CO <sub>2</sub> few is quite often a potent argument for SMEs to participate.	SMEs that are put off by long pay-back times need to be targeted more specifically and individually.
6. Nudging is what it is: a nudge, not a life saver	Nudging is done by means of offering benefits and cutting fees with regards to the CO <sub>2</sub> tax.	A possibly very powerful nudge could be to sign up any new SMEs by default to this programme. They need to opt out, rather than opt in right at the start (again, during a 'Moment of Change')
7. Show who's a leader	The programme is providing comparisons between SMEs and celebrating successful companies, including providing case studies (Pro Kilowatt seminars) and telling their stories on the webpage of EnAW.	Measuring the success of such programmes is very difficult, because it is often not very clear which amount of savings is directly saved because of the programme. For a better evaluation, there has to be done more detailed analysis of different enterprises or the data comparability with all enterprises in Switzerland has to be improved
8. Tailoring is essential	Facilitators play an important role in the programme, but still they have to fulfil expectations from two sides: the ones from the enterprise (cost-effective measures, not too high (i.e. expensive) targets) and the ones from the ENAW/SFOE (high/strong targets).	Continued support and especially training for the Facilitators need to be prioritised more. Efforts are recently improving by offering certified training courses. It could be useful to use business associations who already have strong relationships with SMEs of a particular sector as trusted intermediaries (see eg the NZ Crown Loan Subsidy Scheme for SMEs).

Recommendations	What the programme did	What the programme could do better
9. They lead - others follow	The programme is providing comparisons between SMEs and celebrating successful companies, including providing case studies (Pro Kilowatt seminars) and telling their stories on the webpage of EnAW.	More needs to be done to ensure that more companies follow the good example. This could be done by establishing standards or labels for the industries or national annual awards, for example.
10. Consultants don't care as much about your company as your staff do	Facilitators play an important role in the programme, but still they have to fulfil expectations from two sides: the ones from the enterprise (cost-effective measures, not too high (i.e. expensive) targets) and the ones from the ENAW/SFOE (high/strong targets).	Facilitators need to be sensitised for understanding different companies' needs and processes and learn to communicate differently as well (trustbuilding). See the Task 24 Facilitators Report for Task 16.
11. Trust is everything	Industry associations and facilitators are frequently in touch with each other and are likely to be tasked with an additional audit should it become of relevance.	

## Possible Pilots and Research Questions for each Domain

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

### *Building Retrofits:*

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

### *SMEs:*

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

### *Smart Metering/Feedback:*

How to link smart meters to better feedback, using ICT?

### *Transport:*

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

## THE DISSEMINATION PHASE

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

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

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

However, it is not:

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

## Subtask V - The Expert Platform

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

We currently have 8 members from Switzerland on the [expert platform](#) (1 Government official, 5 researchers, 2 industry members). Attendance at the Swiss workshop was high (>30 people) and interest in the Task is obviously strong.

### *Swiss expert workshop and dissemination*

Task 24 held its Swiss expert workshop in Luzern, Switzerland, on October 16th, 2013. The objectives and key elements of the Swiss *Energy Strategy 2050* were presented and the relevance of DSM to the latter were pointed out. In addition, a broader overview regarding overall current activities was provided, including the [Smart City](#) approach, combining IT with social sciences and the *Smart Meter Rollout Assessment* described in the Subtask 1 analysis. The latter seemed to be of particular interest to the participants, especially in reference to the two Smart Meter Case studies made in Zurich and the Canton of Thurgau. There was also a very interesting presentation on designing [smart water meter feedback](#), using a polar bear drowning on an ice floe<sup>19</sup>. The main issues and constraints described by the participants were related to incentives and regulation, especially in the face of the new Energy Strategy, to rebound effects and awareness raising. For this reason, the regulatory framework still remains a source of uncertainty for stakeholder decisions.

## Storytelling Methodology

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

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


However, it is not:

- a reason to bypass 'proper' analysis.

Storytelling is a very powerful social science methodology to ensure recall, engagement and interest. The initial impetus to use storytelling in Task 24 was created in our largest, [Oxford workshop](#). The story of Task 24 is told [here](#) (at the March 2014 NERI Conference as Pecha Kucha)

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<sup>19</sup> Tiefenbeck, V., Goette, L., Degen, K., Tasic, V., Staake, T., ewz-Amphiro Study: On the Effectiveness of Real-Time Feedback: The Influence of Demographics, Attitudes, and Personality Traits, Final report to the Swiss Federal Office of Energy; July 2014.



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?

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

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

### The Task 24 Extension

#### Switzerland's involvement going forward

Switzerland has not yet agreed to join the Task 24 extension, although they have indicated a 'weak maybe' at the last ExCo meeting in Graz (October 2014).

The need for further research and mutual knowledge exchange among the participating countries of the Task 24 extension is apparent also for Switzerland: In fact, the share of rented homes is still more important than owned properties, providing several challenges when designing behaviour change interventions targeting at higher energy efficiency. SMEs still struggle with acknowledging the incentives for taking measures towards more energy efficiency and for committing to energy saving contracting. The sobering energy saving results of smart meter pilot projects in Switzerland are not only due to the relatively low electricity prices, but also to the yet underestimated active and focused feedback as well as to the still missing cooperative or competitive approach (e.g. European energy-saving contest). Behaviour change research towards more public and sustainable transportation has to be intensified: How can car owners be motivated to change the mode of transportation?

All these issues will be addressed in the Task 24 Extension in a way that it will tie in well with further recommendations for Switzerland's energy roadmap, including further energy saving measures as important cornerstones of the *Energy Strategy 2050*. The Task Extension would allow the Swiss National Expert to establish an integrated interdisciplinary framework that offers a systematic basis for linking the different aspects in research on energy related consumption behavior, thus paving the way for establishing a better evidence base to inform societal actions.

# 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	<a href="#">Brussels, BE</a>	24	8	XM	3	8	13
9-10/ 10/12	<a href="#">Oxford, UK</a>	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	<a href="#">Dubai, UAE</a>	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	<a href="#">Graz, Austria</a>	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	Hyères, FR	450+	45	IEEE summer study, 1 presentation, 3 informal sessions
8/7/13	Nisyros, Greece	100+	10+	Task 24 presentation by Swiss expert at ELCAS
7/10/13	Copenhagen, DE	100+	15+	IEEE ISGT conference - also leading Consumer Behaviour panel
16/10/13	Luzern, CH	30+	10+	IEA DSM Workshop
8/10/13	Stockholm, SE	8	2	Presentation at Technical Institute Stockholm
11/10/13	Brisbane, AUS	25	2	Skype lecture to Qld University energy efficiency course
20/11/13	Sacramento, US	500+	15+	BECC Conference presentation
20/11/13	Sacramento, US	25+	6	Transport panel at BECC conference
2/12/13	Flanders, BE			Smart Grid conference
12/12/13	Bonn, DE			Expert Roundtable on Energy Efficiency & Behaviour in Developing Countries, German Development Institute
18/3/14	Wellington, NZ	>100	12	NERI conference
12/5/14	Brisbane, AUS	15	2	Lecture at International Energy Center
9/8/14	Washington DC, USA	<100/10000	>25	APA conference
4/9/14	Oxford, UK	<300	>20	BEHAVE conference
11/9/14	Berlin, GER	180	>15	IEPPEC conference
10/10/14	Brisbane, AUS	>10	2	IEC Skype Lecture
23/10/14	Sheffield, UK	>40	2	Seminar at Sheffield Hallam Uni
21-22/1/15	Milan, IT			ESCO lecture
14/1/15	DSM University (online)			Task 24 webinar



## Appendix 2

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### Task 24 Publications, films and reports


- IEA DSM Initial Positioning Paper on Behaviour Change\*
- IEA DSM Task 24 Final Workplan\*
- IEA DSM Spotlight Issues (6 stories so far)\*
- IEA DSM Task Flyer 24 (updated)\*
- IEA DSM website Task 24\*
- Positioning paper and minutes from Brussels workshop\*
- Positioning and definitions paper and UKERC report from Oxford 2012 workshop\*
- 25 minute [professional film](#) summarising Oxford workshop
- [Template](#) for Models of Understanding Behaviour via Case studies in 4 domains
- IEA DSM Task 24 Pecha Kucha presentation (powerpoint/film)^
- 6 participating countries' Pecha Kucha presentations (powerpoint/film)^
- Interviews of experts' own energy stories (film, over 30 so far)^
- NZ World Café report-back (film/presentations/documents)^
- ECEEE summer study (2013) paper on Task 24 by Rotmann and Mourik\*
- ELCAS (2013) paper by Carabias-Hütter, Lobsiger-Kagi, Mourik and Rotmann (2013)\*
- BECC (2013) presentations on Task 24 and transport behaviour^
- Overview of definitions and how they were derived (powerpoint)\*
- Overview of models of understanding behaviour (powerpoint/film)^
- NL, Swiss and NZ stakeholder analyses (Excel)^
- Implementation bloopers (powerpoint/film)^
- 10 presentations on various aspects of behaviour change models (powerpoint/film)^
- Interview with [www.energynet.de](http://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](http://www.ieadsmtask24.ning.com)
  - Task 24 dropbox ([www.dropbox.com](http://www.dropbox.com)) to share templates and collected models etc
  - Task 24 wikipedia ([www.ieadsmtask24wiki.info](http://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


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### Swiss DSM interventions (from 2014 Annual Report)

As described in the last IEA DSM Annual Report, after the grave nuclear accident in Fukushima, Japan, the Swiss government decided that existing nuclear power plants should be decommissioned at the end of their operational lifespan and not be replaced by new nuclear power plants. In order to ensure the security of supply, the Federal Council, developed a new Energy Strategy 2050 which is currently discussed in the Swiss parliament. Beside the expansion of hydropower and new renewable energies, and, if necessary, on fossil-fuel-based electricity production and imports, energy efficiency and demand-side management play an indispensable role in the Energy Strategy 2050. The medium term goals are to reduce energy consumption per capita by 43% and the electricity consumption by 13% by 2035 compared to 2000. A further essential step is the transformation of transmission networks into smart grids for future domestic production infrastructures and electricity imports.

In order to reach these goals the Swiss Federal Government provides amongst others the following measures to promote energy efficiency and CO<sub>2</sub>-emission reductions on the demand side:

- **SwissEnergy:** Swiss Energy is operated by the Swiss Federal Office of Energy (SFOE) and has the role of an Energy Agency to conduct activities on awareness rising, information, consulting, (further) education, quality control, and networking and promotion in the fields of energy efficiency and renewable energy. Further information: [www.energieschweiz.ch](http://www.energieschweiz.ch)
- **Consumer Information:** Energy labels for cars, buildings and different appliances inform customers about the energy efficiency and other attributes of the product.
- **Buildings Program:** The Swiss federal and cantonal buildings program promotes the energy-efficiency renovation of buildings and investment in renewable energies, waste heat recovery and the optimization of building utilities.
- **ProKilowatt – Competitive calls for tenders:** Parts of the grid levy on electricity is used to help finance selected energy efficiency measures that would not pay for themselves purely through the energy savings made. A series of tender calls for projects and programs for more efficient use of electricity in industry and households has been launched by the Swiss Federal Office of Energy since 2010. Companies and organizations may apply for the implementation of efficiency measures within the scope of an annual call for tenders. The main criterion is the cost-benefit ratio (promotion funding per saved amount of energy).
- **Target agreements:** Companies can get exempted from the CO<sub>2</sub> levy on heating and process fuels but need to reduce their CO<sub>2</sub> emissions and increase the level of energy efficiency through the implementation of economically viable measures.
- **Reimbursement of the grid levy on electricity:** Large-scale consumers (= electricity costs of more than 5 percent of the gross value) can be (partly) relieved of the grid levy. These consumers need to have a target agreement and spend at least 20 percent of the reimbursements on energy efficiency measures which are not part of the target agreement.
- **Smart grid:** The SFOE is working hard on the future of the power grid. It is drawing up both a smart grid strategy and a smart grid roadmap for Switzerland. In addition the SFOE will outline a schedule and the available options for developing the power grid in Switzerland, and establish when and where action needs to be taken.
- **Research:** Besides pilot and demonstration projects and research in specific technology areas to improve energy efficiency and renewable energy, the socio-economic interdisciplinary research program Energy – Economy – Society (EES) of



SFOE focuses on economic, psychological, social and environmental issues relating to the extraction, distribution and use of energy.

- In addition, the Swiss cantons and municipalities implemented measures to promote energy efficiency on the demand side, too. Further incentives like for example the development of a stronger energy performance contracting market or the implementation of a white certificate scheme are under discussion.

Further details on the different measures and projects can be found on [www.bfe.admin.ch](http://www.bfe.admin.ch) or [www.energieschweiz.ch](http://www.energieschweiz.ch) Appendix 4.

## Appendix 4

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### 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.'<sup>20</sup>

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

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

### Influence of economic theories on building retrofit intervention design

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

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

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

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

Money makes the world go round

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

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

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

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

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

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

You will save money for a nice weekend to the Bahamas

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

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

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

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

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

Money **still** makes the world go round

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

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

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

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

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

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

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

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

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

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

### *What are the upsides of this economic approach?*

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

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

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

They:

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

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

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

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

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

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

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

**Your life will change**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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



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

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

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

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

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

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

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

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

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

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

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

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

We know your car makes your world go round

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

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

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

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

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

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

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

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

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

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

### **A Story on Norm Activation Theory informed transport interventions**

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

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

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

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

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

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

### **A Story on Cialdini's Social Psychology informed transport interventions**

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

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

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

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

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

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

## **Influence of economic theories on smart metering interventions design**

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

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

## **Influence of psychological theories on smart metering interventions design**

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

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

## Influence of design theories on smart metering interventions design

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

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

### **A Story on Design Theories informed smart metering interventions**

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

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

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

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

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

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

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

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

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

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

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

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

- piloting and building on previous experiences
- participation matters

### **A Story on collaborative learning approaches in smart metering interventions**

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

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

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

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

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

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

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

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

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

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

### **The influence of Nudge on SME interventions**

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

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

### **Influence of using social norms approach on SME interventions**

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

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

### **Influence of the Energy Cultures approach on SME interventions**

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

- Energy cultures differ from company to company

### **A Story on Energy Cultures in SMEs**

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

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

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

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

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

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

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

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

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

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

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

## **Influence of using Collaborative learning approaches on SME interventions**

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

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

**Table 1. Example of interventions (both regulatory and non-regulatory) available to policymakers when trying to change light bulb purchasing behaviours<sup>21</sup>.**

<sup>21</sup> From the UK's Parliamentary Office of Science & Technology (2012). Energy Use Behaviour. Number 417.

**Box 2. Ladder of Interventions<sup>1,6</sup>**

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

## Appendix 5

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### Swiss Stakeholder Feedback

Feedback from Swiss Behaviour Changers was collected during the Luzern workshop and can be accessed here:

[https://www.dropbox.com/s/wx68lx6fxdleha9/Copy%20of%20Stakeholder\\_questionnaires.xls?dl=0](https://www.dropbox.com/s/wx68lx6fxdleha9/Copy%20of%20Stakeholder_questionnaires.xls?dl=0)

## Appendix 6

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

#### Building Retrofit Recommendations:

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

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



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

## Transport Recommendations:

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

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

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

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

### Smart meter/feedback recommendations:

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


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

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

### SME recommendations:

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

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



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

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

## Appendix 7

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### 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?