European Energy Network

A voluntary network of European energy agencies

Behaviour Change Working Group:

Results of monitoring survey of behavioural measures

Final, 1.8.2023

Content

Background

Objective

Behavioural Change Working Group Objective 2 in the 2022 ToR: Capacity building and enhancing the knowledge of EnR members on the topic of behaviour change.

To be achieved, among other activities, by monitoring and learning from the results of national behaviour change programmes and policies.

WG decided to carry out a survey on monitoring and evaluation of behavioural change measures with two main objectives:

1. Monitoring of behavioural emergency measures introduced to alleviate the energy crisis caused by the Russian's war in Ukraine.

2. Identifying new approaches for monitoring and evaluation of behavioural change measures.

Implementation

Survey planned and analyzed by sub-croup of volunteers:

- Paule Anderegg and Paula Diaz, BFE (CH)
- Mariagiovanna Gaglione, ENEA (IT)
- Sofia Cordeiro, and Inês Mendes, Luís Silva, ADENE (PT)
- Lea Gynther, Motiva Oy (FI), Team leader

Comments to the survey manuscript and pre-testing implemented among other behavioural change working group participants and chairs of other working groups.

Survey was open from 17 January to 31 March 2023.

16 countries responded, some with multiple campaigns (out of max possible 23).

Results, Part 1, Emergency measures

Behavioural emergency response campaigns reported

- Austria: Mission 11 campaign
- Bulgaria: One-stop-shop
- Finland: Down a Degree campaign
- France:
    - 1) Ademe's site closures,
    - 2) Heating and lighting reduction at Ademe's sites,
    - 3) Every Gesture Counts campaign (Chaque geste compte)
- Greece: Modification of working hours
- Hungary: Training and training materials to energy counsellors
- Italy:
    - 1) Italy in class A campaign &
    - 2) Essential indications for a correct setting of gas heating systems
- Ireland:
    - 1) Reduce your use
    - 2) Beat the peak campaigns
- Lithuania:
    - 1) Government recommendations, "Energy Saving Guidelines"
    - 2) an information campaign for different target groups
- Malta:
    - 1) Energy Efficiency Awareness Campaign 2022
    - 2) Household visits
- Portugal: Campaigns in the Portuguese Energy Saving Plan 2022-2023
- Slovakia: We save for us campaign
- Sweden:
    - 1) Every kWh counts campaign
    - 2) Energy advice in each municipality
- Switzerland: Winter energy saving initiative
- The Netherlands: Flip the switch too campaign
- UK: Warm Home Hacks

Which type of experts did you involve in the design of the campaign/measure?

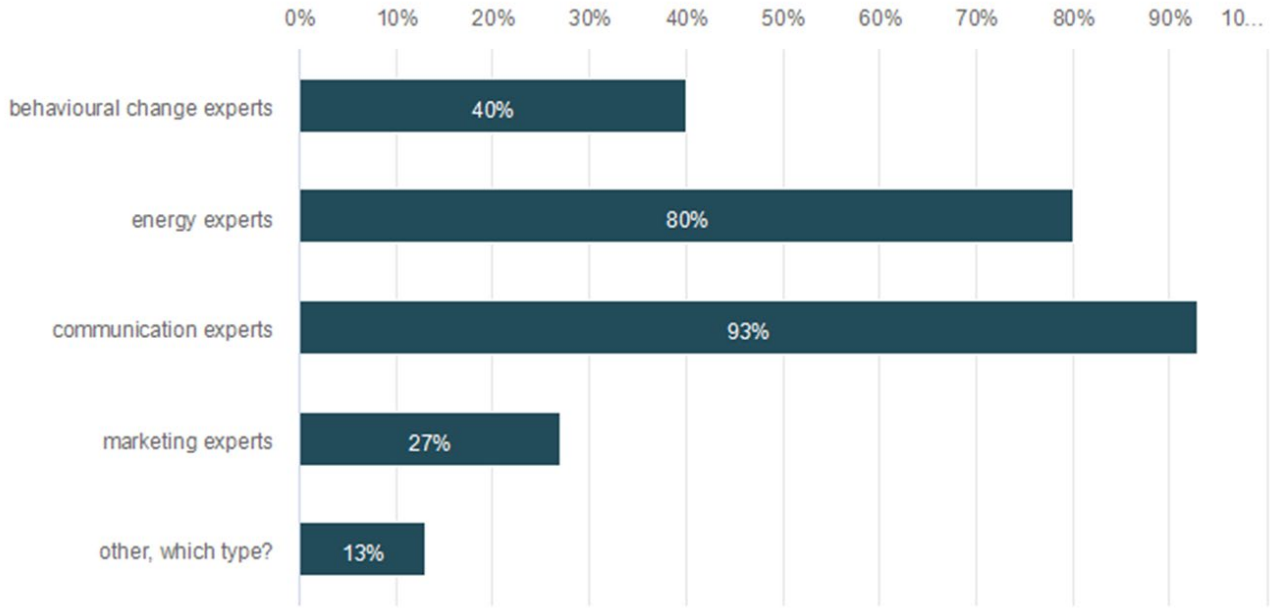

Image 1: Others include: Representatives of target groups Energy efficiency data experts.
Note: Graph includes results of only the first reported campaign.

How do you monitor outreach (methods of campaign tracking)?

- **Campaigns:**
  - Website users & used time, downloads, social media views and paid showings, press coverage (Finland, UK)
  - Standard fortnightly tracking survey run by market research company and specialised monthly behavioural tracking survey run by Behavioural Economics Unit at SEAI (Ireland)
  - Monthly monitoring of actions and people who reacted (Portugal)
  - Market survey and external evaluation (Switzerland)
  - Medium term survey to assess achieved results and the persistence of energy sustainable behaviours in the targeted population (Italy)
- **Other measures:**
  - E-mailing on the days of closure of the Ademe sites (France)
  - Number of users of one stop shop (Bulgaria)
  - Scoreboard to track progress of public sector institutions (Lithuania)
  - Number of and feedback from home energy&water saving visits (Malta)

Which type of drivers have you recognised behind observed change in energy behaviour?

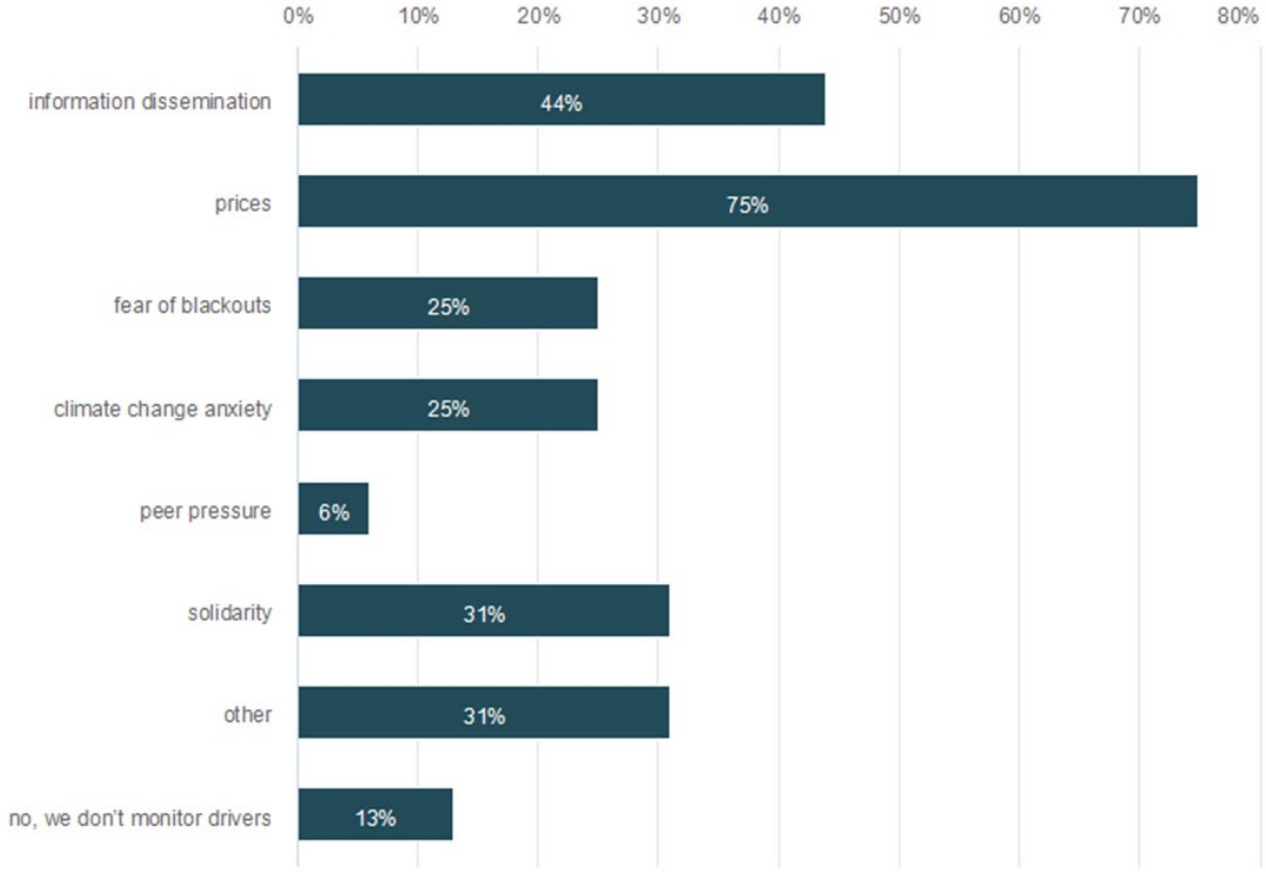

Image 2: High prices/energy costs were strongly driving behavioural change, but this was not the only driver. Other drivers reported were general environmental concerns and cost savings (although closely related to price concerns). *Note: Graph includes results of only the first reported campaign.*

Which type of barriers have you recognized in the implementation of this behavioural measure?

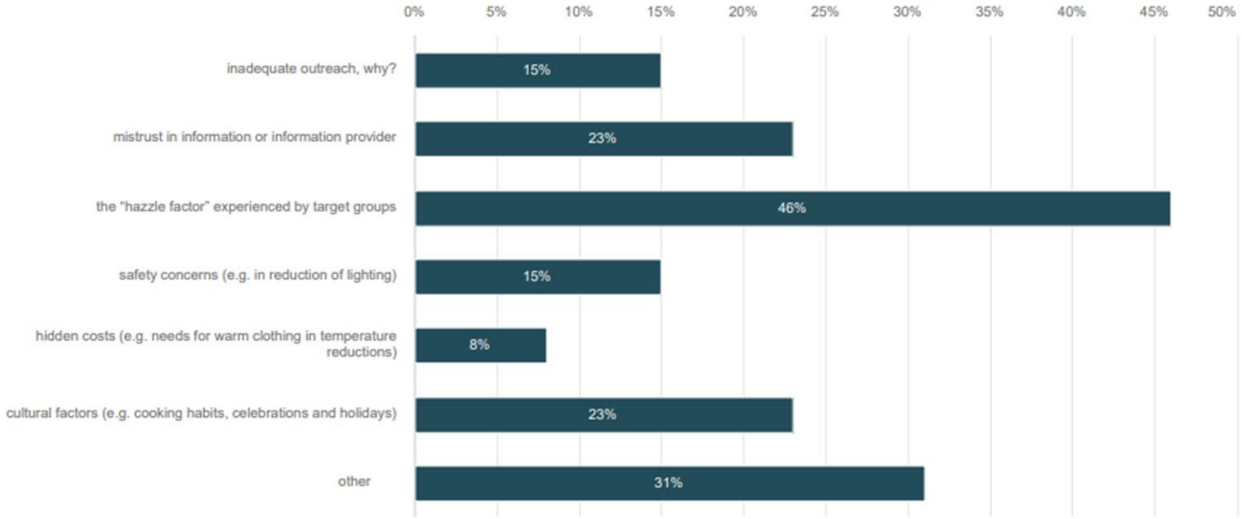

Image 3: Note: Graph includes results of only the first reported campaign.

Comments:

- There are bad practices, e.g., food hoarding/multiple freezers or low/high settings for heating/cooling.
- Changing behaviour again just after the pandemic is consuming.
- So much in already done and easy savings have been made. Now, investments are needed for additional savings.
- At 19°C, very warm clothes needed inside the office, even scarf & gloves.
- Resent to being patronized by politicians.
- Lack of light in the printing area and corridors in late afternoon.
- Do the measures have actual impact?

What are the monitoring methods which have been used [for impact monitoring]?

- Surveyed savings from energy advice users (Bulgaria), annual follow-up of energy advice contacts (Sweden)
- In the House visits and micro-SME campaigns, EWA officers carry out a number of follow-up visits in order to further monitor and assist. (Malta)
- Survey on implemented measures (Lithuania)
- Monthly behavioural survey since Dec 2022 (Ireland)
- Interviews and focus groups with the people involved in the organization, broad questionnaire for the population and interviews with representatives of the companies engaged in the campaign for the companies (Switzerland).
- Periodic citizen barometer with questions on implemented measures added for monitoring (Finland)
- Statistics on energy use (Sweden, Switzerland); Monitoring of national electricity consumption (Finland); Monitoring of energy consumption of the Ademe premises (France); Weekly monitoring of national energy consumption (France).
- Ademe is also monitoring the rebound from site closures caused by teleworking by using a declarative questionnaire, monitoring of the real consumption at the homes of the volunteer employees. (France)
- Comparing results of baseline and post-campaign surveys (the Netherlands)
- In Italy Class A campaign citizens reached by the campaign, share of citizens who implement the behavioural change (through a survey conducted in the early months of 2020) and energy saving coefficient (energy potentially saved implementing the good practices promoted by the campaign). In the gas saving campaign direct social reach, engagement rate, inbound links; no consumption data yet. (Italy)

What are the results so far in end-use measures undertaken, observed consumption reduction or energy savings?

- Observed increased interest by advisory services in one-stop shop advice (Bulgaria), increased demand for energy advice provided by the municipalities (Sweden) and raised interest in investment measures in advisory services (Slovakia)
- Weather adjusted electricity consumption was nationally 10% under the baseline level in the December 2022, which was the most critical moment in teams of demand-supply. Citizen barometer of week 49 in 2022 indicated that 89% of citizens had undertaken some energy saving measures. 51% had reduced use of electric appliances and 50% indoor temperatures of living space, 48% took shorter showers, 39% reduced the usage of sauna and 33% car use, and 24% had lowered indoor temperatures of storage, garage etc. (Finland)
- Significantly reduced energy use, reduced risk of black-out and lower electricity prices. However, impact of the campaign alone is not known (Sweden).
- Institutions located in centrally managed administrative buildings consumed 11% less heat than in the previous year. In September 2022, consumption was 20% lower than at the same time in 2021 (Lithuania).
- By the end of December 2022, 87 communication and awareness campaigns had been carried out, reaching almost 24 000 people in person. Savings of 12.9% were achieved in the accumulated national gas consumption between August and December 2022, compared to the average for the same period of the last five years. (Portugal)

- In Austria, mild winter was the major factor reducing energy consumption. Adjusted analyses show that energy consumption, taking into account the effect of warm temperatures, was not very high and rather in the single-digit percentage range. (Austria)
- Following the majority of the household energy&water visits – positive feedback is received. In many cases it was communicated that there is a reduction in the overall consumption. (Malta)
- As the Italy in Class A campaign has recently started there are no results yet. In the Information and Training Programme 2017-2019, calculated total energy savings were 109.59 ktoe (36.53 ktoe/a) from the citizens' campaign. The ex-post analysis of "Essential indications for a correct setting of gas heating systems" indicates 2.7 billion m^3 gas savings (about 180 euros per household cost savings per year) if implemented by 80% of Italian households. (Italy)
- Results of Ademe site closures: 25-40% energy savings during the days when the sites are closed, with a 3-5-fold difference in energy consumption depending on the energy performance of the building and its occupancy rate. Results of heating and lighting reduction at Ademe sites: The campaign was carried out during 4 months during which 20% reduction in total energy, 5% in electricity and 38% in heating. The rebound effect on residential heating is minimal and random based on household data from volunteering staff members. (France)
- Results of Every gesture counts information campaign: 8% reduction in electricity consumption this winter compared with previous winters, 16% reduction in gas consumption and 12% reduction in electricity and gas consumption combined. (France)
- The evaluation (of the second campaign flight) indicates that the number of citizens that took at least one easy-to-implement gas or energy saving action (in the last few weeks) has remained stable and high at 96%. Intentions to further undertake gas or energy saving actions however have decreased, as a lot of citizens indicate that they have already taken every easy-to-implement gas or energy saving action possible. After the second campaign flight the same number of people turn the thermostat down to 19 degrees or lower (72%), turn the thermostat down to 15 degrees at night or when they leave the house (72%) or shower for a maximum of 5 minutes (77%). The first campaign flight did manage to create an effect however: more people turned down the thermostat to 19 degrees or lower as opposed to before the campaign started (from 74% to 82%). After the second campaign flight less people indicate to often or always consciously shower for a maximum of 5 minutes or shorter. As mentioned earlier, after the second campaign flight more people indicate that showering for a maximum of 5 minutes is hard to maintain. Citizens that indicate to have consciously changed their behaviour in terms of taking easy-to-implement gas or energy saving actions indicate that they, on average, have turned the thermostat a degree lower (both during the day, at night and when leaving the house) and have showered for 3 minutes less after the last campaign flight. (the Netherlands)
- Switzerland saved over 5,800 GWh of gas between October 2022 and the end of March 2023. The target was a voluntary gas saving of 15%, which was exceeded. In the same period, around 1,250 GWh of electricity were saved. This corresponds to electricity savings of approximately 4%, due exclusively to voluntary measures (weather-adjusted data). In addition to the warm weather, higher gas and electricity prices also contributed to the reduction in consumption. Higher prices are an essential price signal for industry in particular to reduce consumption. In addition, about 60% of the approximately 800 operators of dual-fuel plants have followed the Federal Council's recommendation to switch from gas to

heating oil. Participants in the population survey who were aware of the federal government's energy-saving campaign implemented on average 25% more new measures (total) than participants who were not aware of the campaign. The youngest age group (18 to 29 years) implemented more new energy-saving measures in winter 2022/23 compared to other age groups. (Switzerland)

How the short-term results could be converted into longer term behavioural change?

Are there factors which enhance sustainability in the longer term?

- Currently more one-stop-shops are under development. The idea is they to cover the territory of the whole country. (Bulgaria)
- Emphasis in the campaign is directed towards measure with long-term savings potential over the summer 2023 but will be sifted back to short-term savings in the autumn. (Finland)
- There are no concrete results yet as the training materials for energy advisors were released at the end of 2022. (Hungary)
- Italy in Class A campaign can help citizens in obtaining achievable goals, giving impartial advice, and simple tools to use and design interventions to remove barriers. These goals should be coherent with energy policy strategies. Behavioural insights can help policy makers in identifying and remove barriers to sustainable behaviours in energy use. Through Information and Training actions, citizens can improve their energy skills and be more involved in the energy transition, getting motivated to make informed and sustainable energy choices. Gas saving campaign: Sustain motivation in behavioural change for sustainable use of energy , coherent policy strategies and information activities. Set achievable goals and incentive systems.(Italy)
- It is unknown to which extent this is long term, however as of today the effects seem to exist to a significant degree. Later it should be possible to follow up increased investments in energy efficiency. That would give a more complete picture of the nature of the behavioural change. (Sweden)
- Anecdotal evidence of increased interest in some efficiency investments such as solar panels. (Ireland)
- The campaign included advice on longer-term measures such as insulation of water tanks, walls and roofs. This advice, if followed would lead to longer term energy savings. (UK)
- High energy prices have led to the adoption of behavioural change measures. In the long run, they can be applied continuously. It is also encouraged to replace existing inefficient devices with new ones that are more energy efficient and save energy. After the pandemic, the well-developed way of remote working thus contributes to the long-term reduction of energy consumption. (Lithuania)
- Campaign: In view of the nature of the next initiative, there might be long term behavioural changes which would be achieved through this campaign which could be noticed through the House Visits Initiative of the Energy and Water Agency. This has recently been also extended to micro-SMEs. These measures that are being promoted in this campaign can be further overseen and verified through this initiative in the long term. Home energy&water visits: If advice is followed, savings are long-term. (Malta)
- Temperature and lighting reductions: The employees have got used to the idea of coming to the office dressed warmly but if we intend to repeat the experience next year, we may have to revise the conditions : involve the employees more and to really maintain the 19°C (sometimes the temperature was much lower…). (France)

- It is important to communicate to ensure that these actions are sustained over time, so that they become part of overall long-term strategies and initiatives to reduce energy consumption and environmental impact. The winter campaign is now over, but the government's sufficiency plan will continue with the summer measure: no air conditioning below 26°C in the buildings. (France)
- The feedback that we have been receiving through the awareness-raising actions carried out by the different sectors targeted in the Portuguese Energy Saving Plan 2022-2023 (private: residential, services, commerce, industry, construction, central administration, local authorities), indicates an increase in energy literacy which has been transforming both consumption and consumers, with the latter being increasingly attentive and sensitive to issues concerning energy and water efficiency. As a result, consumers are now adopting behaviours that are more efficient, wiling to transform these into their new automatic habits. Currently, consumers know that if they invest in more efficient equipment or technologies, even if it represents a higher initial investment, this will be diluted over time as it will be translated into lower energy bills. Progressively, we have been seeing that this reasoning occurs and affects the consumer's decision about which equipment or technologies they should invest in. This procedure is becoming a socially reinforced rule transversal to the various sectors. (Portugal)
- Companies understand that behavioural changes contribute to their competitiveness, increasing their resilience in the face of instability in the energy market and consequent uncertainty regarding energy prices. They understand that if they avoid non-essential consumption, they will also avoid unnecessary expenses which can then be invested in promoting their productivity. On the other hand, since the customer is increasingly aware of environmental and energy matters, the fact that companies present these concerns by implementing measures and adopting more efficient behaviours can be communicated to the customer and may contribute to increase their satisfaction, it can even be a differentiating factor and influence their choice. (Portugal)
- Transversely, the use of digital tools allowing consumers to monitor their energy consumption, as well as assess the impact of the behavioural changes they adopt, is seen as a decisive factor. Firstly, digital tools allow to raise consumers' awareness and secondly these tools support their decision-making to adopt and/or maintain more efficient behaviours, turning these into their new habits. In this way, through digital tools' use, consumers gain awareness of the impact (the financial impact being the most valued) of their actions and with this comes the will and motivation to maintain these behaviours in the long term. (Portugal)
- The main factors could be price signals that are not dampened by excessive compensation of energy prices from the state budget; ability to compare my energy consumption with the consumption of similar consumers; affordability of devices for monitoring, displaying and energy consumption control; and targeted support for vulnerable consumers. (Slovakia)
- The communication campaign also includes recommendations and support to individuals and companies for long-term energy efficiency measures, e.g., advice on building energy audits, information on subsidies for installation of renewable energy heating, advice on electrical appliances, financing for the installation of renewable energies, etc. (Switzerland).
- Long-term effects through the campaign are not yet ascertainable. The Ministry of Climate Action has implemented other measures aimed at long-term reduction of energy consumption, such as comprehensive subsidy programmes for the replacement of fossil heating systems as well as full funding for the replacement of inefficient electrical appliances

and fossil heating systems in low-income households. These subsidies for low-income households are also combined with mandatory energy counselling aimed at improving the energy consumption behaviour of these households in the long term. Training courses for social workers on energy topics are now also offered by the Austrian Energy Agency (AEA), so that they can provide their clients with basic information on energy saving. This is supplemented by target group-oriented information material on the topic of energy saving in the household from the AEA, which focuses strongly on visualization and little text, and which, from current experience, has been very well received by households. (Austria)

- A site closure protocol would be necessary for greater efficiency. (France)

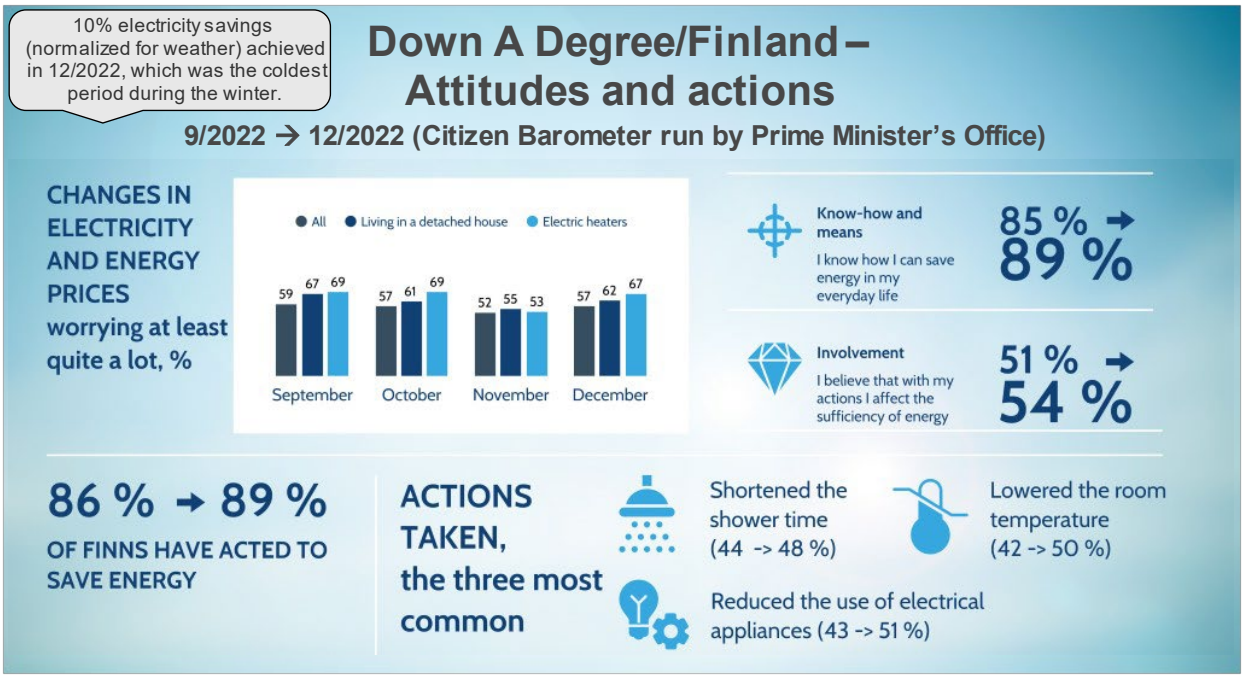

Image 4: Example: Finland

Energia Sostenibile

ITALY

NATIONAL PLAN TO CONTAIN NATURAL GAS CONSUMPTION

In the framework of the national gas consumption containment plan released by the Ministry for Ecological Transition and of the actions necessary for the promotion of a smart and rational use of energy, voluntary measures were adopted between 1 August 2022 and 31 March 2023 to reduce natural gas consumption by 8.2 billion of m^3/year (15% of average of previous years). Actual savings, 10 billion m^3, exceeded the target.

Short term measure : The Italian Government and the Italian Ministry of Environment and Energy Security (MASE) have adopted the "National Plan to contain natural gas consumption", according to the UE Regulation 2022/1369. Among the actions for building sector introduced in this plan and specified by the Ministerial Decree 383 of 6 October 2022, in **all buildings the households have to reduce the indoor temperature for the heating period of 1°C less** than the temperature fixed by DPR 16 April 2013, n. 74 and thus it has to be **19°C + or – 2°C of tolerance**, instead of 20 °C. Moreover, **heating season has been reduced of 15 days and of one hour per day** in all the Italian climate zones, except the coldest one (Zone F).

AGENZIA NAZIONALE EFFICIENZA ENERGETICA ENEA

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Image 5: Example: Italy

Italian Training and Information Programme

Short term measures in the residential sector

Behavioural measures

- ✓ Use of electric heat pumps already installed for summer air conditioning also for winter heating
- ✓ Reduction in the use of gas for domestic hot water and cooking
- ✓ Lower consumption of electricity thanks to a better use of household appliances can lead to a saving of 3.6 billion cubic meters/year.
- ✓ A further 0.4 billion can be saved by replacing appliances and air conditioners with high -efficiency models and installing LED lighting.

Behavioural interventions, which depend on citizens' choices, should be supported with targeted information and communication campaigns, emphasizing that, by adopting sustainable behaviours , the economic benefits can reach up to 240 euros per year per family"

Source: Azioni per la riduzione del Fabbisogno Nazionale di Gas_08 (enea.it)

AGENZIA NAZIONALE EFFICIENZA ENERGETICA ENEA

Image 6: Example: Italy

Summary, Conclusions and Recommendations, Part 1

Most countries reported a public information campaign as an energy measure but a few also energy advice activities (advise, home visits or advisor training materials) or activities covering the public sector or energy use in their own premises.

Although it is common that communication and energy experts have been involved in campaign planning, it is not as common that behavioural or marketing experts have been used. Analytical expertise was mentioned once.

> **Recommendation**: Consider using behavioural and marketing experts in planning when the objective of a communication campaign is changing behaviour.

Energy prices and costs were the major, but not the sole driver behind observed consumption changes as information dissemination was considered to have a significant role along with solidarity, fear of black-outs and climate change anxiety.

The major barrier for behavioural change is that it makes everyday life more difficult. There is also mistrust in information sources, cultural factors and doubt about impact. In some cases, “easy “ savings have already been implemented.

> **Recommendation**: Review possibilities for combining behavioural interventions with other mechanisms, such as financing – impact is stronger together than individually and additional savings increasingly require investments.

> **Recommendation**: If the government is seen as “patronizing” or “non-reliable” information source, this should be addressed in campaign design so that the target groups get information from intermediates whom they trust.

Attention has been paid both to monitoring of outreach and impact. However, monitoring of outreach is more common, as expected.

> **Recommendation**: Consult monitoring and evaluation experts at early planning stages to screen possibilities for monitoring outcome and impact.

In addition to classic outreach monitoring (service users and feedback, website users & used time, downloads, social media views and paid showings, press coverage) also market surveys (number of people reacting, persistence of sustainable behaviour etc.), external evaluation of campaigns and progress scoreboards for the public sector.

Impact monitoring:

In campaigns impact monitoring may be based top-down analysis of changes in energy consumption or monitoring action taken by target groups. End-use actions may be monitored through surveys (regular structure or baseline and post-campaign surveys, citizen barometers, interviews and focus groups.

In case of energy advice, impact monitoring is based on surveys, annual questionnaires or even follow-up visits.

In both cases may include quantitative savings estimates based on deemed savings.

> **Recommendation**: Review the possibilities to single out the impact of behavioural change from the overall trend although it is recognized that this is often not possible.

Recommendation: Report weather adjusted (normalized) savings. Try to judge if any survey results are statistically significant.

Recommendation: Get familiar with the methods used by others. It is not necessary to start from scratch.

It is not clear at this moment, what will be the long-term impact of behavioural campaigns and other behavioural measures, but some countries with regular survey structures or other permanent monitoring tools may be able to monitor this. Some of the emergency campaigns reported are spin-offs of longer-term interventions. This may provide opportunities for continuing activities and messages which have proven effective during the short-term campaign.

Recommendation: Review the possibilities of making use of the effective practices in short-term campaigns in your long-term campaigns, energy advice and other similar measures.

Results, Part 2, New approaches

Have you introduced digitalized information/data tools for citizens to enhance behavioural change? How is their impact monitored?

There is some impact monitoring of the following tools:

- Energy Performance Certificates: Impact on energy saving measures is monitored (Greece)
- Home energy calculator - free desktop application: Number of downloads (Bulgaria)
- The virtual Warm Home Hacks house was an interactive online tool, offering advice to people on how to save energy in the home. Use of the tool was measured though website visits. (UK)
- Home energy audits: Consumption data (Italy)
- The casA+ Portal (HouseA+) digital platform centralizes all relevant information about a home in a single place. The casA+ Portal provides the owner or a tenant with detailed information about the characteristics of the property and its energy and water performance, providing a set of information about efficiency and ways to improve performance and make savings: The number of following impact factors is monitored: private users registered (owners and tenants), the numbers of service providers registered (companies, partners or installers and qualified experts), properties registered, EPCs associated to the properties, requests for intervention proposals, interventions carried out and briefly which financing sources were used in the interventions (own capital, incentives, subsidies or bank financing). (Portugal)

Following tools were reported, but their impact is not monitored/known:

- During advertising campaigns, residents were recommended to perform a simple energy assessment of their home. One of the possible devices is to replace the existing electricity meter with a smart meter or to purchase smart sockets with an energy accounting function. With such measures, residents could identify the devices that consume the most energy and change their energy consumption behavior. (Lithuania)
- The entity responsible for utility billing is the Automated Revenue Management Services (ARMS). Withing the ARMS portal the consumer can access 'My Consumption', where information is provided, including consumption charts. (Malta)
- Ecowatt, RTE's application which informs citizens in real time about their electricity consumption and the state of the network, so that everyone can adapt their consumption accordingly. RTE is the French electricity transmission system operator. Ecogaz is an application for real time monitoring of gas consumption. Datagir (ADEME), the application «Nos gestes climat» allows us to calculate our carbon footprint and see where we can make more effort (food, transport, dwelling and consumption). (France)
- Gamification tools for energy monitoring (Switzerland)
- E-learning (Sweden)
- The Ministry for Climate Action has developed a dashboard that shows various energy market-related key figures for Austria as well as details on current energy production in the country: https://energie.gv.at/. (Austria)
- Use of monitoring services provided by power companies is becoming more popular among the public, prompted by the winter of energy crisis. (Finland)
- The Dutch government does offer an online tool for homeowners to get a personalized advice on how they can improve their house, see: Alles over je huis verduurzamen |

Verbeterjehuis There are a large number of apps and/or displays from commercial providers that can be linked to the smart meter that will provide feedback on energy use and also will give tips on energy saving. This website from Milieu Centraal (which the government subsidizes) offers an overview: Overzicht energieverbruiksmanagers: vind product | Milieu Centraal. (the Netherlands)

Have you analysed the behaviour of citizens living in recently renovated dwellings?

How frequently, focusing of which behavioural factors and for which types of households?

- No official survey/analyses, mostly media interviews or random feedback from residents in multifamily residential buildings after renovation, financed by the government program for renovation. (Bulgaria)
- Within Italy in Class A program, OIKIA Project focused on behaviours of households who have recently renovated their homes with energy efficient interventions. It will lead to a guideline to boost behavioural changes after renovation and the use of new efficient technologies in dwellings and increase indoor comfort and social acceptance of energy transition. (Italy)
- Energy Saving Trust evaluates several of the advice programmes that it delivers. This includes following up with a sample of people who have received advice to assess whether it was useful and if they have actioned any recommendations. (UK)
- Under the buildings' Long-Term Renovation Strategy (LTRS), data is being collected mainly on the physical component of the renovated building, and some regarding occupant behaviour. For example, LTRS has 56% reduction target in 2050 for hours of thermal discomfort in residential buildings which is monitored of by a calculation of these hours in the Energy Certification System (ECS) from the passive solar thermal behaviour of the dwellings for the heating period. Secondary indicators were defined based on a national Household Energy Consumption Survey, which collected information regarding the perception of comfort of the inhabitants in existing buildings (e.g., % housing with positive impact on thermal comfort conditions after implementation of improvement measures, after rising energy class, etc.). The behavioural factors that were taken into account in the survey were related, e.g., to the perception of thermal comfort of the dwellings (hot, cold, humid, etc.) in the winter and summer periods, with the use or not of air conditioning systems (and the reasons for that), or with the use of other ways to maintain comfort (passive measures such as use of blankets, hot drinks, opening/closing windows, etc.). (Portugal)
- Not yet but it is planned. (Sweden)
- No such studies conducted. The Building Construction Authority (BCA) has indicated that studies are required in relation to the calculation of EPCs and Cost Optimality studies in order to come up with an accurate behavioural model for the use of ventilation systems (heating and cooling) and water heating amongst others.(Malta)
- No such analysis conducted. We have analysed the behaviour of homeowners when it comes to making their house more sustainable in 2020, see COVID-19 en verduurzaming van de woning | BIN NL. (the Netherlands)

Do you have novel ideas to overcome data collection barriers for monitoring purposes such as new social innovations or new digital or other tools? For which type of intervention?

- On-line questionnaires. (Greece)
- Within Italy in Classe A Programme, a digital platform will be released in 2023 to collect all the awareness actions developed, energy studies, stimulate discussions on energy issues and sustainable behaviours. The evolutionary platform will host contents in new communication such as virtual tours, virtual reality, artificial intelligence and interactive consultation and all information will be organized in interoperable mode with a digital library. (Italy)
- There is a new (launched 2/2022) Datahub tool for nationally monitoring electricity consumption of each consumer, domestic or other. Also, citizens can log in. Good data coverage in the datahub is enabled by full roll-out of smart meters, implemented already about 7-8 years ago. It is not yet clear what new possibilities the datahub could provide for energy efficiency monitoring purposes. (Finland)
- A more successful data collection strategy can be using multidisciplinary approaches, i.e., consideration of several different areas in data gathering so that there is complementarity in the data and later it is possible that advanced data analysis models based, e.g., on artificial intelligence can establish patterns, trends, rules, exceptions, etc. Regarding behavioural patterns of energy consumption, it is important to collect data not only on consumption itself, but also from preferences of use and occupation, biometrics, health, financial, social, about the building, location, etc. The collection of this information may include crossing information provided for example by sensors (in buildings, mobile phones, smart watches, urban equipment, etc.), with other types of information (such as information made available in a georeferenced manner, through virtual platforms, social networks, etc.), always ensuring the confidentiality of personal data. (Portugal)
- For private data: public involvement while providing them with benefits: more informed decisions, increased comfort and efficiency in the household. For data on the public sectors: requirement by law. (Switzerland)
- A monthly behavioural survey is proving useful for getting accurate granular data on everyday energy-related behaviours in the home using day reconstruction method. (Ireland)
- The BCA is currently working on a data repository to collect building centric information for all the Maltese building stock as required by law. We have preliminary designs and shall be taking our proposals forward. Malta Enterprise has introduced a grant scheme to promote the use of IoT and Building Management Systems. (Malta)
- One idea that is currently being considered by us, and is already being tested on a small scale, is the use of energy consultations for the collection of data on the advised households. Here, at least some insights into the households and their framework conditions can be collected. However, the time in the consultations is of course very limited and the focus is not on the survey, so only some selected data can be collected here. Nevertheless, this can be especially helpful for groups that are difficult to reach, such as energy poor households, since the level of information on them is often very low. (Austria)

Have you used testing/piloting of interventions before full scale behavioural intervention?

Specific questions: For which type of intervention? / Have you used it to collect data for ex ante evaluation? / Have you used it to identify best key performance indicators for data collection and evaluation during implementation? / Have you used it to modify overall implementation approach? / Are you analysing causality (distinguishing different factors in behavioural change; campaigning vs. prices etc.)?

- **Austria/Addressing energy poor households**: When developing our target group-specific information materials for energy poor households on the topic of saving energy in the home, the materials were tested in the course of 50 energy consultations in order to be able to take the feedback from households into account. Only after that were they finalized and distributed in larger numbers.
- **The Netherlands/Subsidy for sustainability of housing:** We have done an online experiment to test the potential of a subsidy that should stimulate homeowners to save money to make their home more sustainable. Although the experiment was a success, there is until now no intention to implement this subsidy. For the report see [titel] (kcpeg.nl) and Woningverduurzaming met spaarbonus | BIN NL. We have tested making advice about home renovations more personal (communication intervention) in a vignette study. Afterwards it has been implemented on verbeterjehuis.nl.
- **Finland/A combination of behavioural measures for the same target group:** There was a randomized test of the combination of energy efficiency newsletter, simple consumption feedback, additional benchmarking tool and personalized energy advice in the city of Porvoo. Participants were divided into different groups which were subject to a different combination of instruments, or nothing at all to get the baseline. However, in the next step of implementation, only a new national Motiva newsletter for consumers was implemented. Nevertheless, the pilot helped in the design of the newsletter (timing, contents, target groups).
- **Italy/Boosting behavioural changes in renovated homes:** Key indicators identified in testing were perceived indoor comfort, settled temperature for boiler and for heating, comprehension of technical instructions and terms. During the energy crisis, the rise of energy bills has been the driver for behavioural changes. The OIKIA Project is an ongoing pilot focused on behaviours of households who have recently renovated their homes with energy efficient interventions.
- **UK/Use of smart meters:** There have been pilots of using new approaches, for example using smart meter data to offer more tailored energy saving advice to households. Collected information is used to improve advice approaches in the future.
- **France/Testing of surveys:** Quantitative surveys are always piloted in small samples before large scale implementation. In experiments, test sites are chosen before duplicating or upscaling.
- **France/Ademe site closures**: The closing of sites and the sufficiency measures were supposed to be an answer to possible blackouts. It is planned to maintain these measures in 2024. Such experiments are becoming the new norm. The closing of sites and sufficiency measures have been evaluated in terms of energy savings by two studies that combined real consumptions of gas and electricity and declaration of behaviour. There has been distinction between site closing and sufficiency measure at the office but no analysis of causality in employee behaviour at home. The phase 2 of the study will explore these elements.

Have you implemented behavioural interventions in combination with different policy instruments promoting technical measures?

What was the reason for the combination (e.g., reduce rebound, increase impact, increase acceptance)?	How did you implement monitoring and what are the results?
Increase acceptance of renovation programs by an information campaign (Bulgaria)	No official monitoring but definitely higher interest to the renovation programs after knowledge rising campaign.
Subsidies for oil and natural gas replacement are supplemented by information dissemination and energy advice. Reliable information raises awareness of the options and the subsidy mechanism and reduces risks of "wrong investments" which could potentially ruin the reputation of the alternative technologies. (Finland)	Use of the subsidies is monitored, and the impact of the information measure is difficult to distinguish from the totality. However, we monitor and evaluate the impact of consumer energy advice activity (with the deemed savings method) as a whole.
Increase impact and acceptance of a combination of behavioural and administrative measures to reduce gas consumption (Italy)	Final survey
Advice messaging also included signposting to support offered by regional and national government, for example financial support with energy efficiency improvements. (UK)	Customer experience with the advice service is monitored.
We have made several behavioural analysis and have together with the responsible policy advisors adjusted subsidies and communications. (the Netherlands)	N/A
That's the case with the closing of Ademe site + sufficiency measure + teleworking. (France)	Cf infra
The energy-saving materials we have developed are used in energy consultations that are implemented within the framework of the described support programmes for households. Furthermore, we train social workers so that they too can offer basic energy advice in this context. The aim was to lead to long-term energy savings. (Austria)	No monitoring
Along with the initiatives mentioned above, Malta has made available various schemes providing grants or tax benefits in related to energy efficiency. It was only logical that both actions have to be implemented. (Malta)	N/A
Awareness raising for increased impact and acceptance/adoption. Long Term Renovation Strategy provides for actions to promote the active participation of all agents in the energy transition, stimulating behavior change through the labeling of products and services related to the energy retrofit of buildings, through voluntary certification and labeling programs for energy related resources (classification systems such	Only outreach and participation, no impact monitoring.

as Aqua+ for building water efficiency, Move+ for transportation fleets and mobility), through technical support in the implementation of renewal measures (e.g. through the creation/dissemination of virtual one-stop-shops such as the Portuguese casA+ portal), through raising awareness of the population for energy efficiency, water efficiency, and water-energy nexus. These campaigns include environmental education in schools, communication campaigns, promotion of energy literacy, etc. Examples include CINERGIA (The center for energy information), the Energy Observatory (information and statistics on the energy sector), "Poupa Energia" ("Energy Saver", information on the energy market, namely simulating prices and providing information on switching utilities) and the "Rota da Energia" ("Energy Route", an in person and online session program with schools, local authorities, companies and general public addressing specifically energy literacy and the potential impacts of behaviour change). Demonstration programs, knowledge and experience sharing are under planning. (Portugal)	

The EED Recast proposal Art 21 (see: European Commission July 2021) includes provisions for dissemination of information and awareness raising. If you already have some of these measures in place, such as one-stop-shops, how do you monitor their impact?

- We have several one-stop-shops, but currently more are under development. There are no specific plans for monitoring the impact beside the usual - reporting on the number of clients. (Bulgaria)
- Key indicators depend on the kind of actions and activity. For one stop shop the impact is calculated on their capacity to reach citizens and give impartial advice to citizens and consumers. (Italy)
- Energy Saving Trust monitors the reach of information campaigns and evaluates the advice services that it offers, through measurement of customer satisfaction. (UK)
- Alles over je huis verduurzamen | Verbeterjehuis is an example. Monitoring consists mostly of web-statistics. We have run an online experiment (using a consumer panel) to test ways to improve the website. We plan to implement A/B-testing on the website itself in the future. (the Netherlands)
- Currently, the casA+ Portal is one of the platforms which serves as a support system for homeowners or tenants to select companies and professionals duly qualified, and to give support to national funding programs or incentives. But soon it will also be able to inform about the support or financing available in the different improvement measures and map out which financing sources are used in the interventions carried out (own capital, incentives, subsidies, or bank financing). It also aims to deliver a standard framework to engage financial institutions (e.g., private investors, banks) and insurance companies into the casA+

Portal, providing specific investment lines for projects developed, reviewed and "pre-approved". The objectives for this delivery are:

- Ensure standard approaches.
- Promote the presentation of funding and financing mechanisms.
- Design and select business models and financial structures for the renovation works.
- Promote the bundling of the projects.
- Engage with financial institutions.

To this end casA+ Portal needs to assure a harmonized and coherent interaction with the different market stakeholders, from the service providers to the third-party investors who are available to provide homeowners with attractive financing conditions so that they can engage with energy and water renovation. (Portugal)

Do you have other novel approaches for monitoring behavioural change programmes and measures?

- Ireland: Monthly behavioural tracking survey (results of first survey round are still underway as of 12 June 2023)
- Italy: Industries and Energy Efficiency Awareness Campaigns: Assessment of Energy Saving from the Italian Experience: https://c2e2.unepccc.org/kms_object/behave-2020-2021-conference-proceedings/
- The Netherlands: Government wide database of behavioural insights projects. See: Projectenbank | BIN NL (background, in English), database (in Dutch)

Summary, Conclusions and Recommendations, Part 2

A large variety of different digitalized/data tools has been provided to users to allow households analyse and monitor their energy consumption and to identify action to take. While user rates may be monitored, there is less evidence on the monitoring of impact. Exemptions may prevail when the monitoring and evaluation is incorporated as part of a digital tool.

Recommendation: Consider the possibilities for in-built monitoring tools.

It appears that analysis of behaviour of dwellers in renovated houses is rather rare, but some examples can be found, e.g., from Italy, Portugal and UK.

Recommendation: Try to increase understanding of resident behaviour to ensure that the building operates as planned (operation and control or new technologies) and to avoid adverse behavioural rebound impacts.

Recommendation: Make use of new social innovations, such as the energy advice training for social workers in Austria, which helps to reach vulnerable population sometimes more averse to using digital tools.

Some countries have set up or are in the process of setting up new digital tools for data collection, either for a more holistic approach (numerous building characteristics) or very specific data (electricity consumption). In contrast, Ireland is conducting a monthly behavioural tracking survey.

One suggestion received was to try to combine data from many different registries and to use new tools such as artificial intelligence for data processing, although this had not been tested yet.

> **Recommendation**: When digital tools are provided for different users, training should be provided by public sector and energy agencies, in order to achieve savings and a smarter use of energy in the long term.

Testing/piloting has been used before a full-scale intervention (Austria, the Netherlands) and for reviewing monitoring tools, such as questionnaires (France). One example from Italy presented the use of testing for identifying key performance indicators for monitoring. Another example of France demonstrated the combination of consumption data with behavioural questionnaires.

> **Recommendation**: Consider running testing of monitoring and evaluation and along with smaller scale pilot of a new campaign or measure. This allows adjustments before full-scale implementation of M&E.

While behavioural measures are often used in combination with other measures, there are no reports of singling out the impact of the behavioural activity from the total impact. However, some reported increasing interest in the other combined measure(s) (e.g., renovation programme or subsidies). Customer satisfaction was also monitored.

> **Recommendation**: Simply continue the monitoring and evaluation of the activity or package of measures which you can, such as subsidies or renovation programmes. Try to identify the baseline level to understand the actual change due to the intervention under analysis. Care should be taken to avoid double-counting which may occur when trying to evaluate the impact of multiple measures that are addressing same behaviour (e.g., energy taxation in combination with information activities).

Countries have started to establish one-stop-shops for energy services in line with EED Recast requirements. Monitoring of use rates, consumer satisfaction, and in some cases also impact, is in place.

> **Recommendation**: As some countries have in place impact evaluation methods for energy advice, usually based on surveys and deemed savings method, consult these methodologies.