Task on Hard-to-Reach (HTR) Energy Users

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Executive Summary

Behavioural-oriented policy initiatives are rather limited, and often confined to experimental settings and utility-driven programmes. A recent, global review of policy efforts at the national and city level addressing low-carbon energy technologies showed a clear focus on technology market development (mostly subsidies) and market failures (particularly, information asymmetries). In fact, policy efforts addressing behavioural anomalies explicitly, are the exception. We believe that there may be a significant percentage of the human population that is currently not engaged or informed by our many efforts to elicit change in their energy-efficient technology uptake and energy consumption. This is even more so the case once you expand from hard-to-reach individuals and groups in the residential, to those in the commercial sectors, and across all fuels and energy services, including mobility. This, potentially very large energy user group is the focus of this new IEA DSM Task.

Overarching Objectives and HTR definition

This Task will provide country participants with the opportunity to learn and share successful approaches how to identify and engage "hard to reach" (HTR) energy users. The Task will facilitate the development of robust social science-based guidance for designing programmes (e.g. national, municipal, utility-driven) that are more tailored to specific HTR audiences. It will also help identify effective approaches for improving existing programmes to increase uptake among specific HTR segments. To summarise, this Task serves four main objectives:

1. Identify and analyse who the HTR energy user segments are in the residential and commercial sectors encompassing all fuel types and energy services (including mobility), and provide guidance on how to best find and approach them.
2. Review behaviour change techniques and interventions (including the roles of legislation and regulation), to assess what has worked well (and not-so-well) in engaging HTR energy users across participating countries and varying contexts.
3. Leverage insights from participating countries' programmes and case studies to develop practical guidance for how to reach the HTR customers in energy efficiency and DSM interventions, run better engagement trials, and monitor / evaluate outcomes.
4. Provide policy and programme recommendations for the design, implementation and evaluation of energy efficiency and DSM behavioural-oriented measures on HTR in participating countries.

> *"In this Task, a hard-to-reach energy user is an energy user from the residential and commercial sectors who uses any type of energy or fuel and energy services, including mobility, and who is typically either hard-to-reach physically, underserved, or hard to engage or motivate, for a variety of reasons. These could include lack of access to information, lack of government or industry policies and programmes targeting such user groups, lack of financial means, lack of confidence, vulnerability, or being a new type of user (e.g. new technology owner) who has not yet been identified or engaged by the relevant agency."*

Motivation, Research Questions and Null Hypothesis

The motivation for this new work comes from five directions:

1) **To build on IEA DSM Task 24 behaviour change expertise and global expert network** as well as using the many tools that were developed and have successfully informed policy in our participating countries. These are described in the Task 24 Toolbox for Behaviour Changers (Rotmann, 2018a).

> **Research Question:** *How can the toolbox for Behaviour Changers developed by Task 24 be used to support better interventions targeted at the hard-to-reach energy users?*

2) **To explore the many differing definitions of what constitutes a "Hard-to-Reach"** (and thus motivate and engage) energy user or customer, in the residential and commercial sectors and to assess different approaches and barriers when targeting these users (including potential gender bias and/or socio-economic inequalities).

Research Questions: *Who are HTR energy users in each participating country? How can they be defined and described? How materially are these HTR markets underserved?*

3) **To test the hypothesis that this underserved user group may entail a large number** of energy users (particularly when we define "hard-to-reach" also as "underserved", "hard-to-motivate or engage", see below) which also means there is a large potential for energy efficiency and conservation improvements.

Research Questions: *Based on country statistics and expert opinions, what is the approximate, estimated size of the HTR user group in each participating country? How many vulnerable HTR users are situational and transitory and can we better quantify these groups by better categorising them? Based on implemented pilots and case studies in each participating country, what is the potential effectiveness (or effect size) that one can expect from behavioural-oriented policy intervention on this group?*

4) **In addition, this Task will aim at collecting insights into best practice and shared learnings** about what type of interventions have the greatest potential to motivate and engage the HTR, and which were less successful (and why).

Research Questions: *What type of policy interventions (e.g. non-pricing mechanisms addressing contextual factors) and behaviour change programmes have the potential to motivate and engage HTR users to use energy most effectively and efficiently? What is the level of public acceptability of such policy interventions in each participating country? What are the ethical challenges associated to them?*

5) **To explore opportunities for non-state sector co-funding to develop and test field research pilots** for HTR energy users based on international best practice. We will show how behaviour change interventions on this target group work in practice. These interventions will provide positive financial, energy efficiency and social (including health) outcomes for this user group - as well as macro-economic benefits for their countries, whilst contributing to significant climate change targets, globally.

Research Question: *Can we use field research pilots to prove that a robust, internationally-validated, standardised process for behavioural interventions on the HTR, is a better approach than the current scattergun one?*

Our null hypothesis, which we hope to test with the help of experts from our participating countries, other expert contributions and the IEA Secretariat (see Subtask 2a) is as follows:

A significant proportion (>30%) of the population in the residential and commercial sectors currently falls under the category of "hard-to-reach" energy users as defined by this Task.

Outputs and Outcomes

By cost- and task-sharing and a lot of expert contributions from in-kind support we are leveraging at least 90 person months of expert time for this 3-year Task. This is based on three participating countries. With every additional country that joins, we will gain at least 6 additional months of National Expert time.

The table below outlines the main deliverables from this work.

Subtask	Deliverable	Deliverable Name	Deliverable Type
0	D0	Work plan defined and signed off	Report
0	D1	Co-supervision of PhD students	PhDs
1	D2	Expert network and dissemination	Various
1	D3	At least 3 international expert workshops	Workshops
1	D4	2 peer-reviewed scientific papers	Scientific articles
2	D5	HTR Definition	Slide deck
2	D6	Country definitions and case study analyses	Reports
2	D7	Literature Review	Report / Article
2a	D8	International publication on HTR	Book
3	D9	Standardised research process	Toolbox / Article
4	D10	Field research pilots	Reports, Policy Briefs

The main impact expected from this Task is to *develop a greater understanding who the HTR energy user group is and how to better engage these users with well-designed and targeted interventions*.

General outcomes from collaborating on this international research Task are:

- Global networking and collaboration to share learnings and stop duplicating efforts;
- Access to cutting-edge expertise, tools and resources which will aid cross-country comparisons;
- Co-creation and promotion of new solutions to old problems, turning participating countries into leaders on how to engage this important and underserved energy user group;
- Insights for industry into serving their "Hard-to-Reach" customers by leveraging learnings from a wide range of different countries', sectors' and research disciplines' expertise and case studies;
- Three PhDs associated with this Task researching in depth various aspects of the HTR;
- Stakeholder and end user research that enables a better understanding of the contextual factors affecting HTR energy users in different countries and sectors, allowing us to better target them;
- Guidance on how to better apply behaviour change interventions on this HTR user group in the residential and commercial energy sectors; including how to align different "Behaviour Changers" to design and run field pilots and evaluate interventions to prove real, long-term change;
- Analysis into how large this energy user segment could be in different sectors, fuels and countries - this should drive changes to government policies (including regulation and legislation) and industry / community sector programmes paying more attention to this underserved user group;
- More capacity to apply behaviour change insights to policy making and real life interventions in IEA DSM countries, including through collaboration with the G20, IPEEC and Energy Efficiency in Emerging Economies (E4) programme, as well as major energy efficiency and behaviour change collaborations such as ACEEE, eceee, BECC, BEHAVE and selected H2020 programmes;
- High quality and accessible dissemination of HTR case studies and field research - becoming the depository of global knowledge on hard-to-reach energy users.

Rationale (Why)

Background

It is generally agreed that large-scale energy efficiency and behaviour change efforts kicked off in response to the early 70s oil shocks (e.g. Whitford, 2015). It even has been argued that they almost single-handedly created "a selective and conservationist approach, which was practically absent heretofore in our consumer society" (Perez-Guerrero 1975, 44), and served as "turning points" that defined the following quarter-century of Western energy policy (Venn 2002). These efforts have been ongoing, more or less, in most OECD countries. However, the behavioural potential for reducing energy waste and consumption remains vast (at least 20%, probably more like 30%, see Dietz et al, 2009) and the relatively slow uptake of energy efficiency relative to its value is still regarded as a market failure (e.g. Gillingham & Palmer, 2014). These authors showed that the way individuals make decisions about energy efficiency leads to a slower diffusion of energy-efficient products than would be expected if consumers made all positive net present value investments. There are several behavioural anomalies (e.g. limited attention, loss aversion, status quo bias) that help explain this, though a key issue is the extent that some of them have become systematic, leading to "behavioural failures". Karlin, Zinger, and Ford (2015) outline four such characteristics of energy use that present challenges in this regard - namely that energy use is *abstract, nonsensory, consists of multiple behaviours*, and is of *low personal relevance*.

Many of our behaviour change efforts focus on uptake of energy-efficient technologies in developed countries and so-called "green consumption" (Lorenzen, 2014). Much of our focus is on technology choice *per se*, with a lot less on the cognitive, motivational and contextual factors that are affecting those choices (e.g. Mourik and Rotmann, 2013). Jackson (2011) examines the complex relationship between income and human well-being. He argues that the rich world has a responsibility to "make room for growth" (similar to the "Contraction and Convergence concept" central to the Rio 1992 Sustainability Charter) where it matters most in terms of improved well-being: in the poorest nations (and, we would like to add: the most vulnerable and underserved members of the community in any nation). He argues that this cannot be achieved simply through efficiency improvements or material "decoupling".

Relatively speaking, behavioural-oriented policy initiatives are rather limited, and often confined to experimental settings, and utility-driven programmes (e.g. OECD, 2017; Andor & Fels, 2018; Rotmann and Ashby, 2019). Mundaca et al (2018) undertook a global review of policy efforts (at the national and city level) addressing low-carbon energy technologies. Results show a clear orientation towards technology market development (mostly subsidies) and market failures (particularly, information asymmetries). In fact, policy efforts addressing behavioural anomalies explicitly, are the exception. We believe that there may be a significant percentage of the human population that is currently not engaged or informed by our many efforts to elicit change in their energy-efficient technology uptake and energy consumption. This is even more so the case once you expand from hard-to-reach individuals and communities in the residential, to those in the commercial sectors and looking at different types of fuel and energy services, including mobility. **This, potentially very large energy user group is the focus of this new IEA DSM Task.**

Overarching Objectives

This Task will provide country participants with the opportunity to learn and share successful approaches how to identify and engage "hard to reach" energy users. This can include a wide range of behavioural interventions such as providing energy audits and advice, energy savings tips, energy-efficient technology or Apps to control and reduce energy consumption, energy savings kits etc. The Task will facilitate the development of robust social science-based guidance for designing programmes (e.g. national, municipal, utility-driven) that are more tailored to specific HTR audiences. It will also help identify effective approaches

for improving existing programmes to increase uptake among specific HTR segments. To summarise, this Task serves four main objectives:

1. Identify and analyse who the HTR energy user segments are in the residential and commercial (including industrial and service) sectors; including how to best find and approach them.
2. Review past and potential behavioural techniques and interventions, assessing what has worked well (and not-so-well) to engage HTR customers across participating countries and varying sectors, fuel types, services and contexts.
3. Leverage insights from participating countries' programmes and case studies to develop practical guidance for how to reach the HTR customers in energy efficiency and DSM interventions, run better engagement trials, and monitor / evaluate outcomes.
4. Provide policy and programme recommendations for the design, implementation and evaluation of energy efficiency and behavioural-oriented interventions for the HTR in participating countries.

Motivation and Research Questions

The motivation for this new work comes from five directions:

1) **To build on IEA DSM Task 24 behaviour change expertise and global expert network** as well as using the many tools that were developed and have successfully informed policy in our participating countries. These are described in the Task 24 Toolbox for Behaviour Changers (Rotmann, 2018a).

Research Question: *How can the toolbox for Behaviour Changers developed by Task 24 be used to support better interventions targeted at the hard-to-reach energy users?*

2) **To explore the many differing definitions of what constitutes a "Hard-to-Reach"** (and thus motivate and engage) energy user or customer, in the residential and commercial sectors and to assess different approaches and barriers when targeting these users (including potential gender bias and/or socio-economic inequalities). This would include an assessment of the different HTR groups and segments that the participating countries are trying to reach, an identification of which of these HTR segments are common across multiple countries, and which are less so.

Research Questions: *Who are HtR energy users in each participating country? How can they be defined and described? How materially are these HTR markets underserved?*

3) **To test the hypothesis that this underserved user group may entail a large number** of energy users (particularly when we define "hard-to-reach" also as "underserved", "hard-to-motivate or engage", see below) which also means there is a large potential for energy-efficiency and conservation improvements.

Research Questions: *Based on country statistics and expert opinions, what is the approximate, estimated size of the HTR user group in each participating country? How many vulnerable HTR users are situational and transitory and can we better quantify these groups by better categorising them? Based on implemented pilots and case studies in each participating country, what is the potential effectiveness (or effect size) that one can expect from behavioural-oriented policy intervention on this group?*

4) In addition, this **Task will aim at collecting insights into best practice and shared learnings** about what type of interventions have the greatest potential to motivate and engage the HTR, and which were less successful (and why).

Research Questions: *What type of policy interventions (e.g. non-pricing mechanisms addressing contextual factors) and behaviour change programmes have the potential to motivate and engage HTR users to use energy more effectively and efficiently? What is the level of public acceptability of such policy interventions in each participating country? What are the ethical challenges associated to them?*

5) **To explore opportunities for non-state sector co-funding to develop and test field research pilots** for HTR energy users based on international best practice and the Task 24 toolbox for Behaviour Changers. We need to show that behaviour change on this hardest-to-reach target group actually works in practice - thus opening up a very large potential new energy user group that can be targeted for tailored behaviour change interventions. These, in turn, will provide positive financial, energy efficiency and social (including health) outcomes for this user group - as well as macro-economic benefits for their countries, whilst contributing to significant climate change targets, globally.

Research Question: *Can we use field research pilots to prove that a robust, internationally-validated, standardised process for behavioural interventions on the HTR, is a better approach than the current scattergun one?*

1. Building on, and utilising tools from Task 24 on Behaviour Change in DSM

This work was inspired by, and is a natural extension of the highly-successful Task 24 which ran from January 2012 to December 2018. This first global research collaboration on behaviour change in DSM aimed at facilitating and sharing knowledge between multiple stakeholder sectors and developing recommendations about the influence of behaviour change in the effective implementation of energy-efficiency policies and programmes. After a period of building the theoretical framework and collecting and analysing case studies (Phase I), Task 24 has now finished the second phase (Phase II), which focused on engaging actual "Behaviour Changers" from five major sectors in co-designing real life interventions. This work, which is described in almost 100 publications, included:

- Undertaking almost 60 country workshops with 100s of Behaviour Changers in 17 countries;
- Mutually-agreeing on a main topic of interest for each of the participating countries;
- Undertaking landscape and stakeholder analyses in these countries;
- Supporting them with evidence-based scientific approaches and practical case study comparisons from other countries along the way; and
- Designing behavioural interventions that were then implemented and evaluated in real life pilots.

The Task also created a global expert network of 400+ Behaviour Changers from over 20 countries. The relationships and tools developed in Task 24 are invaluable and will be built on further with this work.

2. Differing definitions of HTR in the residential and commercial sectors

The focus on, and definitions of energy users that are hard-to-reach will very likely differ between countries, but also between sectors within countries. There is clearly a wealth of research to be undertaken in this area, which will be of global interest in light of the necessary societal and system transformations to avoid climate catastrophe and ecosystem collapse (Jackson, 2011). We will work together with our participating country experts to create an overarching, broad definition like our IEA DSM Task 24 definitions on energy behaviour and behaviour change (Rotmann and Mourik, 2013). For now, we propose this draft definition of hard-to-reach energy users for this Task:

"*In this Task, a hard-to-reach energy user is an energy user from the residential and commercial sectors who uses any type of energy or fuel and energy services, including mobility, and who is typically either hard-to-reach physically, underserved, or hard to engage or motivate, for a variety of reasons. These could include lack of access to information, lack of government or industry policies and programmes targeting such user groups, lack of financial means, lack of confidence, vulnerability, or being a new type of user (e.g. new technology owner) who has not yet been identified or engaged by the relevant agency.*"

Through this HTR Task, this initial draft definition will be refined, and several subsets within each sector will be identified to specifically address through this work. Although this Task will begin with a broad definition that captures the breadth of what is included under the "Hard to Reach" umbrella, definitions of smaller subsets will also help identify which HTR audiences may be the most promising to address through this international collaboration (see Research Questions, above).

Previous Task 24 work on this topic, in collaboration with the U.S. Consortium for Energy Efficiency (CEE), has shown just how divergent the definitions of HTR customers can be (see Rotmann and Ashby, 2019). US and Canadian utilities interviewed during the last year of Task 24 Phase II defined "hard-to-reach" customers as:

- Low income or from lower socio-economic groups
- In energy hardship or fuel poverty ("vulnerable customers")
- Rural, isolated or physically hard-to-reach communities
- Hard to motivate or engage customers
- Underserved customers
- Tenants in multi-family apartment buildings (where the landlord paid the utility bills)
- Not connected to internet or smartphone
- Disadvantaged communities, e.g. indigenous or immigrant communities
- Small to medium businesses.

Residential sector

Work in the UK (see Ambrose, to be published) also includes Citizens Panels with the hardest-to-reach (and most vulnerable), including people who are: Recently out of homelessness; recently released from prison; users of food banks; suffer poor mental and physical health etc.

OR, the hardest-to-reach can be grouped as:

- *The chaotic*, because of drink and drug problems;
- *The scared*, because they do not want to bother their landlord;
- *The hidden*, because they are in such poverty, they only just exist, so any change could make matters worse. Thus, it is better to avoid all change. They have consistently been treated badly by the utilities, so they do have personal experience to enforce their distrust;
- *The ill,* those with mental ill health or disabilities;
- *The stoic,* 'I'm not complaining' group;
- *The proud*, "I know everything in this field and I am doing everything it takes". They may know a lot but not everything, and they are not connected to the decision makers and so they tend to complain about the government's lack of progress; and
- *The skeptic*, who don't believe they can do any improvements, perhaps because they don't have the money / time to invest or it is not their priority or they think it is too difficult to engage their partners / community / coworkers.

Brenda Boardman (e.g. Boardman, 1991), who has studied fuel poverty for 5 decades says: "*They will never self-identify, or self-refer. You might get some through health links, but even then they would probably refuse assistance. A pepper-potting, individual targeting approach will never reach them all. The ONLY way to get them involved is when they want to be helped and I think this might happen best through their neighbours and community.*"

Examples

In the Spanish residential sector, one of the main barriers or difficulties to engage users (especially when it relates to energy management or improvement of the common spaces and building) is the fact that most of the multi-family apartment buildings are owned by several households (individuals, but also banks and real

estate companies). About 60% of the dwellings are in multifamily apartments according to Spanish Statistical Office data from 2011. Many of them rent and don't pay the utility bills (also called the “Split Incentive barrier” (e.g. Melvin, 2018). This situation makes it very difficult for them to reach agreements on the management of the common spaces and there are no leading actors promoting energy renovations of the buildings and common installations. Our Spanish PhD student will focus on the energy cultures of these, and other HTR groups.

In New Zealand, energy poverty and socio-economic inequality have been shown to be a major issue when it comes to the hard-to-reach in the residential sector (O’Sullivan et al 2011). Particularly Māori and Pacific Island communities are disproportionately hit by the negative health effects of energy inefficiency and poor housing (e.g. Howden-Chapman and Tobias, 2000; O’Sullivan et al, 2013). These groups have also been shown to be more difficult to reach with government insulation subsidy programmes than other populations (e.g. Barnard et al, 2011 p24). Our NZ fuel poverty National Expert also found a significant risk factor for young people living in cold housing and fuel poverty (O’Sullivan et al, 2017).

According to our Chief Advisor Aimee Ambrose (forthcoming), UK initiatives and services intended to support individuals and households with energy-related problems (i.e. high bills, cold homes, poor energy efficiency etc.) consistently fail to reach the most marginalised, vulnerable and low income households. Resources are instead taken up by consumers better positioned to take advantage of the help on offer. There is very little existing knowledge or good practice in relation to engaging the hardest-to-reach in energy-related initiatives with the potential to improve their health, wellbeing and prosperity. This knowledge is vital as energy prices continue to rise and such households face higher energy costs as a proportion of their income (Bouzarovski and Herrera, 2016) than other groups in society in addition to increasing pressures allied to welfare reform and limited access to social housing.

A recent report from the UK Committee on Fuel Poverty (2018) said of government progress towards eradication of the problem that: "*Overall progress is stalling, with a mixed performance across each of the three main measures. Since introducing the strategy in 2014/15 the total number of households in fuel poverty is up by 210,000 to 2.55 million. Ministry of Business, Energy and Industrial Strategy (BEIS) forecast progress on upgrading the energy efficiency levels of fuel poor homes is 2% to 6% lower than previously forecast. We estimate that the funding needed to complete the strategy has therefore grown from £15.4 billion in our 2017 Annual Report to £17.1 billion.*" In spite of this failure to impact significantly on fuel poverty, the UK government’s flagship energy efficiency scheme only reserves 30% of the funding available for the treatment of fuel poor households but have pledged to reverse this in future rounds.

Research by Project Partners Sheffield Hallam University and Citizens Advice (see Ambrose et al, to be published) with a panel of highly marginalised and vulnerable energy users in England revealed that participants face multiple and complex barriers to engaging with the energy advice services on offer, that are both structural and personal in nature. For example, anxiety associated with the need to telephone energy companies or other energy advice providers was widely reported and where face-to-face support is not readily accessible, nearly all participants preferred to tolerate the problems they were experiencing rather than engage through other mediums such as on the phone or online. This was the case even in the face of considerable problems such as being owed hundreds of pounds by an energy supplier; having a young child with cold-related illness and in the case of one participant, having a prepayment meter installed in their home without their knowledge.

In the case of Norway and Sweden, research indicates that the elderly may constitute as being hard to reach due to a number of reasons. Even though many who are in the later stages of life in Norway have a sound financial standing and often enjoy this freedom by investing in energy efficiency measures, factors like the onset of illness have been observed to possibly cause severe rebound effects (Throndsen and Berker 2012). This report also uncovered that different energy consumption ethics may manifest in households of the

elderly, where memories of a more resource-strict past had caused values of consumption sobriety and conservation, even in the face of too-low temperatures. A study by Throndsen and Ryghaug (2017), which explored the potential for smart metering technology to affect consumption behaviour in end users, found that certain issues resonate with the elderly more strongly than others. This could possibly constitute challenges to implementing new energy technology in a meaningful way. Specifically, respondents in focus groups were concerned about the knowledge gap, and its potential for rendering older individuals lacking technological experience unable to adapt to price signals. Another concern that was voiced was that (relatively small) incentives toward consumption reduction or time shifting would not make sense after living a long life in the face of well-established habits and routines. Sweden, which has been found to have the lowest rate of energy poverty in the world (see Thomson et al, 2017), has also identified the elderly living on their own in too-large and inefficient houses as a potential HTR user group.

Researchers in Portugal used novel methodologies to map the potential for fuel poverty of residential dwellings (Simoes et al, 2016). On average, 22% of the inhabitants were found to be potentially fuel poor regarding their dwellings' space heating and 29% regarding space cooling. There was a large variation across the country. Another study (Gouveia et al, 2018) tried to identify heating and cooling thermal performance gaps in energy poor and "obese" households. The existence of these gaps allowed confirming and/or discarding the initial hypothesis of the poverty or obesity conditions. Results disclose socio-economic variables, as income, and consumers' behaviour as key determinants of electricity consumption. A major conclusion of this study was that electricity consumption cannot be used alone to segment consumer groups.

There is likely also a HTR segment in the mobility domain (which is of interest to the G20 Transport Task Group) that overlaps with the energy sector, such as:

- (Rural or remote) passenger vehicle owners with no access to public transport, including ones who may benefit from switching to electric vehicles (EVs);
- Individual heavy vehicle drivers;
- Heavy vehicle fleet managers;
- Individual light and medium goods vehicle drivers etc.

In New Zealand, for example, EVs are usually thought of as only suitable for urban areas. However, the higher travel distances done by rural and peri-urban households with poor public transport access make the total cost of ownership of EVs more compelling (particularly as second-hand EVs start to become available). In addition, many rural areas have seen the closure of local fuelling stations and now have to drive out of their way to refuel. EVs can be charged at home making charging vehicles in rural areas more convenient that refuelling.

Commercial sector

Pacific Gas & Electric (PG&E, 2001) also did work on this subject in the commercial sector in California and described the hardest-to-reach customers as such:

1) Small business customers that have fewer than 10 employees;
2) Businesses in leased space;
3) Rural business customers;
4) Strip malls;
5) Local chain or single-location restaurants;
6) "Mom and pop" restaurants and stores; and
7) Convenience stores.

Examples

In California, the PG&E 2001 report found that the majority of HTR segments as identified by the Californian Public Utility Commission (CPUC) have historically been under-served by

utility-funded programmes. In particular, this included small customers that have less than 10 Employees, businesses in leased space, strip malls, local chain or single-location restaurants, and convenience stores. Of these, the two most significant segments are renters and businesses with less than 10 employees, which combined comprise over 60 percent of the small / medium non-residential population in terms of annual energy consumption. Furthermore, these two segments overlap significantly with strip malls, convenience stores and local chain / single-location restaurants.

In the commercial sector in Spain, it was found that the hardest to reach are the contractors that are in charge of the building (Ruiz, 2010). For example, janitors and cleaning service employees are usually contracted externally in Spain. Sometimes, the people who manage a great part of the energy consumption, are hidden to the building owners, staff and other users of the building. Few, if any efforts, have been undertaken to engage this important HTR group.

Our Task 24 case study in the largest health network in North America (see Cowan et al, 2017 and 2018) also focused on building operators and facility managers as a hard-to-reach user group. They felt both *invisible* in terms of the importance that their work had on the survival of patients and effective (but not necessarily efficient) running of the hospitals, and *over-blamed* when it came to the perception of any impacts of building performance on patient comfort or health. This multi-award winning pilot showed that well-designed behaviour change interventions that aim to have a collective impact, can lead to significant impacts (up to 18% in energy savings in one pilot building) and changes in both individual behaviours and corporate culture. Nursing staff were also highlighted during this pilot, as a hard-to-reach user group with a lot of potential for impact on energy use in the health sector.

Lopes et al (to be published) are studying organisational and behavioural demand response in SMEs in Portugal (see also Catarino et al 2015). In Portuguese companies, the major behavioural barriers appear to be limited time, information, and cognitive capacity to process complicated and unfamiliar choices (Catarino et al, 2015; Henriques & Catarino, 2016). It is important to know what kind of information and feedback is most effective at influencing businesses' energy decisions. Changing individual energy behaviours requires not simply new technologies, price incentives or information campaigns, but strategies that address both internal and external influences on behaviour and corporate culture change. In the Portuguese public sector, Figueres et al (2018) found a low adoption level of integrated sustainability policies and practices, despite the expected positive trends related with the mandatory social and economic practices.

In New Zealand, we have analysed a case study on heavy vehicle fleet driver behaviour training by New Zealand Post (Mourik and Rotmann, 2013). During training development, it became clear very quickly that the individual drivers who were contractors and not directly employed by NZ Post were very hard to reach - in terms of training engagement - by the NZ Post sustainability manager. However, when they instead chose some of the most respected drivers to become the others' trainers and mentors, the training uptake and responding reduction in fuel emissions from more efficient driving behaviours, rose significantly. This is a good example of the importance of understanding your "ABCDE building blocks of behaviour change" (see below):

A. Your **Audience** - the independent driver contractors and their contexts and needs;
B. Their **Behaviours** - varying inefficient driving behaviours (up to 40% difference in fuel efficiency when tested!), yet almost all thought they were above-average drivers when initially surveyed;
C. The **Content** of the messaging - how to drive more fuel efficiently and safely, delivered as a training programme; see also
D. The **Delivery** mechanism of the message - initially, delivered by NZ Post but when that was shown to be largely unsuccessful it was changed to instead being delivered by the most respected drivers as trainers and mentors; and

E. The ex-post **Evaluation** of the programme, which in this case showed an average of 15% reductions in fuel use from more efficient driving behaviours.

3. Testing our Hypothesis

Not much, if any, work has been undertaken in estimating the proportion of the hard-to-reach as part of the general population. There have been country-level efforts to determine the percentage of the population in fuel poverty (e.g. Committee on Fuel Poverty CFP, 2018; Howden-Chapman et al, 2011) and international efforts to analyse access to energy (e.g. IEA, 2017), but we are not aware of a global, cross-national study that tried to ascertain the extent of this underserved user group - especially not in both major energy-using sectors (residential and commercial). We hope to undertake primary research, using existing country-level statistics and stakeholder surveys, to ascertain the approximate size of the HTR energy user group in each of these sectors.

Our null hypothesis, which we hope to test with the help of experts from our participating countries, other expert contributions and the IEA Secretariat (see Subtask 2a) is as follows:

A significant proportion (>30%) of the population in the residential and commercial sectors currently falls under the category of "hard-to-reach" energy users as defined by this Task (see above).

4. Field research pilots to test better approaches to reach the HTR

As Phase II of Task 24 has shown, the best way to prove that a behavioural intervention has worked is to test it in the field (e.g. Cowan et al, 2017). In order to do so in a way that can yield cross-country comparisons, we propose to use the tools and recommendations highlighted in the *Toolbox for Behaviour Changers* and by our Project Partners See Change Institute, to co-create a standard, internationally-validated process to **align, define, design & deploy** (which includes **evaluation** of the pilots) such interventions. The only way this process can be validated and standardised is to test it in the field. Once it has been tested, including by cross-country comparisons, outcomes from the pilots can be utilised to support policy message framing and development of further pilots and programmes for the HTR. We hope to attract several co-funders, including non-state actor sponsors and experts willing to share resources and data to undertake several such field pilots in our participating countries. This can take the form of currently-existing field pilots and programmes being adapted to this process.

Our experience in Phase II of Task 24 has taught us that field research piloting can be quite difficult and expensive but is also very rewarding and well-worth its initial investment (see Cowan et al, 2018 for example). Not all of our participating countries may be able to fund field research pilots on the chosen topics of focus (decided on in the DEFINE Phase, see below) from scratch. However, we will still be able to apply our process *ex-durante* and even *ex-post* to relevant pilots that are either currently underway or have recently been completed. We have learned from Task 24 that it is best to be flexible when it comes to how field research pilots will be chosen, supported and / or co-funded, as a lot of possibilities will open up once Subtasks 1 and 2 are underway. Not every country will have to co-fund and undertake a full field research pilot as part of this Task. The decision to do so will depend on the interest, engagement, and non-state actor networks that we can establish, as well as any (changes in) policy directions etc. that may help drive it.

Methods & Process (How)

Multi-stakeholder and trans-disciplinary collaboration

Sovacool (2014) said, in a review of 15 years of energy social science research: "*Coupled with the need for more interdisciplinary breadth is the promise of comparative case study research. Comparative studies, by producing more data than a single case, can more rigorously generate and test hypotheses across multiple areas, resulting in stronger evidence through a convergence of findings, and a wider applicability of results. Moreover, when researchers from different backgrounds are incentivised to conduct collaborative and cross-national projects, they can capitalise on their strengths and offset potential weaknesses*."

Hantrais (1995) noted: "*Comparisons can lead to fresh, exciting insights and a deeper understanding of issues that are of central concern in different countries. They can lead to the identification of gaps in knowledge and may point to possible directions that could be followed and about which the researcher may not previously have been aware. They may also help to sharpen the focus of analysis of the subject under study by suggesting new perspectives*."

The International Energy Agency's (IEA) Technology Collaboration Programmes (TCPs) highlight, in their name, the importance of research and technology collaborations. Over 6000 scientists partake in the 38 TCPs. We believe that IEA DSM Task 24 has created one of the most extensive and engaged expert collaborations, extending its reach to all sciences studying "behaviour" (grouped into the 3 main disciplines of psychology, economics and sociology but encompassing many sub-disciplines) and other "Behaviour Changers" from government, industry, the community and service sectors (see Rotmann and Mourik, 2013; Rotmann, 2016). The entire premise of the Task 24 "Behaviour Changer Framework" (Rotmann, 2016) is based on facilitating multi-stakeholder collaboration, following a *Collective Impact Approach* (Kania and Kramer, 2011). We will utilise and build on these networks and collaboration tools in this Task. We will specifically aim to co-develop and -test an internationally-validated, standardised research process to enable data collection and analysis, as well as intervention design and implementation, in this Task (see Subtask 3).

Task aims and research process

The primary aim of the Task is to enable participating countries to improve policy, industry, research and community outcomes focusing on hard-to-reach energy users, by applying insights and lessons learned from collaboration with other countries and global experts.

The detailed objectives and deliverables (see below) were decided collaboratively during four multi-country and national expert meetings over 4 months, from November 2018 to March 2019. Over 60 experts from 17 countries and 2 international organisations (IPEEC and G20) were contacted and given opportunity to provide input into this work plan.

Some past research efforts have sought to compare strategies for engaging customers in energy efficiency / demand response, yet nearly all energy programmes in the "real world" are comprised of multiple strategies (SCI, unpublished). For example, Home Energy Reports (HERs) combine general information, feedback, and social comparison strategies to change behaviour and can be delivered via email, print mail, or both. Although considerable attention has been given to identifying and categorising strategies, there is no clear consensus on the best way to do this and even less on how to successfully combine them in a field setting.

While this approach to energy programmes has led to some gains in our understanding of strategies to influence energy use, impacts have been inconsistent and it's not always clear which part of a programme is

actually leading to savings. Estimates of savings from individual behavioural programmes range from 0%-23%, with most programmes in the residential sector saving between 0-6.5% (Sussman et al, 2016; Doherty et al, 2015). Savings vary significantly within and across strategies and within and across populations. As such, policy makers have little guidance on how to select strategies to be used in any given programme.

Recent research has advocated for more consideration of how these strategies can be implemented more effectively (e.g. Clayton et al, 2016). One review (Šćepanović et al, 2017) discussed this issue and suggested separating strategies and context. Our Task 24 Project Partner, See Change Institute (SCI), believe that this approach is vital to improving our understanding and suggest that a social scientific approach to energy programmes requires moving from discussing behaviour-based programmes in terms of "strategies" to one of identifying and testing programmatic "variables".

In collaboration with Task 24, SCI undertook a comprehensive methodology review of behavioural programme evaluations (Karlin et al, 2015a) and developed and psychometrically-tested a standard evaluation tool, called "beyond kWh" (Karlin et al, 2015b and Southern California Edison (SCE), 2015). We then tested this toolkit in the field on our Irish Energy Saving Kit pilot (Rotmann and Chapman, 2018). SCI has also developed a framework to identify and test programme variables as the "building blocks of behaviour change" and a process for policy makers to design, implement, and evaluate such programmes. This process, which we will utilise for case study analyses and recommend for any pilots to be developed as part of the Task, contains the following elements:

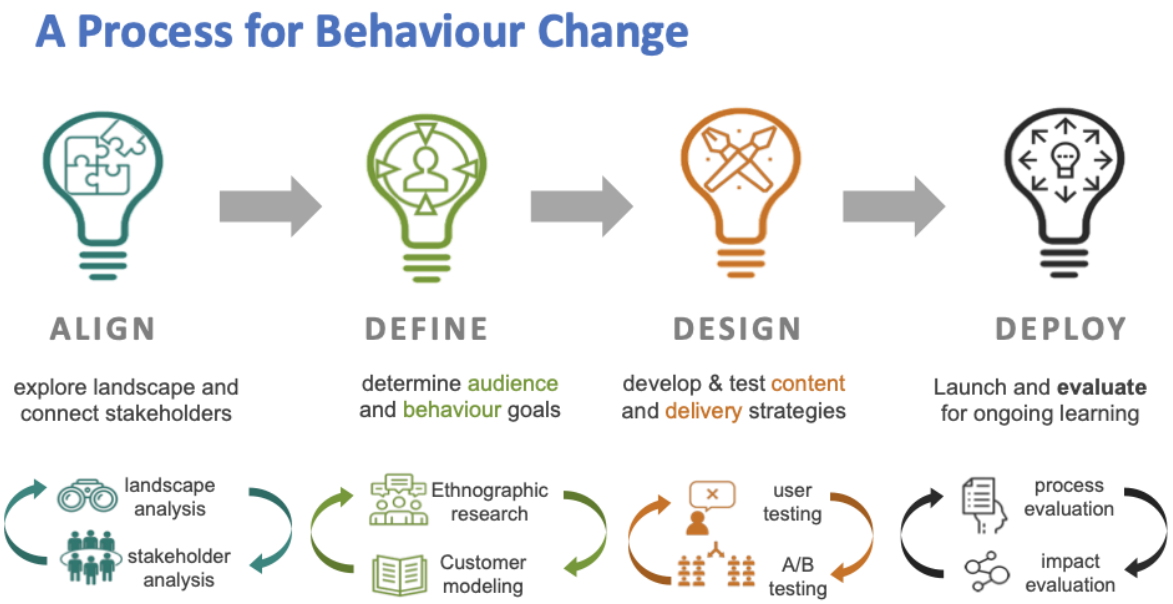


Diagram of the See Change Institute Process

1. ALIGN stakeholders and explore landscape

We will conduct a **stakeholder assessment** which will bring together experts from the government, industry, research and community sectors to identify individual and collective goals and mandates. The Task 24 Expert Platform will be built on and broadened to include global HTR experts from different sectors and research disciplines. We will use the *Behaviour Changer Framework* to visualise the current socio-ecosystem and end user contexts and decide on main HTR target groups in each sector. We will also undertake a **landscape analysis** on current literature, policies and programmes on how to reach the hard-to-reach in the residential and commercial sectors. This will include stakeholder interviews how they ran engagement trials and monitored and evaluated outcomes (using the ABCDE framework: coding for Audience, Behaviour, Content, Delivery and Evaluation, see below). This report will help us to better understand similarities and differences across national boundaries.

2. DEFINE target Audience & Behaviour

Based upon the stakeholder and landscape analyses undertaken in the ALIGN Phase, we will define each of the HTR target groups (aka **audience**) and identify the target **behaviours** for each group that show the most promise for energy savings. To do this, we will undertake mixed-methods research on each group to assess their "energy culture" (adapted from Stephenson, 2010), which is comprised of what they have (infrastructure), think (attitudes), know (awareness), and do (behaviour). This serves three purposes: (1) creating an audience profile for each group, (2) identifying target behaviours, and (3) identifying barriers, motivations, and key leverage points to select strategies and design interventions.

3. DESIGN and test Content & Delivery Strategies

Building from the ALIGN and DEFINE research, this step is comprised of identifying and pre-testing (when possible) appropriate strategies for each audience / behaviour. **Content** and **Delivery** strategies will be identified based on the research and we will develop our programme concepts that can be used by countries for pilots. We will also explore in-kind and co-funding opportunities to design field research trials based on these concepts. We will focus on a different HTR audience group in each of the sectors so different country contexts can be explored, contrasted and compared.

4. DEPLOY and Evaluate field pilots

In this phase, we will collaborate with in-country partners to **deploy** a field pilot of a new or improved HTR programme (where co-funding can be found). We will **evaluate** each pilot to not only measure savings, but also to understand how and for whom the programme did (or did not) work and identify best practices for scaling and /or replicating it. This will include using and testing the "beyond kWh tool" and will follow robust social science and programme evaluation methods.

The final step of the Task is will focus on capacity building and dissemination.

5. SHARE externally and build capacity

In this last phase, we will work with the IEA Secretariat and the G20 Working Groups on Energy Efficiency (amongst others) to **share** findings and help build capacity in key emerging economies through the Energy Efficiency in Emerging Economies (E4) programme. We will disseminate our work via conferences, journal articles, DSM University webinars, and IEA publications that include as many DSM, G20 and emerging economies as possible.

For the case study analyses in Subtask 2 we will describe each programme in terms of SCI's "Building Blocks of Behaviour Change" (Karlin et al, 2016), as follows:

A. **Identify key AUDIENCE segments that are hard to reach in each country, in two main sectors (residential and commercial)**. Audience characteristics include both *demographic* (e.g., age, income, gender, homeownership) and *psychographic* (e.g., values, self-efficacy, identity, locus of control) variables. Understanding and leveraging these variables allows for customisation and personalisation of approaches, both at the programme level, and potentially at the individual level when combined with audience segmentation and machine learning.
B. **For each audience segment, identify what specific BEHAVIOURS have been targeted in past research.** Providing specific target behaviours can focus programme design, enabling the programme to match strategies and behavioural components to more closely reflect objectives. However, the sheer number of possible energy-saving behaviours makes this approach difficult to implement in practice. The *unique features of various characteristics* of energy behaviours (e.g. the upfront cost, time, effort and skill required) influence individual understanding and engagement with those behaviours. We will further delve into understanding these features.
C. **Highlight what messaging CONTENT and strategies were employed**. Content refers to the *behavioural science strategy and message framing* used in the intervention. Past behavioural research has almost exclusively focused on this building block. While many different programmes utilise similar behaviour change strategies (e.g., goal-setting, feedback, competition, games, message framing, and commitment), there is considerable variance across programmes in terms of how a particular behavioral strategy is being applied. Content also refers to the way that messages are constructed or framed within the programme, and includes the language, design, and images used in communications materials.
D. **Identify and analyse the DELIVERY channels that were employed**. Delivery refers to the way that a programme is distributed to consumers. Variables within delivery that can impact programme effectiveness include *frequency* (e.g., weekly, monthly), *duration* (continuous, one-time), *timing* (new homeowners, changing seasons), *medium* (e.g., email, social media, in-person), and *messenger* (e.g., retailer, contractor, peer). These variables play key roles in determining the degree of audience acceptance and receptivity towards a programme intervention, yet they are often underexplored.
E. **Determine how the case studies have been EVALUATED**. Was there *process and / or impact evaluation*? What *metrics and measurements* have been employed? Have *co-benefits* been assessed, and if, how? Was there quantitative and qualitative evaluation and (how) has it been triangulated? We will identify barriers to undertaking large-scale behavioural interventions in each of these case studies and highlight international best practice approaches and learnings.

To summarise our research process (see diagram above): Each phase includes both qualitative and quantitative research to marry inductive and deductive strategies of learning. First, the overarching programme or policy goals must be established and **aligned** in the context of the existing landscape of work and the mandates of key stakeholders. Second, the target **audience** and **behaviour** are **defined** through

mixed-methods customer research and modelling. Then, the programme can be **designed** to address audience and behavioural needs and key **content** and **delivery** variables can be "pretotyped" via experimental and usability testing. Finally, once the programme has been optimised based on empirical data, it can be **deployed** and **evaluated** in a pilot study, using both process and impact evaluation to determine not only whether it worked but how it can be continuously improved over time.

Management, roles and responsibilities

The project management of this Task will be undertaken by former Task 24 Operating Agent (OA), Dr Sea Rotmann (SEA – Sustainable Energy Advice Ltd, NZ). She will serve as the main liaison with the IEA DSM ExCo, funders, Project Partners, Chief Advisor and National Experts. Dr Aimee Ambrose of the University of Sheffield Hallam will be Chief Advisor (CA) of the HTR Task. See Change Institute, led by CEO Dr Beth Karlin will serve as primary Project Partner (PP), further developing and testing the *See Change Institute process* and *Beyond kWh* toolkit to be used in this Task (Subtask 3). Other Project Partners (such as the University of Sheffield Hallam) and highly-engaged Task 24 experts will continue to be part of this work on a per-need (based on the country, sector and/or HTR expertise) basis. Current Task-sharing estimations in each Subtask are based on three financially-participating countries. We will use online project management tools such as *Teamwork*[1] to ensure all collaborators will undertake their fair share of work, as outlined in the Deliverables, below. We understand there needs to be some flexibility in terms of how the NEs and other experts and PPs choose to apply their time in the most meaningful and relevant manner. Using a real-time tracker linked to detailed Gantt charts will enable us to flag early any potential issues with under- or over-performance (see Risk Management).

The responsibilities of the Operating Agent (OA) include:

- Overall management of the Task, including coordination, liaison between Subtasks, flow of information between participants, and communication with the ExCo;
- Responsible for the management and delivery of work performed under all assigned Subtasks, including meetings, status reports, deliverables, and budget oversight;
- Quality and risk management;
- Providing Task Status Updates at ExCo meetings, Annual Reports, and Final Task Report;
- Attracting funding for additional participant countries and field research pilots;
- Finding relevant international comparison studies for cross-cultural analysis;
- Disseminating the results of the work and promoting wider work of our experts within the IEA;
- Chairing Task workshops and meetings (with organisational support from relevant NEs) and presenting the Task at conferences, webinars, seminars and lectures;
- Research analysis, writing and publishing of peer-reviewed articles and technical reports;
- Co-supervising PhD students (with input from NEs) associated with the Task (see below);
- Maintaining close contacts with research related to this Task that is conducted in other TCPs or in other international organisations and research collaborations.
- Take primary role in drafting all project deliverables, with input from National Experts.

The responsibilities of the Chief Advisor (CA) to the Task include:

- Supporting the OA during Task definition phase;
- Providing expertise on the HTR to the OA, NEs and other experts, where required;
- Support the OA with coordination of the HTR expert network (ST 1);
- Applying for PhD scholarship/s and recruiting and co-supervising PhDs to take part in this Task;
- Taking part in international Task workshops and disseminating results.

[1] https://www.teamwork.com/

The responsibilities of the Project Partner/s (PPs) identified by the OA include:

- Responsible for the management of work to be performed under assigned Subtask 3, including guidance, status reports and deliverables;
- Input into design, analysis and evaluation for funded field research pilots using the *See Change Institute* process and *Beyond kWh* Toolkit (Subtask 4);
- Manage and/or support country-specific pilots[2], where relevant (Subtask 4);
- Collaborating with OA, PhDs and NEs on academic write-up and publications;
- Supporting the OA and NEs with general social science expertise and expert networks.

The responsibilities of the National Experts (NEs) include:

- Support development of the HTR Task Work Plan;
- Track their time spent on each Subtask and flag any issues with the OA immediately;
- Contribute to the Task expert platform (Subtask 1);
- Organise one international expert workshop in their home country (funded by their country) over the course of the Task, attend other participating countries' expert workshops, and attend at least one international conference to (re)present the Task (Subtask 1);
- Manage and lead country-specific research efforts, identifying and analysing *ex-post* at least two (one per sector, around 5-6 pages in length) case studies (Subtask 2);
- Provide feedback to PP on research process (Subtask 3);
- Input into design, analysis and evaluation of country-specific pilot studies (Subtask 4); including feedback to any PhD-related work in the context of pilots;
- Identify experts from different Behaviour Changer sectors for the topic chosen as focus for field piloting, and pilot co-funding opportunities, if possible (Subtask 4);
- Support pilot team (PPs, PhDs, OA and cofunders) with coordination of country-specific field pilot, where applicable (Subtask 4);
- Provide the OA with feedback and information on the results of the work carried out by the various country experts;
- Provide contribution to the content and reviewing of all draft reports of the Task;
- Support the OA in disseminating the results of the work, including among their own networks.

The participating countries will formally assign appropriate national experts (NEs) to the HTR Task on their notice of participation (NPP) to the IEA Secretariat. There can be one, or more NEs (e.g. one for each of the main sectors that will be investigated here). How NEs will be funded for two person months per year is up to each country's ExCo. The NEs will help the OA chose the next layer of experts (the Behaviour Changers) that will be involved in the Task expert network (their involvement is expected to be in-kind).

The responsibilities of the IEA DSM Executive Committee (ExCo)

- The IEA DSM Executive Committee (ExCo) will oversee the successful management and implementation of this Task, including potential dispute resolution and mediation, if required;
- The IEA DSM ExCo (participating countries excluded) is asked to find the minimum funding (NZD5,000) for each of their countries to contribute to a chapter to the international publication or to agree to a bulk payment from the IEADSM common fund (Subtask 2a);
- The ExCo members of interested countries are asked to find (co)funding to formally join the Task as participating members;
- Participating ExCo members shall oversee their country contribution, including identification and relationship management of the NEs;
- Participating ExCo members shall support their NEs and other HTR country experts in any ways they see fit (either financially or in-kind) and organise and fund at least one international expert workshop

[2] Funding for this work is not included in the Task and co-sponsorship would be required

in their country. They are invited to attend any Task expert workshops, but especially the one organised in their own country; and
- Participating ExCo members shall contribute to draft country publications, including choice of focus, content and dissemination to their agencies and other networks.

The responsibilities of other Task co-funders

This Task is expected to receive significant, and flexible co-funding arrangements outside of ExCo member agencies, especially for the field pilots (Subtask 4). Co-funders can come from any Behaviour Changer segments, e.g. *Decision-makers* in local government; *Providers* from utilities or heavy vehicle fleet transport industries; *Experts* from other research collaborations like H2020; *Middle Actors* such as facilities managers and commercial building estate contractors; and agencies we call "*the Conscience*" such as those focused on better health (e.g. reduction in respiratory disease from improving building stock) or other social outcomes (e.g. integration of refugees and other new immigrants, support for indigenous populations, fuel poverty etc.). Co-funders' responsibilities are:

- Collaborate with the relevant IEA DSM country ExCo and NEs to align co-funding and roles and responsibilities;
- Support pilot team with the management, coordination and implementation of pilots (Subtask 4);
- Identify any other means to identify and / or support possible field research pilots in this Task (e.g. by data sharing, in-kind expertise, access to resources, knowledge and capacity; access to other possible co-funding sources and wider networks etc.);
- If committed to undertake or support field research pilots, share access to (non-confidential) data and resources; support our OA, Project Partner/s or (National) experts in data collection and analysis; and contribute to report writing and dissemination, including among their networks.

Co-funders will have final say over removing any reference to commercially-sensitive information but will otherwise agree to share insights and data from field pilots via the open-access IEA DSM website.

The responsibilities of PhD Students associated with the Task

This Task has already attracted three fully-funded PhD students (an international one who will be based in the UK, one in the UK / Sweden and one in Spain / NZ) and the OA will co-supervise at least one of them, together with UK Chief Advisor Dr Aimee Ambrose and Swedish Expert, Professor Jenny Palm. They will get co-authorship (or primary authorship) on any papers or reports they have contributed to for this Task. The students will:

- Support report writing and dissemination of Task-related publications (Subtask 1);
- Undertake (primary) literature review on the HTR, and support definition and case study analyses (Subtask 2 and 2a);
- Support utilisation and testing of research process (Subtask 3);
- Support pilot team on field research collection and analysis of data on chosen focus topics in participating countries (Subtask 4);
- Input into design, analysis and evaluation of country-specific pilot studies (Subtask 4);
- Establish links between the Task and the EU-wide Horizon 2020 funded STEP (*Solutions to Energy Poverty*) project, where relevant.

Outputs & Outcomes (What)

Objectives of the HTR Task

The main objective of this Task is take undertake wide-ranging empirical research and field pilots on hard-to-reach energy users to allow Behaviour Changers (from government, industry, research, the service and the third sectors) to:

- Partake in a *global research collaboration* under the umbrella of IEA DSM (**Subtask 0**);
- Engage in, and have access to, an *international expert network* (**Subtask 1**);
- *Define HTR energy users in the residential and commercial sectors*, collect & analyse case studies highlighting past and current work to better engage this user group (**Subtask 2**);
- Develop an *international publication* with participating and interested countries, including those outside the OECD, that attempts to analyse the proportion of energy users that would fall under the Task's hard-to-reach category and identifies some of the distinct groups and subgroups beneath the broader HTR umbrella. This work will be based on the case study analyses and definition work undertaken in Subtask 2, in participating countries (**Subtask 2a**);
- *Use and test the tools* highlighted in the Task 24 Toolbox for Behaviour Changers, including the *See Change Institute Process* to align, define, design and deploy better interventions geared at the HTR energy users identified in Subtask 2 (**Subtask 3**);
- Identify and, where possible, undertake voluntary *field research pilots* to take the theoretical learnings into practice (**Subtask 4**).

Subtasks, and their objectives and deliverables

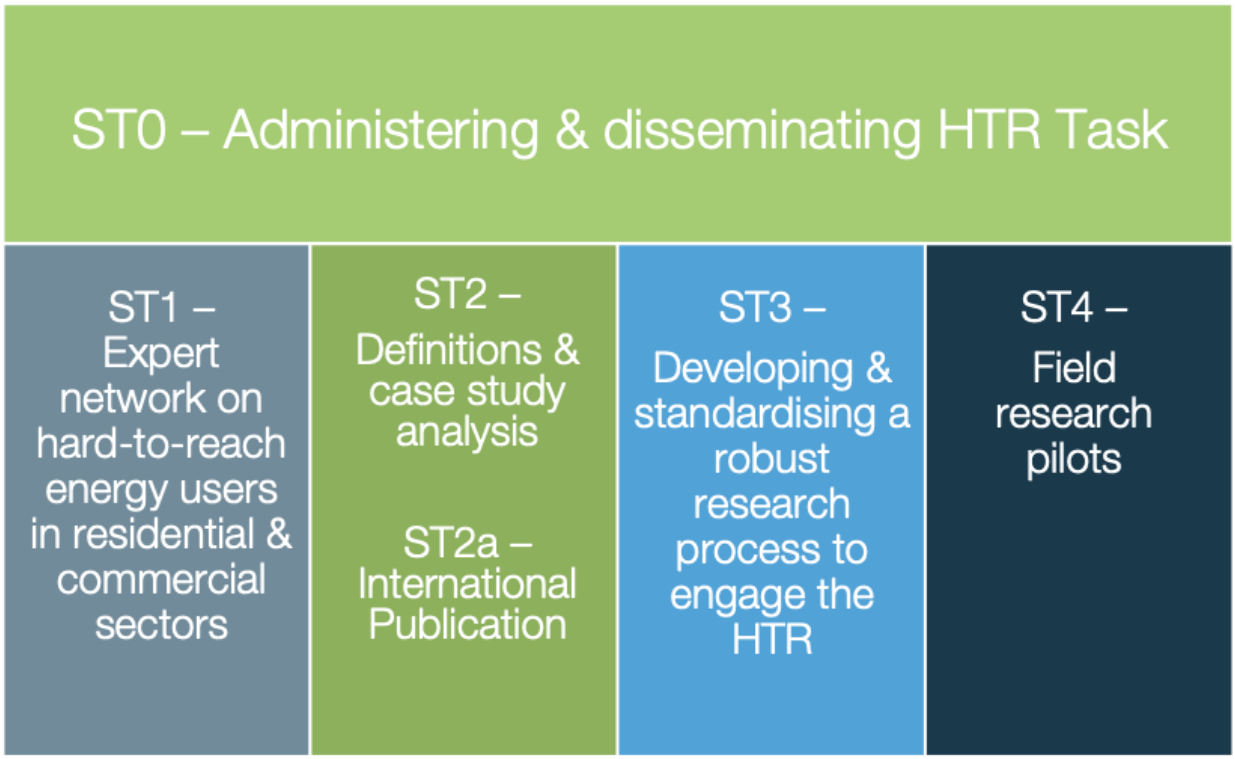


Diagram of HTR Task Subtasks

Subtask 0 – Administration, management and logistics

Subtask Number	0 - Project administration and ExCo reporting
Start Date	Month 1
End Date	Month 36
Activity Type	Project Management and Coordination, ExCo feedback, Reporting, Risk management

Objectives

- Work plan definition, country and national expert participation;
- Overall project coordination, including relationship and risk management;
- Attendance of ExCo meetings, IEA DSM conferences and reporting to IEA DSM ExCo;
- Project management, including time tracking, financial, legal and other administrative issues.

Deliverables

- **D0: Initial work plan**: Delivered by Operating Agent (OA) with input from National Experts (NEs), Project Partner/s (PPs) and Executive Committee (ExCo)
- **Overall project organisation and management:** Delivered by OA
- **Contracting, legal and financial reporting**: OA and ExCo
- **Task Status reports**, **Annual reports:** Delivered by OA
- **Participation in IEA DSM ExCo meetings:** OA
- **Task flyers** – at the start, during and at the conclusion of the project: OA
- **IEA DSM Website updates:** OA
- **IEA DSM Task communications (e.g. blogs, newsletter)**: OA, NEs, PPs
- **Communication with related IEA Tasks and other HTR projects:** OA, NEs and PPs
- **D1: Co-Supervision of PhD students**: OA and CA.

Roles and responsibilities (outlined in detail above)

The OA will lead this Subtask, with support from NEs, ExCo and other co-funders, and PPs, where needed.

Task sharing and expected person-months (pm) or days (d) for the total 3 year participation

Subtask 0	OA	CA	PP	Each NE	ExCo
D0: Work plan definition (up front)	3pm	3d	0.5d	3d	1d
Project management	6pm	5d	1	15d	1d
ExCo Reporting & Communication	3pm	0	1.5d	2d	3d
D1: PhD student co-supervision	2pm	22d			
TOTALS	**13 months**	**1.5pm**	**3 days**	**1 month**	**5 days**

Subtask 1 – Expert network and dissemination

Subtask Number	1 - Expert network and dissemination
Start Date	Month 1
End Date	Month 36
Activity Type	Networking and dissemination activities

Background

Task 24 has developed a strong and successful expert network of over 400 Behaviour Changers from 20+ countries. We will build on, and expand this expert network with HTR experts. Our Project Partner SCI also has a very strong expert network, particularly in North America. Our National, and other HTR experts also have significant networks. We will combine all our networks to engage a global expert network of Behaviour Changers to participate, financially and in-kind, in this HTR Task.

Objectives

- Combine and grow our international expert network particularly in the field of HTR energy users;
- Widespread dissemination of this Task and its outputs;
- Continued 'matchmaking' and promotional / supporting activities for members of the expert network.

Deliverables

- D2: HTR Expert network
- D3: At least three international conferences and / or Task expert workshops open to all Behaviour Changers engaged in this Task (following successful model of Task 24);
- D4: At least two scientific, peer-reviewed papers in high-impact journals; technical reports, peer-reviewed conference papers, lectures, seminars, DSMU webinars etc.

Roles and responsibilities

The OA will lead this Subtask, with support from CA, PPs, NEs, ExCo and other experts and co-funders, where needed.

Task sharing for the total 3 year participation

Subtask 1	OA	CA	PhDs	PP	Each NE	ExCo / co-funders
D2: HTR expert network	2pm	5d	5d	2d	8d	1d
D3: 3 international conferences / workshops	1pm	6d	5d	5d	12d	1d
D4: Two scientific papers, other dissemination efforts	5pm	4d	1pm	15d	1pm	3d
TOTALS	**8 pm**	**15d**	**1.5 m**	**1 pm**	**1.5 m**	**5 days**

Subtask 2 – Hard-to-reach energy user definitions and case studies

Subtask Number	2 - HTR definitions and case studies
Start Date	Month 2
End Date	Month 12
Activity Type	Definitions, collection & analysis of case studies from participating countries

Background

Using our expert network (ST 1), we will collate definitions of HTR in the commercial and residential sectors via a landscape analysis and stakeholder interviews in each participating country. We will also collect and analyse (using the ABCDE framework) at least two case studies per country that highlight how they each were addressed. PhD students will undertake a literature review of the primary literature on this topic. We will use the Task 24 Behaviour Changer Framework (Rotmann, 2016) to identify top issues of interest and relevant Behaviour Changers in each participating country. National Experts will lead each country's efforts on HTR definition and case study analysis. PhD students and OA will support landscape analysis and stakeholder interviews. Other experts and ExCo are expected to contribute to the production of outputs, leading to an international publication (ST 2a).

Objectives

- Overarching Task definition of HTR that encompasses the residential and commercial sectors and all users groups
- Individual country definitions of HTR in the 3 sectors
- Literature Review
- Participating countries: case study analyses, stakeholder and energy user interviews and / or surveys
- Deciding on top HTR focus group in each sector for all participating countries.

Deliverables

- D5: Overarching Task definition of HTR
- D6: Participating country reports that outline definitions, case studies and landscape and stakeholder analyses (to feed into Subtask 2a)
- D7: Literature review on the HTR in the residential and commercial sectors.

Roles and responsibilities

The OA will lead this Subtask, with support from PhDs, PPs, NEs, ExCo and other experts and co-funders, where needed.

Task sharing for the total 3 year participation

Subtask 2	OA	CA	PhDs	Each NE	ExCo / co-funders
D5: Task definition of HTR	1d	0	0	0.5d	0.5d
D6: Country reports	1.5pm	2d	1d	28d	3d
D7: Literature Review	0.5pm	3d	2pm	1.5d	2d
TOTALS	**2 pm**	**5d**	**2 months**	**1.5 months**	**5.5 days**

Subtask 2a - International publication on HTR (TBD based on country interest)

Subtask Number	2a - International publication
Start Date	Month 6
End Date	Month 18
Activity Type	International Publication on HTR Energy Users in 3 sectors

Background

We hope to attract enough interest from additional DSM or G20 countries who do not want to formally participate in the whole Task to be able to develop this international publication - preferably in collaboration with the IEA Secretariat. We envisage around 12-15 countries in total are needed to warrant such a publication - as an edited book, for example. Financially-participating countries will feed in their Subtask 2 efforts. A small contribution from either each additional country (NZD 5,000 / ~ USD 3,500 / ~€3,000 per country) or, if the whole DSM TCP decides to partake in this Subtask, the DSM Common Fund (NZD 85,000 / ~€50,000) would be sufficient to develop a publication defining HTR energy users in different country contexts. It will highlight main case studies, policies or programmes currently underway to engage them in each country and undertake the secondary, desktop ABCDE analysis (see ST 2) to establish effectiveness. A small number (smaller than those undertaken for ST 2) of stakeholder and / or end user interviews are envisaged for each contributing country. We plan to invite G20 and emerging economies (4E) to contribute to this publication.

Objectives

- To include a wider range of developed and developing countries, including those outside IEA / OECD to participate in an international publication on HTR energy users;
- To collect different definitions and case studies and undertake high-level analyses of effectiveness, best practice and shared learnings;
- To estimate total effect size of HTR energy user group in the residential and commercial sectors in each country using stakeholder interviews and country statistics.

Deliverables

- D8: International publication on HTR energy users in 12-15 countries (at least).

Roles and responsibilities

The OA will lead this Subtask, with support from PhDs, PPs, NEs, ExCo and other experts and co-funders, as well as the IEA Secretariat and G20 Working Tasks, where needed.

Task sharing for the total 3 year participation

Subtask 2a	OA	PhDs	PP	Each NE	ExCo
Identifying additional countries	10d	0	0	0	1d
Case study analysis and expert interviews in each country	1.5pm	1pm	2d	0 (part of ST2)	3d
D8: Finalising publication	0.5pm	1pm	0	1d	1d
TOTALS	**2.5 months**	**2 months**	**2d**	**1d**	**5 days**

Subtask 3 – Standardised and validated research process

Subtask Number	3 - Research process
Start Date	Month 6
End Date	Month 36
Activity Type	Develop and validate standardised research and evaluation process

Background

Task 24 Phase II has developed a Toolbox for Behaviour Changers (Subtask 8), which provides many insights into tools, research and evaluation methodologies on how to "do" behaviour change from A to Z. Task 24 project partners, the Californian See Change Institute (SCI), are currently developing and testing the See Change research process with utility partners in North America. The Task 24 and SCI tools and processes can be combined to develop and validate a standardised way of how to best engage HTR energy users in field pilots (Subtask 4). These need to be specified to apply to the HTR focus group that was mutually agreed-upon and to field research pilots with varying amounts of co- and in-kind funding and support.

Objectives

- To develop a standard, internationally-validated research process for behavioural interventions and field research pilots on HTR energy users in the residential & commercial sectors;
- To provide a standardised process to undertake cross-country case study comparisons.

Deliverables

- D9: Report on the standard research process recommended for testing in field research pilots (Subtask 4) and validation of the process using those pilots.

Roles and responsibilities

The Project Partner SCI will lead this Subtask with support from the OA, NEs, PhDs and other experts.

Task sharing for the total 3 year participation

Subtask 3	OA	CA	PP	PhDs	Each NE	ExCo / co-funders
Development of standard process	5d	3d	0.5pm	0	1d	0.5d
Validation of data collected in ST4	5d	2d	0.5pm	0.5pm	3d	1d
D9: Final Report	10d	5d	1pm	3d	6d	1.5d
TOTALS	**1 pm**	**10d**	**2 pm**	**0.5 pm**	**10 days**	**2 days**

Subtask 4 – Field research pilots in participating countries

Subtask Number	4 - Field pilots
Start Date	Month 12
End Date	Month 30
Activity Type	Field research piloting, including evaluation

Background

The standardised process developed and validated in Subtask 3 is hoped to be tested in field research pilots on the chosen priority areas each participating country or co-sponsor has agreed upon. Provided that commitment and co-funding are secured, field trials are expected to take around 18 months each and can be co-sponsored by industry (e.g. utilities), government (e.g. ministries of social development, energy or health), research organisations (e.g. H2020 STEP programme), or the third sector (e.g. social organisations focusing on refugee integration, indigenous communities or fuel poverty). The all-important Middle Actors - often contractors or social / health agencies with direct end user access, will be identified and engaged by the pilot team in each country / sector to help administer field research trials (as part of the *delivery* part of the ABCDE of behaviour change). The Task 24 Behaviour Changer Framework will be used to visualise the socio-ecology of each country and topic of focus and facilitate multi-stakeholder collaboration at the start of each pilot (see, for example Cowan et al, 2017).

If the necessary co-funding to develop such pilots cannot be found in one of the participating countries, the NEs and ExCo will choose a current or past field pilot or programme on one of the chosen priority areas and assess the research process developed in ST 3 *ex-durante* or *ex-post*. This will be less rewarding than a fully-fledged pilot co-created and implemented *de novo*, but will still garner important insights and learnings to support testing and validation of our proposed research process. We expect all participating countries to try their best to develop a fully-fledged pilot.

Objectives

- Proof-of-concept of the research process developed in Subtask 3 in the field;
- Evaluation of success of interventions and (shared) learnings;
- Using a *Collective Impact Approach* to facilitate multi-stakeholder collaboration;
- Engaging the hard-to-reach and connecting them with the relevant organisations and individuals, policies and programmes that can help them improve their energy use and consumption.

Deliverables

- Co-funded, voluntary field research pilots on one of the main topics of focus chosen by participating countries OR identify relevant field pilots currently underway or recently completed;
- D10: Evaluation of field pilots (including *ex-durante* or *ex-post*, if needed) and reports with recommendations, including policy briefs for each participating country.

Roles and responsibilities

The OA will lead this Subtask, with support from PhDs, PPs, NEs, ExCo and other experts, co-funders and Behaviour Changers. Co-sponsorship can take several forms and is not expected to come (only) from ExCo funders but can also involve non-state actors: direct funding, in-kind or Task sharing support, access to end users and / or data, providing internal resources and capability for data collection and analysis etc.

Task sharing for the total 3 year participation

Subtask 4	OA	CA	PP	PhDs	Each NE	Pilot funders
Identification of field pilots & co-funding	1pm	5d	2d	10d	5d	0.5pm
Project management of field research pilots, data collection	3pm	5d	0.5pm	6pm	10d	1.5pm
Data analysis	1pm	5d	1pm	3pm	3d	2d
D10: Final Reports for each pilot	3pm	5d	0.5pm	3pm	12d	3d
TOTALS	**8 pm**	**1 pm**	**2.5 months**	**12.5 months**	**1.5 pm**	**2 pm**

Deliverables

Subtask	Deliverable	Deliverable Name	Deliverable Type
0	D0	Work plan defined and signed off	Report
0	D1	Co-supervision of PhD students	PhD theses
1	D2	Expert network and dissemination	Various
1	D3	At least 3 international expert workshops	Workshops
1	D4	2 peer-reviewed scientific papers	Scientific articles
2	D5	HTR Definition	Slide deck
2	D6	Country definitions and case study analyses	Reports
2	D7	Literature Review	Report / Article
2a	D8	International publication on HTR	Book
3	D9	Standardised research process	Report / Article
4	D10	Field research pilots	Reports, Policy Briefs

Deliverables by Year

Year 1 Deliverables

- Synthesis of the international literature on HTR programmes.
- A report detailing different HTR definitions and relevant case studies from participating, and supporting countries. This synthesis of HTR definitions will include an overview of participating countries' mix of HTR groups and segments.
- A synthesis of survey results from stakeholders and end users that enable a better understanding of the contextual factors affecting HTR energy users in different countries;
  initial assessment of the different HTR groups and segments that participating countries are primarily trying to reach; identification of which of these HTR segments are common across multiple sponsor organisations and, conversely, which HTR groups are less conducive to addressing through this international collaboration.

Year 2 Deliverables

- Development of a mutually agreed-upon research process based on Task 24 Toolbox for Behaviour Changers; identifying field pilots to implement and evaluate process and impact.
- Guidance on how to encourage behaviour change of HTR users in the energy sector, how to align different "Behaviour Changers", design and deploy field trials and evaluate interventions to prove real, long-term change on this difficult end user group has occurred.
- Continued assessment of the different segments of HTR for participating countries and which of these segments may be the most promising and less promising to address.

Year 3 Deliverables

- Field research pilots in all participating countries following strong social science process that can help identify and engage the HTR groups that may be the best candidates for behaviour change through energy efficiency and DSM programmes and interventions.
- International publication on hard-to-reach energy users in residential & commercial sectors, possibly in collaboration with IEA Secretariat.
- Final country reports and overarching country comparisons, including insights into which HTR groups may be the most promising to engage in energy efficiency and DSM interventions, and the social science techniques and / or engagement approaches to use in motivating some of these specific segments.

Outcomes and benefits to all participants

General outcomes

By collaborating on this international research Task we will gain:

- Global networking and collaboration to share learnings and stop duplicating efforts;
- Access to cutting-edge expertise, tools and resources which will aid cross-country comparisons;
- Co-creation and promotion of new solutions to old problems, turning participating countries into leaders on how to engage this important and underserved energy user group;
- Insights for industry into serving their "Hard-to-Reach" customers by leveraging learnings from a wide range of different countries', sectors' and research disciplines' expertise and case studies;
- Three PhDs associated with this Task researching in depth various aspects of the HTR;
- Stakeholder and end user research that enables a better understanding of the contextual factors affecting HTR energy users in different countries and sectors, allowing us to better target them;

- Guidance on how to better apply behaviour change interventions on this HTR user group in the residential and commercial energy sectors; including how to align different "Behaviour Changers" to design and run field pilots and evaluate interventions to prove real, long-term change;
- Analysis into how large this energy user segment could be in different sectors, fuels and countries - this should drive changes to government policies (including regulation/legislation) and industry / community sector programmes paying more attention to this underserved user group;
- More capacity to apply behaviour change insights to policy making and real life interventions in IEA DSM countries, including through collaboration with the G20, IPEEC and Energy Efficiency in Emerging Economies (E4) programme, as well as major energy efficiency and behaviour change collaborations such as ACEEE, eceee, BECC, BEHAVE and selected H2020 programmes;
- High quality and accessible dissemination of HTR case studies and field research - becoming the depository of global knowledge on hard-to-reach energy users.

Expected benefits for IEA DSM

This proposed Task goes somewhat beyond the traditional Task structure, where a small number of countries fund individual Tasks with rather narrow research objectives. Instead, it utilises flexible (co)funding strategies, including opportunities for voluntary contributions to specific Subtasks (particularly, Subtask 2a and to some extent, Subtask 4). This work will continue to build on the strong brand and reputation of Task 24 but with particular focus on an energy user group that may have collectively been in somewhat of a blind spot in past behavioural and energy efficiency interventions.

This Task will provide ExCo members with:

- A strong platform for the IEA DSM Programme to stand out among the largely-technology focused TCPs;
- Leadership in engaging hard-to-reach energy users and communities, HTR experts and other Behaviour Changers in whole-system collaborations that focus on structural issues which we need to change to accommodate climate change and energy efficiency targets;
- Improved political buy-in for their countries' policy development via policy briefs, which include policy recommendations that can improve the effectiveness of existing policy interventions and help better design and implement new ones;
- Coordination with the IEA Secretariat and other international bodies interested in this area of research (e.g. G20, Horizon 2020, eceee, energypoverty.eu, ACEEE, BEHAVE, BECC…);
- Ability to collaborate with non-state actors across multiple countries / sectors that have the resources and mandates to conduct large-scale behavioural field trials;
- Ability for non-participating ExCo members to contribute to an international publication on the hard-to-reach energy users in their countries;
- Interesting webinars for DSMU;
- More flexibility for the Operating Agent to engage with non-state actors and non-IEA DSM countries to collect a wider range of research and insights, including into developing countries.

Benefits for Behaviour Changers and co-funders to join this Task

Non-state actors who are in active development of a behaviour change programme or intervention will be invited to join the project as "implementation" partners. These Funders and *Implementers* will work closely with the *Researchers* (OA, NEs, PhD students and Project Partner/s*)* on the field pilots determined in Subtask 4. At the end, the Implementers will have conducted a new, or assessed a current behavioural field pilot and the researchers will have completed formative, summative, outcome and process evaluations with guidance on how to replicate and / or scale-up their pilot.

In addition, all experts and Behaviour Changers joining this Task (formally, or in-kind) will partake in the following benefits:

Opportunities for Global Networking and Collaboration

- Implementers will become part of the combined expert platforms with 100s of Behaviour Changers from many different countries, research disciplines and sectors;
- They can bring their own DSM issues and get cutting-edge, tailored advice and research support for the entire chain of designing, implementing, evaluating, reiterating and disseminating behavioural interventions that work;
- They will gain access to, and participate in the IEA DSM University including developing and disseminating their field pilots in promoted webinars, peer-reviewed publications and technical reports;
- They will gain access to global dissemination and cross-country case study comparisons via the highly-reputable IEA network.

Access to Cutting-Edge Tools and Resources

- Behaviour Changers will gain improved knowledge and understanding on what different models and theories of behaviour change are available and when and how to best use them in practice;
- They can learn from and share, directly and via the IEA DSM network, best practice case studies and stories;
- They can get access to, and expert support for, the standardised, robust research process developed in this Task;
- They will get expert facilitation and backbone support to develop the *Collective Impact Approach* in practice, tailored to their stakeholders, mandates and needs.

Co-creation and Promotion of New Solutions to Old Problems

Behaviour Changers will gain access to a highly respected global brand. This includes being invited to collaborate on joint behaviour change publications in DSM including, but not limited to:

- Re-framing the big issues facing HTR energy users and the agencies trying to reach and engage them, together;
- Learning how to apply good research process to design, implement and evaluate better interventions and share learnings via cross-country case study comparisons;
- Reducing duplication of efforts by learning from real-life field research so we can move from individually-focused, programme-level approaches to collaborations aimed at the common goal of achieving systemic, societal changes with collective community and citizen participation at its core.

Proposed Budget (based on initial 3 countries)

Even though we expect at least another 2-3 IEA DSM countries to join this Task over its lifetime, we have to base the initial budget on the first three countries that signed up to participation. Following our experience in Task 24, where we started with 4 countries initially but had 11 countries participate overall (8 in Phase 1, and 6 in Phase II), we chose to keep the budget the same, independent of how many countries will ultimately participate. This is the absolute minimum budget needed to undertake the work described in this Work Plan. Any additional country funding will reduce some overheads but will increase the complexity of the OA's work including time, travel costs, project management, administration and communication costs etc. Depending on how many additional countries will join this Task, and at what stage of completion, there may be a small time over-run (at no extra cost to participating countries).

Original country participants will have significant benefits: They will be able to co-create the Task Work Plan and shape the overall approach, have more time to develop expert networks and attract co-funding, and will be able to promote this work within their own country by hosting one of the international expert workshops. They will also get preference in terms of finishing their country contribution first (e.g. should there be a small extension of the Task to incorporate new countries that joined at a later stage). Later country participants will

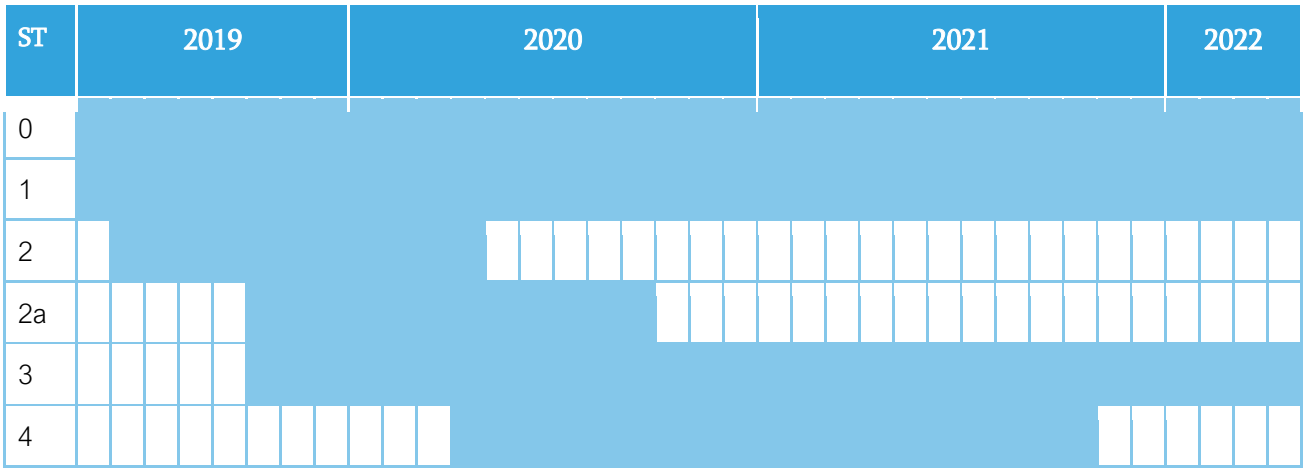
be supported to play catch-up by the OA, and will benefit from the learnings and insights of work that has been already undertaken by other countries.

Budget break-down per country

- **Cost sharing**: **NZD 50,000 per year per country** (~USD 35,000 or ~€30,000) for 3 years, which includes Operating Agent salary, administrative and overhead costs, communications and web expenses, and travel to ExCo meetings, expert workshops and relevant conferences etc.
- **Task sharing: 2 person months National Expert time per year,** plus hosting of one expert workshop in one country each year (to be hosted by the US in 2019, Sweden in 2020 and New Zealand in 2021).
- **Additional co-funding** for field research pilots - **ultimate cost depends on size of pilot and co-funding**. This can involve non-state actors such as Universities, NGOs, community groups, utilities and other industry actors. Co-funding can include direct funding, in-kind support with data and expertise, providing resources such as e.g. PhD students or access to research subjects or current or recently-completed pilots etc.

Proposed Timeline

Based on 3 participating countries (see comments above). A detailed GANTT Chart will be developed and incorporated into online team and project management tools as soon as the Task commences.



Risk Management

The Risk Management table below outlines the main risks and risk mitigation measures that will be taken. These risks are informed by seven years of OA and ExCo insight from running a high-performing IEA DSM Task with 11 participating countries, and support and input from over 20 countries and 400+ experts overall. This Work Plan has been designed with strong input from National Experts and potential country funders, as well as other HTR and behaviour change experts from ten countries. It aims to minimise impacts by providing maximum flexibility in areas that will be the hardest to achieve, as they rely on additional external support (especially field piloting in Subtask 4 but also the (IEA) publication in Subtask 2a). Past experience in Task 24 has shown that high flexibility and a can-do approach by the OA will open up opportunities for co-funding and collaboration that cannot currently be envisioned or foreseen in its entirety. We trust that our successful management and high-quality outputs in Task 24 mean that a similarly supportive environment will be provided by ExCo and country funders, here.

Risk	Likelihood	Impact	Risk category	Risk Mitigation Measures	Risk category, post mitigation
Lack of requisite expertise with which to deliver required services	Low	High	Medium	Strong Project Partners and existing expert network and relationships with national and other experts and Behaviour Changers.	Low
Inability of OA and NEs to work together	Low	High	Medium	Successful completion of Task 24 has shown that OA will be able to deal with underperforming NEs. ExCo will have new conflict mediation strategies. Time tracking will flag issues early.	Low
Sudden unavailability or withdrawal of NE	Medium	High	High	NEs are aware of responsibilities and are expected to find replacement. Strong Task 24 expert network to draw on, if needed. ExCo support to find replacement NE expected.	Low
Sudden unavailability of OA or other key research staff	Low	High	Medium	Project Partner/s could allocate new OA from their available pool of highly-qualified researchers	Low
Inability to attract field pilot co-funding	High	Medium	High	It is expected that co-funding for new pilots may be difficult to find in all participating countries. That is why the co-funding arrangement is highly flexible, allowing for different collaborators and kinds of support. We can also apply the research process developed in ST3 to current, or recently-completed pilots	Medium
Project delivery timeline overruns, extra burden from additional countries joining later	Medium	Medium	Medium	It is expected that more countries will join once the Task is underway. Any time overruns will be at no extra cost to participating countries and we will finalise countries who started early, first. Task 24 was only 6 months over despite having 3 countries join late.	Medium
Budget overruns	Medium	High	High	Project to be delivered on fixed-price total basis, OA has to find additional funding unless it is out of their hands (see below)	Low
Countries not paying full contribution	High	High	High	OA will ask ExCo to intervene to ensure all countries pay full Task participation fees, unless agreed otherwise	Medium

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IEA Demand Side Management Energy Technology Initiative

The Demand-Side Management (DSM) Energy Technology Initiative is one of more than 40 Co-operative Energy Technology Initiatives within the framework of the International Energy Agency (IEA). The Demand-Side Management (DSM) Energy Technology Initiative, which was initiated in 1993, deals with a variety of strategies to reduce energy demand. The following member countries and sponsors have been working to identify and promote opportunities for DSM: Australia, Austria, Belgium, Canada, Finland, India, Ireland, Italy, Republic of Korea, Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, United Kingdom, United States, ECI (sponsor), RAP (sponsor)

Programme Vision: Demand-side activities should be active elements and the first choice in all energy policy decisions designed to create more reliable and more sustainable energy systems
Programme Mission: Deliver to its stakeholders, materials that are readily applicable for them in crafting and implementing policies and measures. The Programme should also deliver technology and applications that either facilitate operations of energy systems or facilitate necessary market transformations

The DSM Energy Technology Initiative's work is organized into two clusters:
The load shape cluster, and
The load level cluster.

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

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

These Tasks and their respective Operating Agents are:
Task 1 International Database on Demand-Side Management & Evaluation Guidebook on the Impact of DSM and EE for Kyoto's GHG Targets – Completed Harry Vreuls, RVO, the Netherlands

Task 2 Communications Technologies for Demand-Side Management – Completed Richard Formby, EA Technology, United Kingdom

Task 3 Cooperative Procurement of Innovative Technologies for Demand-Side Management – Completed
Hans Westling, Promandat AB, Sweden

Task 4 Development of Improved Methods for Integrating Demand-Side Management into Resource Planning – Completed Grayson Heffner, EPRI, United States

Task 5 Techniques for Implementation of Demand-Side Management Technology in the Marketplace – Completed
Juan Comas, FECSA, Spain

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

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

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

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

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

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

Task 12 Energy Standards - to be determined

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

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

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

Task 16 Competitive Energy Services- Jan W. Bleyl, Graz Energy Agency, Austria

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

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

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

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

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

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

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

Task 24 Behaviour Change in DSM: Phase 1 - From theory to practice
Phase 2 – Helping the Behaviour Changers Completed - Dr Sea Rotmann, SEA, New Zealand

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

For additional Information contact the DSM Executive Secretary, Anne Bengtson, E-mail: anne.bengtson@telia.com and visit the IEA DSM website: http://www.ieadsm.org