streamSAVE Dialogue Groups

Priority Actions:

- **Small-scale RES for heating (including Domestic Hot Water)**
- **Feedback and tailored advice for behaviour changes**

Minutes of Meeting 2

Tuesday 15 November 2022

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Short summary

This meeting discussed calculation methodologies and related issues about energy savings from (1) small-scale RES for heating (including Domestic Hot Water), and (2) feedback and tailored advice for behaviour changes. Key points highlighted in the discussions:

About small-scale RES for heating (with a focus on heat pumps in this meeting):

- An important point for the methodology about heat pumps is the availability of national indicative values.
- There is also a need to later consider cooling in the methodology.
- The Greek example shows the importance of including a mandatory share of technical measures for EEOS.
- Another lesson learnt from the Greek example is the importance of simplifying the monitoring data collection for bottom up measures.

About behaviour changes:

- There is a difference in calculating the behavioural measures' savings depending on whether they do or do not include tailored feedback, meaning pre-analysed data.
- Behavioural programs in the US consistently provide measurable savings, and are now very important for residential savings.
- Savings are measurable using statistical analysis of the billing data, especially when randomised control trials (RCTs) are possible.
- The evaluation of the behavioural savings using RCTs pays off to the utilities, even if the price is high.
- RCTs could also help distinguish external factors from behavioural measures, even if the external factors are very influential (like climate catastrophes or war).
- There is a decline in savings when messages discontinue after a year: examples from the US shows that there is 3.6 (1.5 for renters) years usually of a period in which they still result in savings (the messages seem to still work), and afterwards it is usually not delivering energy savings anymore.

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15:20	Example of the calculation methods for heat pumps used in Greece, by Christos Tourkolias (CRES, Greece)
	PART 2: Feedback and tailored advice for behaviour changes
15:45	Complements and updates about the streamSAVE methodology, by Carlos Patrão (ISR-UC)
16:00	US experience with measuring energy savings from behavioural programmes, by Adam Thomas, Principal Consultant at ADM Associates

(All times are in CET)

GA N°890147

Part 1: Small-scale RES for heating (including Domestic Hot Water)

Complements and updates about the streamSAVE methodology, by Nelson Rene Garcia Polanco (CIRCE, Spain)

(*See presentation file available on the streamSAVE Knowledge and support facility*)

Nelson Garcia presented the streamSAVE methodology for small-scale renewable heating. The methodology includes the definition of small-scale RES (systems that supply central heating without polluting emissions, in this case, to cover the heat demand of buildings and provide domestic hot water). The scope of the related streamSAVE methodologies is focused on measures targeting residential sector and non residential sector.

Methodologies prepared include two technologies: heat pumps and biomass boilers.

The streamSAVE methodology to calculate energy savings from **heat pumps** can be applied only for heating and DHW. It does not cover the use of heat pumps for cooling. The methodology compares a reference heating system with a heat pump.

Calculation of impacts on energy consumption:

$$TFES = A \cdot (SHD + HWD) \cdot \left(\frac{1}{eff_{baseline}} - \frac{1}{eff_{action}}\right) \cdot f_{BEH} \cdot cf_x$$

(cf_x depends on the geographic area: x is higher in Northern Europe, where the demand is higher)

Lifetime depends on the lifetime of the type of heat pump (air to air, air to water and geothermal). It is also possible to calculate the primary energy with the additional formula. Overview of the costs related to the action are represented, and CO2 savings calculations are presented for both technologies.

The calculation for the **biomass boilers** are carried out in a similar way, and the main difference is the lifetime of savings, it only has a classification for residential and non-residential.

$$TFES = A \cdot (SHD + HWD) \cdot \left(\frac{1}{eff_{baseline}} - \frac{1}{eff_{action}}\right) \cdot f_{BEH} \cdot cf_x$$

The efficiency of the boiler is different and included in the formula, and the effect of primary energy consumption, costs and CO_2 emissions are calculated.

The presentation emphasises the importance of national indicative values and later involvement of cooling.

More details are available in the presentation.

Example of the calculation methods for heat pumps used in Greece, by Christos Tourkolias (CRES, Greece)

(*See presentation file available on the streamSAVE Knowledge and support facility*)

The Energy Efficiency Obligation Scheme (EEOS) of Greece started in 2017, with the participation of suppliers of electricity, natural gas and petroleum products. Challenges included low maturity of the market, involvement of petroleum suppliers, economic recession and fitting the challenges to all the technical requirements of Article 7. First target was set up to 10% of the national target for Article 7 EED (for 2014-2020). The target of the EEOS is now set to deliver 20% of the current target for Article 7 EED (for 2021-2030). Moreover, Greece has now specified a subtarget to ensure that at least 30% of the energy savings come from the implementation of technical measures.

In the first period (2017-2020), the majority of the savings came from behavioural measures, but also included technical measures. Four measures in the monitoring and measurement framework (among 26 standardised methodologies available to the obligated parties) refer to heat pumps (Energy upgrade of heating and cooling systems with high-efficient ones in residential and tertiary sectors – BU19 to BU22). The methodologies are based on the one developed by the multEE project, with the aim to reduce administrative burden. The fundamental pillar of the protocol is the bottom-up nature of the monitoring protocol, as it defines data collection, control, reporting and verification.

Details on the bottom up methodologies are available in the presentation, along with the improvements to lower the administrative burden.

Part 2: Feedback and tailored advice for behaviour changes

Complements and updates about the streamSAVE methodology, by Carlos Patrão (ISR-UC)

(*See presentation file available on the streamSAVE Knowledge and support facility*)

"Behavioural measures" cover any type of policy measure or intervention aimed at saving energy by changing end users' behaviour or systems. Scope of the streamSAVE includes measures targeting the residential sector with behaviour changes related to using energy (e.g. reducing the indoor temperature setpoint). This streamSAVE methodology does not cover behaviours related to investment decisions (e.g., adopting a new technology).

The feedback measures could be "feedback" only – like information displays, real time consumption on a webpage etc., or "feedback including tailored advice", which includes pre-analysis – so data is processed before sharing with the end user. The formula used is the one included in the Appendix VI of the Recommendation published in 2019 by the European Commission about the implementation of Article 7 EED:

$TFES$=N×UFEC×S× dc

With

TFES	Total final energy savings [kWh/a]
N	Number of participants [dmnl]
UFEC	Unitary Final Energy Consumption per household (electricity or gas) [kWh/a]
S	Energy saving factor [%]
dc	Double-counting factor [%]

The Appendix of the Commission's Recommendation however highlights that "*Member States are recommended to use, where appropriate, the randomised controlled trials (RCT)*

approach, which involves collecting data on metered or monitored energy consumption before and after the intervention(s). By comparing the (before/after) changes in energy consumption between the treatment and the control groups, it is possible to verify whether the real energy savings are close to what was expected."

Therefore, the energy saving factor should be first determined with a RCT approach (or alike), before the calculation formula above can be applied. More details about using a RCT approach are provided in the next presentation about the US experience.

Calculation formulas for energy savings in the context of Article 3 EED and for reductions in GHG emissions are also available in the presentation. The platform hosts the online calculation tool.

US experience with measuring energy savings from behavioural programmes, by Adam Thomas, Principal Consultant at ADM Associates

(*See presentation file available on the streamSAVE Knowledge and support facility*)

Experimental design, i.e. randomised control trials (RCT), remains the best methodology to evaluate the success and impacts of behavioural measures. It compares participants with a control group to separate the effects of the behavioural measures from other factors that may influence energy consumption.

A typical cohort should have around 20.000 control customers using any of the options to choose customers to get the adequate representation. In the US, the evaluation protocol for behavioural programmes developed by the Uniform Methods Project is the best reference for this kind of behavioural policy evaluation. The alternative methods to RCT (quasi-experimental methods) are usually biased towards an overestimation of the savings, and it is not possible to assess the uncertainties or deviations related to the bias.

Common intervention types include:

- '**Social norming**' (comparing to neighbours), which achieves better results in comparison to "comparing to yourself", meaning your last year consumption or possible consumption;
- '**Billing pre-pay**' with targeted 5% reduction of energy (paying more if you go over the target);

Savings peak with customers getting more messages on savings measures, especially if it is delivered physically. Physical mail produces higher savings, but this is countered by carbon-intensity of transportation: therefore it is a trade-off of energy impacts vs. carbon-intensity. The trend is a continuous decline in the open-rates for emails. Considering the customers' preferences for billing method might help select the most appropriate approach.

On average, the results show that customers will make significant energy savings when they open 4 or more messages in the year. The customers that opened 3 messages or less annually did not show significant savings.

Another important point is data cleaning: when there are outliers, estimated reads should be re-considered. 'Unusual' customers should also be included as they do affect the results.

More data on the modelling, regression and double counting analysis are available in the presentation.

Discussion

- *What behavioural measure is considered adequate? How engaging should the measure be so we consider in one of these calculation groups, based on research? Is it informing or creating case-based information, "custom based" feedback? Are there any case studies that could help us in differentiating among the "same" measures??*

Adam Thomas: the type of behaviour science or approach used to send the message is as important as the message the customers get. This is why the comparison to the neighbours has proven to be more effective. Generally, most of the savings come from thermostat control, and smart solutions for sending the related messages (providing customers with messages based on the patterns of use).

There is a decline in savings when messages discontinue after a year. The period while customers still save energy has been found to be around 3.6 years on average. It means that the messages seem to still work up to that time. And afterwards it is usually not working anymore (no more significant savings). Also, this is relevant for homeowners, not for the renters, where this 'effective period' is shorter.

- *What is the order of magnitude for the costs of trials?*

Adam Thomas: In the US, there is very much a focus on the economies of scale. So it makes much more sense to do larger trials if that makes more sense for the specific results.

The cost of getting 250.000 customers is about 400-500 thousand dollars/year if it is done by an external company. It can be much less if it is done by government agencies or municipal utilities. The main cost is the exporting and processing of the data (clearing data for example).

- *How do utilities technologically cover everything that is needed for the policy evaluation? Is a state support included and provided to the utilities?*

Adam Thomas: The US has mostly privately owned profit utilities. They could file for cost recovery for the maintenance of software/database and then change the energy prices to get this investment back and the regulatory body needs to approve this change. This is similar to any other investment by the utility. Only some of the publicly owned utilities do not have such database.

- *In this year with the strong increase in energy prices, is it easy to distinguish the effects of information campaigns from the media attention and the price effects?*

Carlos Patrão: The energy prices are also considered very powerful measures (e.g. taxation measures) and have a significant influence on the final energy consumption (cf. price elasticities).

Adam Thomas: This brings one more reason to use RCTs to be able to distinguish the effects. This is a similar situation to what happened in the US in the period of blackouts due to hurricanes.

List of participants

28 participants

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