UsersTCP

Hard-to-Reach Energy Users

Subtask 2: Case Study Analysis

SWEDEN

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Luis Mundaca

International Institute for Industrial Environmental Economics, Lund University

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Contents

Preface

This report was developed under the 'Users Technology Collaboration Programme (TCP) by the International Energy Agency (IEA) Task on Hard-to-Reach (HTR) Energy Users'. The Task aims to provide country participants with the opportunity to share and exchange successful approaches identifying and better engaging HTR energy users. Under the Task, HTR energy users are broadly defined as *'any energy user from the residential and non-residential sectors, who uses any type of energy or fuel, and who is typically either hard-to-reach physically, underserved, or hard to engage or motivate in behaviour change, energy efficiency and demand-side interventions*'.

Outcomes from the Task indicate that HTR energy users involve, for example, renters and landlords; low- and high-income households; the MUSH (municipalities, universities, schools, and hospitals) sector; small to medium enterprises / businesses (SMEs / SMBs); and people exposed to intersecting and compounding vulnerabilities based on factors such as age, race, gender, minority status, geographic, linguistic, technological or social isolation.

The case studies presented in this report aim to offer insights into programmes that aim to better engage HTR energy users in Sweden. Particular attention is given to design, implementation and behaviour change aspects. Other country case studies developed under the Task also include: Aotearoa New Zealand, Canada, Italy, the Netherlands, Portugal, the UK and the U.S.

We would like to thank all participating countries, their authors, and the interviewees who provided insights into their programmes targeting the HTR. I would like to particularly thank our National Experts and any national experts who undertook peer reviews.

All case studies can be found on the project's website.

Dr Sea Rotmann
Task Leader
Users TCP by IEA Task on HTR Energy Users
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Country background: Sweden

Overview of the Energy System

Sweden is often listed as a world leader in the domain of clean energy, innovation policy and environmental protection, and the country tops multiple international rankings (e.g. the *Global Green Economy Index*[1], the *Legatum Prosperity Index*[2] and the *Global Cleantech Innovation Index*[3]). According to the *International Energy Agency* (IEA; 2019), there are many reasons why Sweden is leading the way towards a low-carbon economy. For example, among IEA member countries, it has the lowest share of fossil fuels in its primary energy supply, and electricity generation and space heating are mostly decarbonised. As a result, the country has the second-lowest carbon dioxide (CO_2) emissions per gross domestic product, and the second-lowest CO_2 emissions per capita (IEA, 2019).

Sweden's history of a low-carbon supply mix and the rapid expansion of commercial bio-energy for electricity and heating is reflected in significant reductions in CO_2 intensity (Mundaca et al., 2015). In 2018, total primary energy supply was 552 TWh[4]. Hydro, wind, biofuels and solar accounted for 40% of this, with nuclear power adding another 35% (Energimyndigheten, 2020, p. 4). These low-carbon energy sources also play a critical role in the country's energy self-sufficiency (IEA, 2019). For the particular case of electricity generation (160 TWh in 2018), the fuel mix is as follows (Energimyndigheten, 2020, p. 6): nuclear power (41%), hydropower (39%), wind power (10%) and solar power (0.2%). Combined heat and power plants covered the rest (~9%) (see Figure 1).

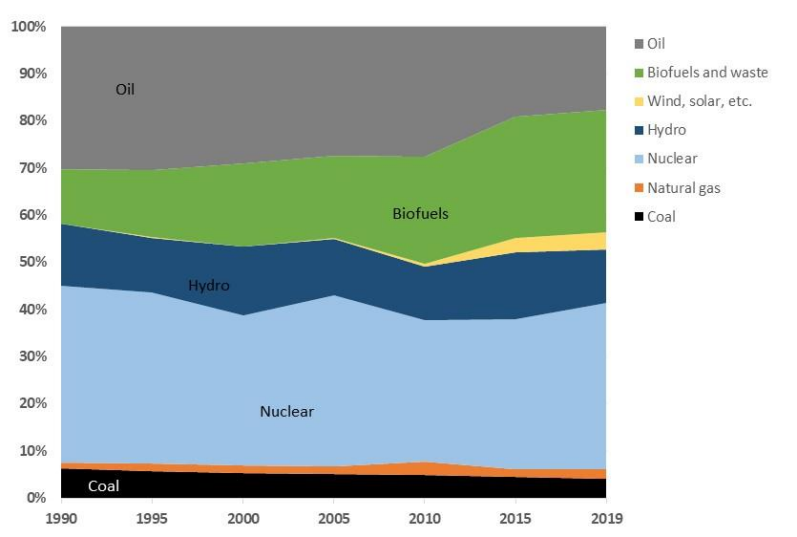

Figure 1: Total energy supply by source (in relative figures), Sweden 1990–2019. Data source: IEA *(2020)*.

[1] https://www.greengrowthknowledge.org/research/global-green-economy-index-2016.

[2] https://www.prosperity.com/.

[3] https://www.cleantech.com/indexes/the-global-cleantech-innovation-index/.

[4] Note that energy losses and non-energy use accounted for 183 TWh in 2018 (Energimyndigheten, 2020).

Turning to the demand side, energy use has remained relatively stable for decades, with most (subtle) changes related to climatic conditions and business cycles. The country has a relatively large energy-intensive sector (wood, iron and ore processing), which accounted for 141 TWh (37.8%) in 2018, while residential and service sectors accounted for 147 TWh (39.4%) and transport 84 TWh (22.5%) (Energimyndigheten, 2020, p. 9; see Figure 2). Electricity, biofuels and district heating are the top fuels used across the industrial, residential and service sectors. However, despite the growing use of biofuels (17 TWh in 2018), the transport sector is still heavily dependent on fossil fuels (64 TWh in 2018) (Energimyndigheten, 2020; IEA, 2019). In addition, electricity use per capita in Sweden remains one of the highest in the world (12.8 MWh in 2019) (IEA, 2019).

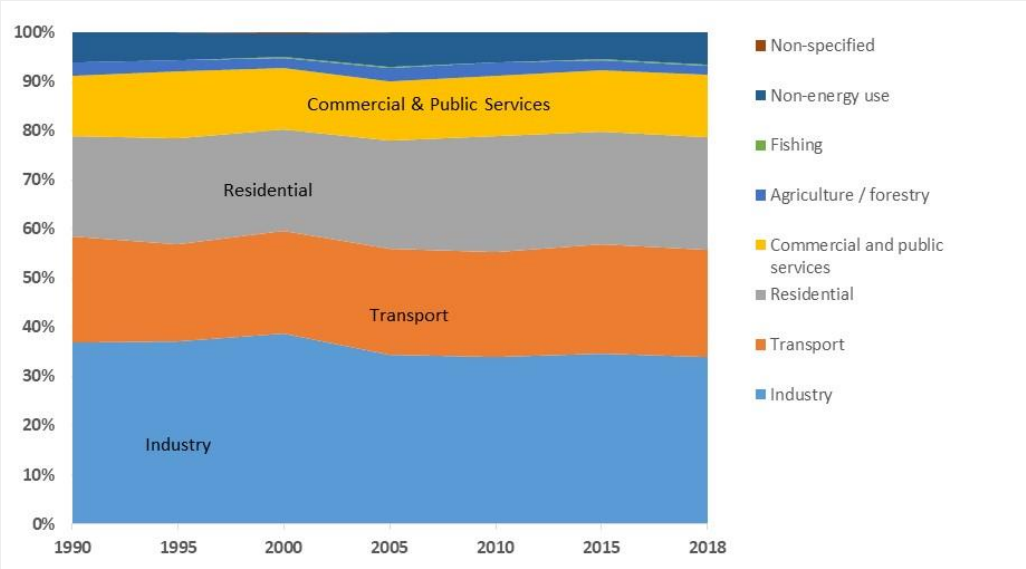

Figure 2: Total energy use by sector (in relative figures), Sweden 1990–2018. Data source: IEA *(2020)*.

Hard-to-Reach Audiences

In Sweden, there is no official definition of 'hard-to-reach' (HTR) energy users. Efforts have only just begun to identify them, along with the development of the HTR policy discourse in general (Rotmann et al., 2020). However, research in the context of the IEA Task on HTR energy users suggests that the following audiences can be distinguished in the country (see Ashby, Rotmann et al., 2020; Ashby, Smith et al., 2020):

- in the commercial sector: small and medium-sized enterprises (SMEs).
- in the residential sector: housing / building associations, low / high-income households; and non-native speakers.

Although there are clear limitations, these audiences (characterised in more depth in subsequent chapters) are consistent with the literature (for details see Rotmann et al., 2020). For example, several studies highlight cost-effective potentials for improving energy efficiency (EE) among SMEs, but also underline that market barriers and failures prevent implementation. Among SMEs, these include: information asymmetries; the lack of a strategic approach; perceived disruption to production; limited access to capital; and a lack

of technical skills (Johansson et al., 2019; Palm & Backman, 2020; Palm & Thollander, 2010; Thollander et al., 2007, 2013). In the residential sector, they include: the stagnation of EE improvements; the relaxation of building regulations; a lack of technical knowledge; high transaction costs; and the principal-agent problem (Nässén et al., 2008; Nässén & Holmberg, 2005; Ó Broin et al., 2015; Unander et al., 2004). As a whole, the literature underscores the need for better-integrated and more ambitious HTR policy interventions (Rotmann et al., 2020).

Within this context, this report presents the results of two case studies, namely the 'Energy Efficiency Network' and the 'Energy and Climate Advice Services',that were not explicitly designed to deal with HTR audiences *per se*, but have the potential to offer insights into policy initiatives that aim to engage HTR audiences in Sweden. Given the orientation and scope of these two initiatives, the report focuses primarily on two HTR audiences, (SMEs and households) that have been identified as high priority in terms of energy-saving potential. The two audiences are fairly representative in terms of size. For example, there are over 730,000 SME units (equivalent to 99.9% of the total class-size commercial / industrial base) that generate nearly 61% of added value and employ approximately 65% of the workforce (~2.18 million people) in the non-financial sector (SBA, 2018, p. 3). Regarding households, the latest statistics show that there are over five million dwellings in the country, with one- or two-dwelling buildings accounting for 42%, and multi-dwelling buildings accounting for 51% (SCB, 2020). Electricity consumption in this HTR audience has more than doubled in past decades, going from 9.2 TWh in 1970 to 22.1 TWh in 2017 (Energimyndigheten, 2019b). It has been argued that these figures underline the importance of the residential sector in shaping overall electricity use and energy-saving potentials in the country (Ek & Söderholm Patrik, 2010; Nässén & Holmberg, 2005).

Case Study Methodology

The methodology to develop the case studies is simple, and is composed of the following elements.[5]

First, the case studies were chosen based on the outcomes of previous activities undertaken by the Users TCP HTR Task. As indicated in the previous section, these activities aimed to identify and characterise HTR audiences in participating countries. To that end, a variety of data sources were used, including an international survey, interviews with experts and practitioners, and a literature review (for details, see Ashby, Rotmann et al., 2020; Ashby, Smith et al., 2020). For the particular case of Sweden, these activities revealed that SMEs, housing / building associations, and high-income households were important HTR audiences. Therefore, the case studies focused on programmes or initiatives targeting the following audiences, in particular:

- the *Energy Efficiency Network* (EENet) for SMEs; and
- *Energy and Climate Advice Services* (ECAS) for households.

Although both initiatives have national coverage, unless otherwise stated, the findings presented in this report are mostly applicable to the region of Skåne (the southernmost county of Sweden), where interviews and data gathering took place.

Second, and from an analytical point of view, the approach adopted the framework developed by the *See Change Institute*, called *The ABCDE Building Blocks of Behaviour Change* (for details, see Karlin et al., 2021; and Rotmann et al., 2021). This framework focuses on the analysis and systematisation of the design, implementation and assessment of interventions addressing behaviour change that, in our case, target EE and energy conservation. The framework focuses on data collection across specific blocks, namely: Audience, Behaviour, Content, Design and Evaluation. Data gathering is guided by an interview protocol that addresses each block, and the set of questions can be found in Rotmann et al. (2021).

Third, interviews (~60 minutes) supported data collection and provided a deeper understanding of the chosen cases. These were conducted by the author of this report and the following people were interviewed:

- Anna Evander, Regional Energy Office, Skåne (2 March, 2021).
- Anna Mattsson, Regional Energy Office, Skåne (8 March, 2021).
- Ann-Kristine Nilsson, Energy and Climate Advisor (17 March, 2021).

Finally, the case studies were supported by a review of official documentation and related journal publications. This phase also included the analysis of information found on the websites of the two initiatives[6], and multiple (*ex-post*) evaluation reports and papers.

[5] The overall methodology followed the co-designed CSA methodology and template developed under IEA Task on HTR and described in Rotmann et al. (2021).

[6] For details, please see: https://www.energimyndigheten.se/nrp/natverk-for-energieffektivisering/sa-fungerar-natverken/ and https://www.ekrs.se/.

Case study #1: the *Energy Efficiency Network* for SMEs

Background

The *Energy Efficiency Network* (EENet) was established in 2016, and as publicly funded project, it ended during the spring of 2021. There were two overarching goals: i) to help SMEs to work systematically towards improved EE; and ii) to achieve 15% EE improvements as a result of the implemented measures. The methodology built upon the experience with EE networks in Germany and Switzerland (details in the next section). The initiative was run by the *Swedish Energy Agency* (SEA) in collaboration with county administrative boards and regional energy offices. It had a total budget of approximately €14.4 million and received co-finance from the *European Regional Development Fund* through the *National Regional Fund Programme* (SWECO, 2020b).

Despite the heterogeneity of SMEs (in terms of size, industrial foci, technology systems, personnel, etc.), the initiative aimed to develop regional business networks that could provide technical support and assistance to SMEs wanting to use energy efficiently (Energimyndigheten, 2015a). By the end of the programme, there were 34 networks and over 350 participating companies (Energimyndigheten, 2015a; SWECO, 2020b). Each network consisted of approximately 8–16 companies with energy use of over one gigawatt hour (GWh). In Skåne, for example, five networks were established with each sub-network hosting 8–10 SMEs.

In simple terms, the main motivation to design and implement the EENet initiative was to promote EE in SMEs. Within this context, there are a number of reasons that justified the utilisation of networking as an intervention approach. First, SMEs were targeted because significant EE potentials and related benefits (e.g. increased productivity, emission reductions) have been identified (see, for example, Johansson et al., 2019; Paramonova & Thollander, 2016; Thollander et al., 2007). However, interviewees argued that there is a gap between potentially profitable EE measures and what SMEs are capable of, or willing to do. This appears to be due to market barriers and failures such as information asymmetries, a lack of knowledge, a lack of finance, a lack of a long-term vision, and the relative low priority given to EE. A lack of a strategic approach has also been identified in the literature (Thollander et al., 2013) and the initiative aimed to eliminate these problems by focusing on, for example, information sharing, education, the energy management system, site visits and expert knowledge.

Second, the intervention built upon the successful implementation of so-called *Learning Energy Efficiency Networks* (LEENs) in Germany and Switzerland (Energimyndigheten, 2015a; for details see, for example, Jochem & Gruber, 2007; Ringel et al., 2016). In addition to the market barriers and failures mentioned above, LEENs pay particular attention to transaction costs, such as the search for expert knowledge (cf. Mundaca et al., 2013). They aim to reduce or eliminate these costs by, for example, providing expert advice, giving technical presentations and promoting the exchange of experience among SMEs (Jochem & Gruber, 2007).

Third, according to Jochen and Gruber (2007), EENets are built on four major conceptual components: innovation systems (e.g. addressing the complex relationships between multiple actors who influence energy [efficiency] decisions), investment cycles (e.g. addressing the risks and co-benefits of new end-use energy technologies), the diffusion of innovation (e.g. addressing early adopters and promoting spill-over effects), and social dynamics (e.g. addressing industrial norms and mutual support among peers). Both implicitly and explicitly, these aspects support arguments for the implementation of the EENet in Sweden.

Case Study Methodology

At the risk of oversimplification, the key methodological element of the EENet initiative was the formation and development of the network itself. The latter consists of an expert and peer-to-peer platform that strategically supports energy management among participating SMEs. The network and its related activities (e.g. consultations with experts, access to technical information, site visits, M&V processes) aimed to reduce or eliminate a variety of market barriers and failures that can prevent EE improvements. In Sweden, the literature indicates that networking can be an important driver for EE improvements (Thollander et al., 2013). Based on the German example, the Swedish EENet unfolded as follows (Energimyndigheten, 2015b): [7]

Phase 1 – Initiation: During the initiation phase, a network coordinator was appointed by the SEA. This person led the network and was joined by an energy expert (or experts) who provided support and advice. The network was formalised, dissemination took place and potential companies were approached. Interested SMEs signed an agreement and paid an annual fee of approximately €1,000. The coordinator was responsible for running and managing the network's activities, and the energy expert(s) assisted with technical knowledge and proposals, and helped to reduce (perceived) risks related to potential measures or technologies.

Phase 2 – Mapping: During this phase, participating SMEs were asked to conduct an energy audit in their respective organisations. SMEs could apply for funding to support its implementation (up to 50%; with a cap equivalent to approximately €5,000). The audit was critical to identify EE potentials, related measures and provide a baseline for future evaluations. Based on the outcomes of the audit, and with technical support from the network, participating companies defined an energy policy, set goals and developed an action plan. These strategic aspects were supported in the next phases.

Phase 3 – Networking: This phase ran almost in parallel with Phase 2. It included four main activities: i) participating in joint meetings and seminars (at least three times per year) supported by energy experts and a coordinator; ii) receiving training and support for energy management work, in which companies appointed an energy manager, developed M&V processes, reported on their internal work, and conducted information meetings and training sessions; iii) implementing follow-up action plans and evaluating annual energy use. Here again, companies received support from the network's expert; and iv) identifying financial

[7] A video about the methodological approach undertaken in Germany can be seen here.

resources to implement measures. Companies received assistance from the coordinator to find and apply for grants to support the implementation of identified measures.

Phase 4 – Evaluation: During this phase participating companies reported their results to the network's coordinator who was responsible for compiling the information and informing the SEA about progress. The SEA provided assistance in the form of the EENet tool, which companies could use to monitor their energy use and see the outcomes of implemented measures. The relevance and robustness of M&V processes that had been established in previous phases, and follow-up activities were a critical part of this phase.

Audience

As stated above, the EENet initiative focused on SMEs. To participate, the company had to fulfil the following criteria (Energimyndigheten, 2015a): i) no more than 249 employees; ii) annual sales of under €50 million (or total annual assets of under €43 million); and iii) annual energy use over 1 GWh/year.[8] The initiative was open to any type of SME. The SEA performed a feasibility study to evaluate the potential number of eligible SMEs, and a target of 400 was set.

However, and in line with the HTR narrative, the recruitment of SMEs was a resource-intensive challenge. Although the project started in the summer of 2015, it took a year to actually recruit companies. This meant that networking activities did not start until the summer of 2016. Once companies had been recruited, they were grouped into specific networks. In Skåne region, five networks were established: three focusing on industry, one on property owners, and one on farmers. Each had 8–10 SMEs, which meant that about 50 SMEs were involved in total. Finally, it became apparent that the energy use criterion, which was originally set at 2 GWh/year, would have to be relaxed to attract more companies.

Overall, the process highlighted that the smaller the company, the harder it was to engage. In addition, one can also argue that recruited SMEs were somehow *less* HTR. Thus, the number and profile of participating SMEs was very likely to be unique and not representative. The interviews that were carried out revealed that it was important to share experience and lessons learnt to increase the number of participating SMEs, and identified several reasons for the lack of engagement. The latter included a *lack of time, low priority given to the topic, a lack of knowledge*, and *poor timing* (e.g. with respect to production cycles). These issues are consistent with the barriers preventing EE improvements indicated in the previous section.

Behaviours

The EENet aimed to promote behavioural change, defined as "*systematic and structured work on energy issues*" (SWECO, 2020b, p. 4). This was deemed critical for the initiative to have a long-term effect on participating SMEs, and was prioritised by the SEA. The requirement was applied to the country as a whole, and no regional variations were considered. Behavioural change was targeted via numerous activities that addressed energy management. For example, participating SMEs were required to appoint an energy

[8] Given the fact that some companies expanded over time, the legal requirements to be part of the programme were important. Companies that, for whatever reason, were no longer considered to be an SME could still join the EENet but could not receive the same level of support.

manager. This was critical for the establishment of an energy policy that included goals and an action plan. They were also required to develop a method to continuously monitor and report energy use, notably progress with respect to implemented measures. Finally, participating companies had to conduct internal information meetings and/or run training programmes to encourage other employees to get involved (Energimyndigheten, 2015b).

Content

Overall, the engagement strategy and messages addressed two core areas: i) the benefits of increased EE; and ii) the benefits of being a member of the EENet. Contents during the recruitment phase included highlighting the economic, social and environmental benefits of efficient energy use, and that EE strengthened the company's brand.

The engagement strategy also paid close attention to the benefits that SMEs would obtain if they joined the EENet. To that end, the following elements were part of the communication strategy[9]:

- an opportunity to share experience with others (potentially in a similar situation);
- access to individual consultations with energy experts;
- the opportunity to choose topics and themes for discussion;
- access to training and courses covering a variety of energy areas (e.g. cooling, heating, ventilation, solar energy); and
- support and follow-up activities throughout the initiative.

The communication strategy was developed by the SEA together with regional partners.[10] The elements listed above emerged as regional networks were formed, and were tailored to their needs (e.g. a seminar on cooling and ventilation for the property owners network). Once companies had joined the initiative, the engagement strategies indicated above continued (e.g. about the benefits of being a member of the EENet). In fact, communication was a key element in the overall programme as it was expected that constant engagement among participants was crucial for the network's success (cf. Paramonova & Thollander, 2016).

Delivery

Several delivery mechanisms were developed to reach the target group throughout the various phases of the programme. In the initial phase, the EENet worked with municipal energy advisors, environmental inspectors and key business leaders to identify SMEs that might be willing to join the programme. Phone calls, emails, website advertising and in-person visits were all used to attract companies. Regional energy authorities launched a major recruitment effort, consisting of 200–300 phone calls and 100 in-person visits to interested companies. In the mapping phase, energy experts were hired to support SMEs, and site visits to participating companies were an important element. These mechanisms were consistent with findings in the literature which highlight that both the source and level of expertise appear to be important to gain trust among programme participants (cf. Dütschke

[9] A brochure (in Swedish) promoting the EENet among prospective SMEs can be found here.

[10] An interviewee indicates that SEA probably hired a communication expert to develop the communication strategy.

et al., 2018; Lucassen & Schraagen, 2011; Sniezek & Van Swol, 2001). At this time, the team realised that reminders and encouragement were not enough to ensure the implementation of EE measures, as the commitment of top management was also crucial. If this person was a member of the EENet, the task was relatively easy. However, if this was not the case, the coordinator had to support the person representing the company and engage the top management of his/her company. Side-events / workshops (e.g. about energy management) were used to get the attention of top managers. Thus, the EENet deployed both bottom-up and top-down approaches. Finally, the programme's website provided information to both recruited and potential SMEs about the initiative (e.g. publications, newsletters, requirements). The active engagement of regional coordinators was crucial in all of these delivery mechanisms.

Evaluation

As indicated above, the EENet had two specific goals: i) SMEs were required to work systematically towards better EE; and ii) to achieve 15% EE improvements as a result of implemented measures. The EENet was evaluated externally with respect to these two overarching goals several times.[11] Furthermore, regional coordinators reviewed them every three months in the course of reporting to the SEA.

From a national point of view, these evaluations revealed that the goals were largely met (see SWECO, 2020b). In particular, the first goal (and thus the targeted behaviour) was seen as the core of the programme, because it paved the way for long-term impacts (SWECO, 2020b). Specific activities supporting its successful achievement included the development of an energy policy, the definition of clear energy goals, the establishment of routines to monitor energy statistics, and educating and raising awareness among employees of EE (SWECO, 2020b). Turning to the region of Skåne, in particular, the overall evaluation appears to be consistent with outcomes at the national level. With respect to the 15% target, the interviews revealed a degree of heterogeneity among participating SMEs. For example, some companies reached 30–40% EE improvements[12], surpassing the target, while others did not reach the goal. However, it is important to note that some EE measures were only implemented in the last year of the initiative, and the results could not be taken into account when the evaluation took place. In addition, in some cases, the COVID-19 pandemic slowed down the implementation of selected measures or led to the postponement of decisions.

Conclusion

The case study revealed that networking can be an effective methodological intervention to reach SMEs. This seems to be consistent with the experience in other European countries (e.g. Germany). However, it is a very time-consuming and resource-intensive approach to creating structures that seek to establish lasting behavioural change (cf. SWECO, 2020b). Multiple challenges had to be overcome to reach and maintain working relationships with this HTR audience, and achieve the programme's goals. From a behavioural perspective, an in-depth understanding of the psychographics (let alone barriers and needs) of the target

[11] Evaluations were conducted by SWECO https://www.sweco.se/.

[12] Based on a mix of both ex-ante and ex-post estimations.

audiences was needed to better support the design of engagement strategies. Another challenge was to establish the structure and functioning of the network, which delayed its operation and is likely to have reduced the impacts of the initiative, particularly in the short term. In fact, engaging SMEs proved to be difficult and confirmed why they are regarded as a HTR audience in country. Interviewees argued that participating SMEs have made significant progress with respect to EE and are expected to be better-prepared to continue this work in the future. At the same time, this case study suggests that behavioural change is possible if enabling conditions are in place. These conditions include, among others, commitment, trust, expertise, dedicated resources and time. Now that the initiative has come to an end, and given the multiple (business) uncertainties triggered by the COVID-19 pandemic, these enabling conditions are even more critical to sustain (or improve) the effectiveness or persistence of the programme in the long term. It remains to be seen how both energy authorities and coordinating organisations will build upon the experience, and implement further initiatives to support SMEs.

Case study #2: *Energy and Climate Advisory Services* (ECAS)

Background

The purpose of *Energy and Climate Advisory Services* (ECAS) in Sweden is to "*provide impartial, free, technologically neutral and commercially independent advice to households, companies, housing associations and organisations*" (Ministry of Infrastructure, 2020, p. 90). They were established by the government as an energy-advising service nearly four decades ago. Driven by the oil crisis and local energy planning, this initiative was implemented in the 1970s and initially focused exclusively on energy. The programme has undergone several changes (e.g. *Ordinance 1997:1322* concerning grants to local authority energy consultancies and the temporary withdrawal of governmental subsidies in 1986), and climate mitigation aspects were only explicitly added in 2000 (Granath & Westelius, 2012; Kjeang et al., 2017). It was reviewed again in 2015, when new guidelines (*Ordinance 2016:385*) were established for *Communal Energy and Climate Advisory Services* (Ministry of Infrastructure, 2020).[13]

Four actors are involved in its implementation (Energikontoret Skåne, 2020; Energimyndigheten, 2019a; Khan, 2006; Kjeang et al., 2017): i) the government, which establishes the policy framework and provides funding; ii) the SEA, which administers and coordinates activities at the national level; iii) regional energy offices, which coordinate, support and promote ECAS at the regional level; and iv) municipalities, which receive funding to employ energy and climate advisers who, in turn, provide services to the target audience. Currently (June 2021) in the region of Skåne, 33 (of a total of 33) municipalities participate in the programme, and employ 21 municipal energy and climate advisors.

Several reasons have been put forward to justify the implementation of ECAS. First, from a national perspective, it is one of several policy interventions that the government has introduced to support the country's *Climate and Energy Integrated National Plan* (Ministry of Infrastructure, 2020). Implemented by the SEA, the aim is to encourage municipalities to support national policy efforts.

Second, from a local perspective, the initiative aims at supporting the implementation of other national policy measures addressing EE and climate issues (e.g. energy declaration of buildings, subsidies for solar PV; Khan, 2006; Kjeang et al., 2017). The implementation of other regulations that target, for example, heating and cooling, under EU Directives (such as the *Energy Performance of Buildings Directive*), are also the responsibility of ECAS.

Third, there are extensive information asymmetries or a lack of information about sustainable energy use among target audiences (for households see e.g. Myhren et al., 2018). In this context, ECAS aim to bridge the knowledge gap between experts and non-experts by providing free, impartial information to target audiences. Thus, awareness raising and education are important methodological elements.

[13] See Kjeang et al. (2017) and Granath and Westelius (2012) for a historical (policy) perspective, notably the main drivers behind their implementation and subsequent modifications.

Fourth, there are specific information-related barriers among audiences. For example, homeowners, housing / building associations and social organisations (the main target audiences by ECAS) can lack basic knowledge about energy use (e.g. types of heating system). Getting their attention and bringing them into contact with experts is a critical way to trigger demand for energy advice. Trust is another important issue, and ECAS address this by offering a non-commercial service and impartial technical advice. For the specific case of non-native speakers, language and literacy are important barriers, and simply walking people through their energy bills can be a simple but effective measure[14].

Case Study Methodology

ECAS provide free, impartial and technologically-neutral advisory services to households, SMEs, housing/ building associations and social organisations (Energimyndigheten, 2019a; Ministry of Infrastructure, 2020). This government-subsidised programme[15] is based on a decentralised structure that aims to optimise financial and technical resources to reach target audiences (Granath & Westelius, 2012). The programme addresses a key market failure: *a lack of information*. A central methodological assumption is that the provision of information, via advisors, will enable target HTR audiences to make more rational decisions about their energy use and service demands. In this context, an important component is the *Information-Deficit Model*, which implies that more effort should be made to transfer information from experts to non-experts (Suldovsky, 2017). As a policy intervention, the model underscores the role of awareness-raising and education among target audiences (Janda, 2011). Thus, the ultimate goal of the initiative is to provide tailored, expert information that supports investment decisions related to EE and also renewable energy technologies.

At the regional level, the initiative works as follows (Energikontoret Skåne, 2020; Energimyndigheten, 2019a; Khan, 2006):

Policy and funding: the initiative is one of several policy measures that the SEA has implemented to support the country's *Climate and Energy Integrated National Plan* (Ministry of Infrastructure, 2020). The SEA allocates public funds to municipalities and regional energy offices, which coordinate the programme in their respective regions. It also supports networking and training at the national level.

Coordination: At the regional level, the energy office leads, manages, promotes and facilitates the development of the ECAS initiative. In coordination with both the SEA and municipalities, it ensures that activities are consistent with the overarching goal of the programme. It also supports networking activities and ensures that advisers have appropriate training.

Outreach: A variety of dissemination activities promote the initiative (more details in the following sections) and can trigger or increase demand for advice among target audiences. These outreach activities are critical to alert HTR audiences to the existence of the ECAS and the opportunity to get free-of-charge advice. Municipalities, together with energy and

[14] The government has given regional energy agencies responsibility for finding opportunities and evaluating the role of the ECAS programme for this specific target group.

[15] Subsidies were phased out or discontinued between 1986 and 1997.

climate advisors, define and implement the contents and delivery mechanisms of outreach activities, which are also supported by the regional energy office.

Advising: This is the phase in which advisers and those seeking advice meet. Broadly speaking, the advice that is provided covers five, often interrelated areas:

i) how to reduce energy use
ii) how to switch to or increase the use of renewable energy
iii) how to decrease energy costs
iv) how to minimise environmental impacts; and
v) information about the availability of grants (Energimyndigheten, 2019a; Khan, 2006).

Advice is delivered via several routes (in-person visits, phone calls, emails, seminars, etc.). People seeking advice can also find information via a dedicated website[16]. In addition to the basic advisory services (e.g. about heating technologies, ventilation, lighting), municipalities can also offer more comprehensive services that target local priorities (e.g. building associations) or specific technologies (e.g. solar PV, sustainable mobility) drawing upon additional financial support from the SEA (Ministry of Infrastructure, 2020). The strong assumption is that increased level of knowledge is expected to lead to behaviour change and/ or investments, resulting in increased EE or the use of renewable energy (Khan, 2006).

Reporting: Advisors report their activities using information management systems at the municipal level, and to the regional office. The latter collects data for further analysis by the SEA. Statistics relate to, for example, the number of people/ organisations seeking advice, communication channels (e.g. telephone, email, in-person meeting), the type of outreach activity (e.g. seminars, pop-up stands, in-person visit), seasonality (i.e. advice per month), and the focus of the advice (e.g. heating systems, transport, renewable energy).

Audience

As indicated above, the ECAS initiative targets several audiences. Within the context of the IEA-HTR Task, the most important are: i) housing/ building associations, and ii) SMEs. High-income households and non-native speakers are other targets (see Ashby, Rotmann et al., 2020; Ashby, Smith et al., 2020), although there are no specific requirements to provide advice to any of these segments. Interviewees highlighted the following issues in relation to these audiences:

- **Homeowners and housing/ building associations**: Historically, this is the largest target group that the programme has addressed. Relatively speaking, this audience is easier to approach, as energy issues are more salient. However, there is a lack of knowledge and decisions can take time due to internal administrative procedures. In certain cities, this audience is a key target group.
- **SMEs**: SMEs are often hard to reach, and a key issue relates to the relatively low priority and internal capacity given to energy management. However, this can change if advisors (from ECAS), municipal environmental inspectors and SMEs work together. Triangulation can often reduce barriers to reaching this audience.

[16] For the region of Skåne, the ECAS's website is https://www.ekrs.se/

- **High-income households**: There is some degree of discrepancy regarding the extent to which this specific segment seeks advice. On the one hand, it is claimed that very little demand for services comes from it. On the other hand, it is also argued that middle- or high-income households are the ones that often use ECAS, and that they are the ones more likely to invest in the building envelop and/ or buy solar PV, for example. At the time of research, interviewees noted that advisors were able to engage more effectively with households in relatively lower-income areas, as people are more aware of energy costs and the potential benefits of increased EE. In any case, advisors are not aware of or have information about the specific income level of those that seek advice.
- **Non-native speakers**: Interviewees pointed out that this group can be of particular interest because they, for example, lack financial resources and energy bills can be high. Where possible, an interpreter is used, and coordination with social services plays a role. There is also the case of non-native speakers who have resources but need advice when, for example, there is a need to understand how grants work (e.g. for solar PV) or which improvements may be suitable for their (summer) houses.

In this context, interviewees noted the need to be careful when using the term 'audience' or 'segment' as experience strongly suggests that audiences are very heterogeneous. A given audience can contain energy users (i.e. different segments) that are more or less difficult to engage with. In addition to specific market barriers and failures such as information asymmetries or a lack of access to capital, interviewees suggested four elements that may affect the degree to which a specific audience may or may not consist of HTR users. First, there is a *degree of self-deception* (e.g. denying the relevance, significance, or importance of scientific evidence or knowledge) about climate change or energy use. For some, the question about EE is unimportant, as long as energy is cheap. Secondly, there is a *present bias*. Some users prefer to settle for a smaller present benefit or cost reduction, rather than waiting for a larger future benefit. This applies, in particular, to some SMEs that, for example, decide to buy a second-hand machine that is cheap but inefficient. Third, *negative externalities* (i.e. the social costs of climate change) are not included in users' decisions, and there can be perverse incentives to seek advice (e.g. about a heated swimming pool that increases electricity use). Finally, *gender* seems to play a role, with males seeking advice more often than females. This can be partly explained because men appear to be in charge of energy-related decisions.

Behaviours

Overall, the ECAS initiative aims to promote behaviours that foster the efficient use of energy and the use of renewable energy. At the most basic but also the most ambitious level, ECAS wants its target audiences to be better-educated and aware of energy and climate issues. Via its technical advice and information campaigns, the initiative helps energy users to make better choices. As Khan (2006, p. 9) states, "*this advice leads to an increased knowledge among the public, which in turn leads to more measures to increase energy efficiency and the use of renewable energy*". Therefore, ECAS aim to make energy and climate change issues an integral part of decision-making processes.

In addition to EE, ECAS also promote the adoption of renewable energy (particularly solar PV) and sustainable transport options. Solar PV is an important area for the programme, and advisors are generally keen to provide advice. Albeit relatively new, transport has

become another important driver of behaviour change and there is increasing demand for advice on sustainable mobility. Recently, for example, there is growing interest in electric vehicles and charging stations. The latter is of particular interest for building associations.

The interviews also highlighted that more insight into behaviour change could be obtained by reviewing the most frequently-asked questions. These include queries about the building envelope (e.g. efficient windows and better cavity wall insulation), the pros and cons of different heating technologies, more efficient appliances, and the process and implications of installing solar PV. Finally, interviewees observed that behavioural change could be defined in terms of different drivers. For example, the phase out of fossil fuels for heating purposes in the household sector focused ECAS activities on that particular change (e.g. use of biogas, district heating, temporary aid for conversion). Other drivers, such as motivating people to adopt solar PV and low-carbon transportation options are chosen to speed up progress with respect to climate change policies, while yet others are the result of local initiatives (e.g. encouraging people to take 'train' holidays).

Content

The overall strategy is to offer free-of-charge technical advice to target audiences, which is supported by a variety of delivery mechanisms. At a more fine-grained level, the initiative develops and deploys specific content that is focused on various EE measures and their benefits for target audiences. This content includes, for example[17]:

- economic and environmental benefits as a result of solar PV adoption;
- a better indoor climate and reduced energy bills as a result of the implementation of triple glazed windows; and
- health and wellbeing benefits as a result of improved ventilation systems.

In particular, the initiative addresses specific questions that advisers can help to answer, for example (Energimyndigheten, 2019a):

- How can I reduce my energy use at home?
- What are the advantages and disadvantages of different heating systems?
- How can I use solar energy for heating, hot water and electricity?
- What should I keep in mind when renovating or constructing a new building?
- What grants and support schemes are available?
- What should I think about and what support is available if I want to install a charging station for an electric car?

These contents can be tailored, at least to some extent. On the one hand, the programme's main activities and services are relatively standard and can be promoted in a similar fashion across different municipalities or audiences. On the other hand, municipalities and advisors are free to tailor the content and define engagement strategies for a specific audience (e.g. SMEs, building associations), or implement a particular local initiative (e.g. solar PV in a specific city). A key issue is that actors are relatively free to choose engagement strategies,

[17] For details see https://www.ekrs.se/broschyrer

as long as the activity benefits the target audiences and is consistent with both the programme and the SEA's guidelines.

Delivery

Various **delivery mechanisms** are used. They include so-called 'pop-up' stands located next to train stations, shopping malls or supermarkets, seminars, the programme's website, social media (e.g. Facebook), leaflets, brochures, letters, face-to-face visits, messages on buses and train screens, and advertising in local newspapers, radio and magazines. Interviewees noted that input from people who seek advice is fed back into delivery mechanisms – for example, social media is used more due to its high adoption rate across target audiences. Delivery mechanisms are defined at national, regional and city levels, and participating municipalities are free to mix and match them, as long as they adhere to the objectives and guidelines of the programme.

A variety of **messengers** contribute to, or support these delivery mechanisms. One of the main tasks of the regional coordinator is to promote and disseminate information about the activities and services on offer. This person is able to draw upon financial resources from participating municipalities, and organise a common, regional marketing initiative (e.g. radio advertising). The regional office is also in charge of maintaining and updating the programme's website. Municipalities also play an important role in defining and supporting delivery mechanisms. For instance, large municipalities can dedicate specific budgets to media, special events, marketing and advertising, etc. In general, municipalities that join the programme need to establish a budget and clearly define how it will be spent, including activities that aim to increase the visibility of ECAS. However, municipalities that have no, or a limited budget, often use their website, Facebook and other social media outlets that are free-of-charge. The regional office can sometimes allocate a limited budget to support municipal partners that cannot fund the deployment of delivery mechanisms.

The analysis of internal statistics and seasonal effects supports the **timing** of delivery mechanisms. For example, website traffic analyses, the volume of emails/ phone calls and weather patterns clearly indicate three key months (or milestones) when delivery mechanisms can be most effective:

- February, when people receive their winter energy bills.
- May, when people start doing things outdoors and there is increased demand for advice on solar panels.
- October, when people think about the cost of their heating systems as temperatures fall.

During the interviews, it was mentioned that the COVID-19 pandemic has increased demand for ECAS services. This may be because people are spending more time at home, using more energy and have more time to think about their domestic energy use. In particular, demand for advice surged during the spring/summer of 2020, even on topics that had previously been neglected at this time of the year (e.g. cavity wall insulation).

Finally, the initiative emphasises that its advisors are willing and able to provide customised technical advice. This practical but strategic element is designed to engage target audiences, by stressing the point that any advice is personal. For example, advisors can be

contacted via phone and email, and potential users can easily find their local advisor via the programme's website[18].

Evaluation

As stated above, the overarching purpose of the programme is to provide impartial, free-of-charge, technological advice to households, SMEs, housing / building associations and social organisations. Beyond that, there are no specific goals or targets that can be explicitly evaluated (Khan, 2006; Kjeang et al., 2017; SWECO, 2020a). However, the programme has operated for many decades, and during this time there have been multiple evaluations by the SEA, consultants and academics. Here, we briefly focus on aspects relevant to its implementation that are, as far as possible, directly related to the HTR discourse.

Beginning with the national level, it is estimated that the programme has reached approximately 200,000 people (Energimyndigheten, 2010, p. 11) and that there were a minimum of 20,000 to 30,000 direct consultations in 2019 (SWECO, 2020a, p. 52). These numbers seem to be consistent with previous studies that estimated 27,000 consultations in 2012 (Energimyndigheten, 2013, p. 54). However, as there are no specific goals, it is not possible to ascertain whether these figures represent success or failure (Harmelink et al., 2008; Khan, 2006) and views are mixed in the literature (see e.g. Energimyndigheten, 2013; Kjeang et al., 2017). Interviewees reported some degree of satisfaction regarding these numbers, but also noted room for improvement. For example, how to increase demand for the programme and the communication strategy (contents and delivery) were highlighted as key areas to be developed. For small municipalities, or ECAS in less wealthy regions, budget constraints were a factor that limited their ability to reach a wider population.

Secondly, it is important to know the main reasons why people seek advice. Energy savings and related financial savings are reported to be the most popular topics, often driven by the high cost of energy. Another important issue is the need to have an independent party (an ECAS advisor) who can confirm or support an energy-related decision that has already been made (e.g. the installation of efficient windows or solar panels). Many of those who seek advice are looking for reliable information and this information is given to audiences in relation to: i) potentially cost-effective measures, ii) current grants, and iii) current suppliers (e.g. EE technologies; SWECO, 2020a).

Third, once advice has been provided, a relevant question is the extent to which this information does (or does not) increase the knowledge or competences of those who receive it. Data in this area is fragmented and uncertain; however, the latest evaluation of the programme provides some clues, based on perceptions/experience of advisors themselves. For example, 36% of 140 advisers who responded to a national survey stated that 75–100% of those seeking advice felt more competent in procuring EE technologies (SWECO, 2020a, p. 25). Figures for the use of renewable energy are relatively similar: 33% of advisors stated that 75–100% of those seeking advice felt more competent in increasing their use of renewable energy (SWECO, 2020a, p. 26). Nevertheless, caution is needed when interpreting these figures, due to the inherent degree of uncertainty and potential bias. Furthermore, it has been claimed that because the ECAS programme interacts with or

[18] For details see https://www.ekrs.se/energiradgivare.

supports other policy instruments (e.g. subsidies for solar PV), it "*has limited possibilities to change people's behaviour*" (Khan, 2006, p. 11). These issues bring up the 'impact problem' in policy evaluation, which is discussed in the next section.

The fourth question relates to whether the programme does change attitudes towards EE and renewable energy among target audiences. In this case, 41% of 140 advisers stated that they perceived a positive, "to some extent" change in attitudes among those seeking advice, with only 1% stating that the advice had no effect at all (SWECO, 2020a, p. 45). Here again, caution is needed due to uncertainties and potential bias. In addition, changing attitudes can be driven by several other factors such as social norms, new technologies and international events. The specific characteristics and psychographics of those who seek advice also determine the extent to which the programme has a lasting effect. As one interviewee put it, "s*ometimes yes* [there is an effect]*, but not always. Those who are interested in energy and climate work get a boost to continue and improve their work".*

Finally, a key issue is whether advice actually leads to investments. Here again, the level of uncertainty is high for many reasons. For example, authors have noted that *ex-post* evaluations, focused on energy savings and emission reductions have not been performed because they are too costly (Khan, 2006), or because of the complexities associated with measuring the effects of informative instruments (Kjeang et al., 2017). Studies have also reported a relatively high level of implementation by homeowners as a result of the advice (Mahapatra et al., 2011). Management practices also seem to play a role. One evaluation revealed that seven (out of ten) advisers followed-up on their activities (e.g. whether or not EE measures are implemented). However, they were only able to get information in about 60% of cases, and noted that it was difficult to obtain results measured in kWh (Energimyndigheten, 2013, p. 29). This is even more difficult when there is little willingness to share information among participants. Those that did not follow up the results of their work cited a lack of time, templates and routines as the main reasons (Energimyndigheten, 2013, p. 29). Interviewees also highlighted that changes in privacy laws prevented *ex-post* assessments. Until recently, it was possible to collect contact data from those seeking advice and contact them again at a later date. Nowadays, this is prevented or limited by the *General Data Protection Regulation*.[19] They noted that comprehensive follow-up is a complex process, and that keeping track of all of the people and organisations who had sought advice, via multiple channels, would overwhelm the system. This point highlights that specific resources would have to be dedicated to understanding the net impacts of the programme.

In addition, it was pointed out that advisors are not allowed to perform ex-ante analyses of potential energy savings, which could serve as a baseline or proxy for resulting savings. This information would put them in competition with private market agents who offer services, and violates the principles of the programme itself. Nevertheless, with various assumptions, SWECO (2020a, p. 32) estimated that approximately 9,000 consultations ended with the implementation of EE measures, and another 5,000 increased the use of renewable energy. A lack of structured feedback has prevented more specific metrics regarding actual implementation (SWECO, 2020a).

[19] For details see https://gdpr-info.eu/.

Conclusion

The case study highlighted that the provision of energy and climate advice services is important to increase knowledge and overcome the lack of information among target audiences. The initiative is also an important way to support or increase the effectiveness of other policy instruments. At the same time, the analysis revealed that behaviour change among target HTR audiences is a complex, long-term process, with multiple challenges and uncertainties associated with its assessment. The literature (details in next section) also acknowledges that the provision of information alone may not necessarily lead to behaviour information. During its long lifetime, the programme has been revised many times and there is agreement that there is still room for improvement. An in-depth understanding of the barriers and needs of the target audiences is crucial to better support the design of engagement strategies. The communication strategy and its delivery play a key role in behaviour change, and a fundamental issue is how to better increase demand for the advice services, and expand follow-up activities. The latest evaluation (SWECO, 2020a) recommends methods and further support for advisors in the form of communication tools and skills. The particular use of digital tools in connection with the advice given to housing associations is also stressed (Samuelsson, 2018).

General Discussion

In the context of the HTR policy discourse and the ABCDE framework, these two case studies raise a number of issues. They are briefly addressed below, and provide further insights into the analysed initiatives.

From a behavioural perspective, both case studies suggest that there is a decent, but partial understanding of the target audiences. On the one hand, socio-economic and demographic aspects, notably the characteristics of households and SMEs (e.g. their size, location, and business type) appear to be well-understood by the organisations that lead or coordinate the initiative. On the other hand, the psychographics (e.g. attitudes, interests, beliefs) of target audiences appear to be much less well-known; this is particularly the case for SMEs. The latter observation seems to be consistent with a general lack of psychographic audience analysis (see, for example, Khayer et al., 2020; Mayr et al., 2020). Given the growing number of studies that analyse attitudes, values and norms and opportunities for sustainable energy use (see, for example, Gadenne et al., 2011; Perlaviciute & Steg, 2014; Poortinga et al., 2004; Steg, 2016) it could be argued that a better understanding of psychographics would generate new knowledge and enhance the effectiveness of mechanisms. In the particular case of SMEs, it is reasonable to expect that such an understanding would allow EE programme managers to better-target their efforts (Plog, 1987), identify opportunities for further market segmentation (File & Prince, 1991), and analyse the role of social influence in technology acceptance (Pentina et al., 2012). Interviewees underlined the importance of studies on the psychographics of target audiences, and noted that they were likely to be part of future activities. If this happens, the information that is captured should provide valuable input to many of the elements addressed by the ABCDE framework.

Following on behavioural-related issues, the literature on EE networks (see, for example, Dütschke et al., 2018; Jochem & Gruber, 2007; O'Keeffe et al., 2016; Palm & Backman, 2020; Paramonova & Thollander, 2016; Pitt et al., 2006) suggests a number of critical factors for success. They include:

i) energy audits to make the financial benefits of increased EE more visible
ii) seminars, site visits and face-to-face time with a trusted expert to support intensive learning opportunities
iii) network activities to reduce transaction costs for participating companies
iv) social cohesion and shared experiences to boost motivation and provide inspiration
v) increasing trust and confidence in the lead organisation and experts to promote (long-term) engagement and enhance the credibility of the process; and
vi) efficient communication and transparency to support commitment across the network's activities.

Some of these elements could be identified, to some extent, in the EENet initiative. For example, both interviews and the documentation suggested that energy audits are a valuable way to raise awareness among participants. They also highlighted positive learning outcomes following seminars and site visits, and reduced transaction costs when solutions were pursued by a group of SMEs (or specific sub-networks). Thus, while quantifiable evidence may be lacking or cannot be publicly disclosed, there are several reasons to

believe that the EENet initiative may have provided an enabling environment for behavioural change.

With respect to the critical factors for the success of information schemes such as the ECAS, the literature (Gynther et al., 2012; Harmelink et al., 2008; Vedung, 1999; Weiss & Tschirhart, 1994) suggests that the following elements are, at least to some extent, related to behavioural issues:

i) a need for quantitative information and regular monitoring
ii) clear market segmentation
iii) synergies with other policy instruments
iv) credibility and trust in the energy advisors
v) social acceptability; and
vi) the provision of specific information on how to move forward.

Here again, it was possible to identify some of these elements, to some extent, in the ECAS initiative. For instance, the importance of interaction with other policy instruments was noted several times e.g. trust on energy advisors (Mahapatra et al., 2011). Similarly, the importance of advisers being credible and trustworthy appears to be primordial for the entire programme. However, and consistent with the evaluations of the initiative, the literature acknowledges that even if informative instruments can generate knowledge, this may not necessarily lead to substantial or long-term behaviour change (see e.g. Abrahamse et al., 2005). In fact, the information-deficit model has been widely criticised in the literature because it fails to drive behaviour change (Blake, 2007; Owens & Driffill, 2008; Tanenbaum et al., 2013). For example, even if there is increased knowledge about energy use and profitable EE potentials, the renovation rate is still very low in the residential sector (Myhren et al., 2018). Thus, the strong assumption that increased level of knowledge will lead to behaviour change may not hold in reality, which stresses the need to complement informative instruments with other mechanisms (e.g. regulations; Harmelink et al., 2008). In turn, the two cases underscore the importance of interactions between behavioural-oriented initiatives and other policy interventions. In the case of EENet, for example, SMEs could apply for funding to implement energy audits. This was a critical element in the programme's methodological approach. In the case of ECAS, the initiative has been an important catalyst for solar PV uptake. There have been up to 30% more installations in municipalities that joined the scheme compared to others that did not (SWECO, 2020a). These interactions raise a variety of questions.

First, initiatives do not act in isolation, and it is important to understand the policy portfolio. However, from an assessment perspective, it then becomes difficult to disentangle the effects of the studied programme from the effects of other policy instruments (the impact problem; Mickwitz, 2003; Mundaca et al., 2016). The findings reported here suggest that target participants are likely to have higher levels of knowledge; at the same time, the level of behaviour change, particularly in the long term, is more uncertain. If individual elements are evaluated in isolation, outcomes are likely to be marginal (Harmelink et al., 2008). Second, the case studies confirmed, at least to some extent, that informative instruments are key to supporting the effectiveness of other policy initiatives (Boza-Kiss et al., 2013; Harmelink et al., 2008). They also highlighted the importance of robust and ambitious regulatory frameworks (e.g. building codes, performance standards) to trigger demand among target audiences (cf. Gynther et al., 2012; Kjeang et al., 2017). Third, current

recommendations that seek to improve the performance of the two initiatives seem to build upon experience from other policies. For example, evaluators suggested that the ECAS initiative should focus more on networking activities in the future, which is likely to be due to their experience with EENet, (see SWECO, 2020a). At the household level, the adoption of solar PV shows that networking (resulting in peer influence or shared experience) can have positive effects (Mundaca & Samahita, 2020). Due to the pandemic, these networking activities have been (and most likely will be) inevitably affected so the use of digital platforms to counteract the effects should a play a greater role.

The two initiatives have been externally assessed, and the outcomes are mixed, particularly for ECAS. From a behavioural perspective, however, many other aspects could (or should) be integrated into future assessments. For example, the assessments could define target behaviours and the goal of the programme more clearly. From an *ex-post* point of view, it would be interesting to capture the underlying psychological and motivational factors that determine (or not) the extent to which the goal is met (e.g. 15% energy savings in the case of EENet). This knowledge could be used to encourage desirable behaviours, either by improving the design and implementation of the initiative (e.g. via further market segmentation), or by strengthening synergies with other policy instruments. Robust and accessible monitoring information could be used to address specific areas such as changing behaviours, reducing energy use (and related costs), limiting carbon emissions and enhancing hedonic or subjective well-being.

It is clear that *ex-post* policy evaluations of behaviour are resource intensive, and gathering data is difficult. Processes must be put in place to ensure that data collection meets the requirements of current regulations. However, this issue should be considered as a specific challenge, and not as a weakness in the evaluation approach *per se*. Like most such exercises, behavioural-oriented assessments improve the administration of initiatives, ensure public accountability, and develop new knowledge that reshapes policy interventions. Thus, future assessments should aim to answer the question of whether the intervention encourages energy-saving behaviour, and what the practical effects are. It is critical to have this information in order to know whether the programme is, in fact, achieving its goals.

From a methodological perspective, the use of the ABCDE framework merits some attention. On the one hand, the five building blocks (audience, behaviour, content, delivery and evaluation) provide a clear framework that shapes the discussion about behaviour change, notably during interviews. From a theoretical perspective, it facilitated a dialogue about elements and concepts belonging to multiple disciplines – for example, behavioural economics (e.g. loss aversion), psychology (e.g. psychographics), marketing (e.g. customer segmentation), and sociology (e.g. social cohesion). This dialogue, in turn, confirmed the ability of interdisciplinary collaboration to provide a more comprehensive analysis of behaviour change. The use of the framework revealed that both initiatives have, to a greater or lesser extent, gone through the process of defining, designing and evaluating behaviour change interventions. It also stresses the assessment of behavioural persistence, an element often overlooked in the reviewed evaluations connected to the case studies. Furthermore, as revealed by the case studies, it highlighted the importance of several key issues, notably the need for better audience profiling, the identification of specific behaviour change goals, a clear engagement strategy, and the evaluation of the programme's effectiveness. Overall, the multi-disciplinary nature of the framework means that it can

provide a variety of outcomes that support analyses, which are broader than single-discipline approaches.

On the other hand, the use of the framework introduced numerous challenges. For example, it is both resource- and data-intensive. While gathering information via interviews is clearly needed, it was insufficient to capture the complex dynamics of the programme. Furthermore, confidentiality issues and data protection regulations limited the amount and quality of information that could be collected. This problem highlights the need to understand the outcomes of programmes using several independent routes, in an approach known as 'triangulation' (Scriven, 1991). Consequently, the review of official and publicly-available information provided critical input that ensured a more balanced analysis. However, the lack or limited amount of primary data made detailed analyses or assessments challenging. The 'evaluation' block illustrates this point particularly clearly, and the outcomes reported here must be considered with due caution. The focus on behaviour change means that the analysis tends to be confined to 'process' or 'outcome' evaluations (Schalock, 2007) – in other words, participants' responses, such as the adoption of new technology – and much less on 'impacts' (Scriven, 1991) – on society and the environment, such as improved well-being, or emission reductions. As noted above, interactions or linkages with other policy interventions exacerbate this problem. Based on the above, and depending on the scope and ambition level, the approach requires a group of analysts with skills in a variety of disciplines, theories and social research methods.

Concluding remarks

This report sheds light on some lessons that have been learned from policy initiatives that aimed to better engage HTR audiences in Sweden. Two cases were studied, namely the *Energy Efficiency Network for SMEs* (EENet) and the *Energy and Climate Advisory Services* (ECAS) programme. Where relevant, the study focused on an analysis of participants' behaviour using the *ABCDE Building Blocks of Behaviour Change* framework. With due limitations, the findings reveal various complexities, challenges and uncertainties associated with HTR policy initiatives; particularly from a behavioural point of view. They include the identification and characterisation of target audiences and specific behaviours to be changed; the barriers and factors that determine these behaviours (*ex-ante* and *ex-post*); the effectiveness of initiatives that seek to encourage sustainable energy use behaviours; and the outcomes and impacts of interventions, both in the short and in the long term. Both cases also highlight the importance of differentiating 'HTR audiences' from 'HTR segments', as the former can exhibit a high degree of heterogeneity and include both HTR and non-HTR segments (i.e. energy users that are more *or* less HTR).

The case studies highlight that evaluation regimes should be co-designed with HTR policy intervention programmes. Although the results are highly context-dependent, the case studies illustrate that rigorous policy assessments are needed, and confirm that such initiatives need to be carefully designed and implemented. Attention needs to be paid to synergies with other policy instruments that can maximise complementarities between price and non-price interventions. Data are a key issue (e.g. psychographics of small companies that are harder to reach). For the methodological framework to be fully effective, and cover all ABCDE blocks, data must be available, reliable, timely and useful. This is particularly the case for quantitative analyses. Nevertheless, the framework is a useful way to gain a better understanding of the broad effects of the analysed cases. Overall, the results reported here highlight the value of evidence-based evaluations in supporting the design, choice and implementation of behavioural-oriented policy interventions, and underline the need for assessment and monitoring mechanisms to be integrated early into EE programmes addressing HTR audiences.

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FURTHER INFORMATION

Contact Luis Mundaca luis.mundaca@iiiee.lu.se