Behavioural Changes

Methodology/Methodologies

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stream SAVE

Feedback and tailored advice for behaviour changes

Definition and scope

- Definition (source: Energy Efficiency Directive, Appendix VI):
  - *"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:
  - measures targeting the residential sector;
  - behaviour changes related to using energy and not for investment decisions (e.g., adopting a new technology);
  - examples of measures are presented on the methodology.

Feedback and tailored advice for behaviour changes

Definition and scope

- Specifically addresses behaviour measures that are based on “feedback” (direct feedback) and “feedback including tailored advice” (indirect feedback)

Type of measure	Type of feedback measure
Feedback	“Direct feedback” campaigns, immediate (real time) and easily accessible consumption feedback from: – Self-meter-reading (visible energy meter/smart meter) – Information display – Real-time consumption on a webpage – Ambient devices (which by light or sound can inform consumers about their energy consumption level)
Feedback including tailored advice	Feedback including information which has been processed in some way before the consumer receives: – More informative frequent bills – Historical energy consumption comparison – Energy consumption rewards – Information on a webpage – Direct e-mail and SMS – Energy audits or reports – Energy Efficiency advice tailored to the consumer

Methodology formulas (Article 7)

$$TFES = \mathrm{N} \times \mathrm{UFEC} \times \mathrm{S} \times \mathrm{dc}$$

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 [%]

Methodology formulas (Article 3)

$$EPEC = FEC_{Baseline} \cdot \sum_{ec} (share_{ec,Baseline} \cdot f_{PE,ec}) - FEC_{Action} \cdot \sum_{ec} (share_{ec,Action} \cdot f_{PE,ec})$$

EPEC	Effect on primary energy consumption [kWh/a]
FEC	Annual final energy consumption [kWh/a]
$share_{ec}$	Share of final energy carrier on final energy consumption [dmnl]
$f_{PE,ec}$	Final to primary energy conversion factor of the used energy carrier [dmnl]
Baseline	Index for the baseline situation of the action
Action	Index for the situation after the implementation of the action
ec	Index of energy carrier

Methodology formulas (GHG emissions)

$$GHGSAV = \left[FEC_{Baseline} \cdot \sum_{ec} \left(share_{ec,Baseline} \cdot f_{GHG,ec} \right) - FEC_{Action} \cdot \sum_{ec} \left(share_{ec,Action} \cdot f_{GHG,ec} \right) \right] \cdot 10^{-6}$$

GHGSAV	Greenhouse gas savings [t CO_2/a]
FEC	Annual final energy consumption [kWh/a]
share	Share of final energy carrier on final energy consumption [dmnl]
f_{GHG}	Emission factor of final energy carrier [g CO_2/kWh]
Baseline	Index for the baseline situation of the action
Action	Index for the situation after implementation of the action
ec	Index of energy carrier

Indicative Values

(Unitary Final Energy Consumption - UFEC)

- Grouped by final use:
  - Electricity;
  - Electricity for heating;
  - Gas for heating.

- Data sources:
  - Eurostat database (Eurostat, 2019a);
  - JRC IDEES database (JRC, 2018);
  - values are weather normalised using Heating Degree Days (HDD).

Country	UFEC Electricity per household (1) [kWh/a] (Eurostat, 2019)	UFEC Electricity for heating per household (2) [kWh/a] (JRC IDEES, 2015)	UFEC Gas for heating per household (3) [kWh/a] (JRC IDEES, 2015)
Austria	4,654.58	7,583.86	11,742.55
Belgium	3,838.40	6,443.27	12,502.88
Bulgaria	3,754.16	2,956.74	3,823.72
Croatia	4,216.25	5,062.84	9,951.72
Cyprus	5,328.79	2,561.23	5,484.02
Czechia	3,206.90	8,567.80	11,458.61
Denmark	3,927.40	5,571.89	12,060.06
Estonia	3,225.80	9,673.39	10,202.56
Finland	8,309.44	7,980.90	17,598.05
France	5,314.94	5,973.06	7,554.68
Germany	3,134.18	7,242.33	9,685.01
Greece	3,738.15	N/A	N/A
Hungary	2,816.84	8,670.03	10,150.66
Ireland	4,304.29	9,642.40	11,158.54
Italy	2,523.44	4,347.70	7,826.44
Latvia	1,905.04	7,867.61	9,414.13
Lithuania	2,226.32	7,031.34	7,165.31
Luxembourg	3,564.20	7,169.80	18,797.65
Malta	4,199.31	925.50	1,392.58
Netherlands	2,948.68	5,577.07	7,808.56
Poland	2,016.41	7,700.80	9,049.61
Portugal	3,187.76	809.58	1,158.78
Romania	1,729.78	5,705.91	6,344.90
Slovakia	2,697.64	5,824.78	6,776.09
Slovenia	3,717.77	6,125.92	8,068.41
Spain	3,889.06	2,398.70	3,543.40
Sweden	8,268.64	7,219.05	14,843.62

Notes:

(1) Values including total electricity consumption of households, incl. electric appliances, lighting, heating, etc;

(2) Values referring only to households with conventional and advanced electric heating

(3) Values referring only to households with heating systems using "Liquified petroleum gas (LPG)", "Gas/Diesel oil incl. biofuels (GDO)" and "Gases incl. Biogas"

Indicative Values (Energy Savings Factor (S))

- Recommended to *"use the randomised controlled trials (RCT)"* approach:
  - which involves collecting data on metered or monitored energy consumption before and after the action.
- streamSAVE indicative values for **Energy Savings Factor (S)** should be considered as EU-wide benchmarks (more than 40 studies were assed in terms quality).

Final use	Type of measure	Energy Savings factor (S) [%]
Electricity	Feedback	2.30 %
	Feedback including tailored advice	3.50 %
Electricity for heating	Feedback	2.00 %
	Feedback including tailored advice	3.00 %
Gas for heating	Feedback	3.40 %
	Feedback including tailored advice	3.60 %

Indicative Values (Lifetime of savings)

- The existing scientific literature is unable to provide a solid suggestion;
- streamSAVE methodology
  - focusses on yearly average savings;
  - assumes that an implemented action in this area must be reported each year with the actual number of households that received feedback about the energy consumption.

Lifetime of savings	[a]
Lifetime of savings	1 year

Indicative Values (share of energy carriers)

- Please keep in mind that these values are based on EU-wide data and will need to be adjusted to national circumstances;
- Calculated using the (JRC, 2018) EU28 final energy consumption disaggregation by final end use and energy carrier.

$share_{ec,Baseline}$		
Target end-use	Energy carrier	Share of energy carrier (%)
Electricity	Electricity	100 %
Electricity for heating	Electricity	100 %
Gas for heating	Natural gas	74 %
	Gas/Diesel oil	25 %
	Liquefied petroleum gases	1 %
$share_{ec,Action}$		
Target end-use	Energy carrier	Share of energy carrier (%)
Electricity	Electricity	100 %
Electricity for heating	Electricity	100 %
Gas for heating	Natural gas	74 %
	Gas/Diesel oil	25 %
	Liquefied petroleum gases	1 %

Online & Excel Tool

https://streamsave.flexx.camp/training

Behavioural Changes

Calculate

This methodology can be applied by all Member States, following the provided indicative values and indications. It deals with behaviour measures targeting residential sector consumers. The methodology specifically addresses behaviour measures that are based on “feedback” (direct feedback) and "feedback including tailored advice" (indirect feedback). The definition and examples of each type of measure ia available on the methodology description document.

Thank you

Get in touch for more information!

Project coordinator - Nele Renders, VITO

All project reports will be available for download on the streamSAVE website www.streamsave.eu

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