Dialogue meeting

2nd Cycle – 1st meeting on:

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

May 11, 2022

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Welcome and Agenda

15.00 (CEST)	Introduction to the meeting
	PART 1: Feedback and tailored advice for behaviour changes
15.05	Methodology scoping and approach to be followed + Q&A, by Carlos Patrão (ISR-UC)
15.25	Methodology to assess the impacts of behavioural changes from the NUDGE pilot projects + Q&A, by Dr. Stratos Keranidis
	PART 2: Small-scale RES for heating (including Domestic Hot Water)
15.50	Methodologies scoping and approach to be followed, by Gema Millan Ballesteros (CIRCE, Spain)
16.10	Insights from the 'REPLACE your Heating System Calculator', by Tadeja Janša and dr. Gašper Stegnar (Jožef Stefan Institute – Slovenia)

Note: Discussions will be under Chatham House Rule: the minutes will not mention any name or country.
All discussion points included in the minutes will be anonymized.

PART 1: Feedback and tailored advice for behaviour changes

Measures targeting Behavioural Changes

- Several measures have proven to have significant impact on human behaviour, such as: provision of feedback on energy usage and tailored advise.
- Their main goal is to increase knowledge about energy consumption and more efficient technologies, triggering behavioural changes towards efficiency.
- Some studies suggest that human behaviour is at least as important as the physical characteristics of a building in influencing energy use;
- However, calculating their effect in the different MS is challenging due to the different social and economic contexts;
- streamSAVE is going to provide a suggestion for a BU methodology with indicative values for reporting energy savings due to behavioural change actions (feedback and energy advice).

Feedback and tailored advice for behaviour changes

Scoping

- 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.*
  - *Such measures may involve:*
    - *energy advice, targeted information campaigns, real-time energy-consumption display or feedback, energy-saving campaigns at work, etc.*

- Scope of the streamSAVE:
  - *Target sector:* Residential
  - *Type of measures/actions:* Awareness raising campaigns, Feedback mechanisms (e.g., information displays), Home Energy reports/audits/consulting
  - *Does not include* => transport/vehicles, behaviour changes in terms of making investment decisions

Feedback and tailored advice for behaviour changes

Calculation formulas

One methodology with the following calculation 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]
FEC	Unitary Final Energy Consumption [kWh/a]
S	Energy saving factor [%]
dc	Double-counting factor [%]

- *Article 3 =>* $\mathrm{APES} = TFES \times PEF_{Electricity}$

APES	Annual primary energy savings [kWh/a]
TFES	Total final energy savings [kWh/a]
$PEF_{Electricity}$	Primary Energy Factor for electricity [dmnl]

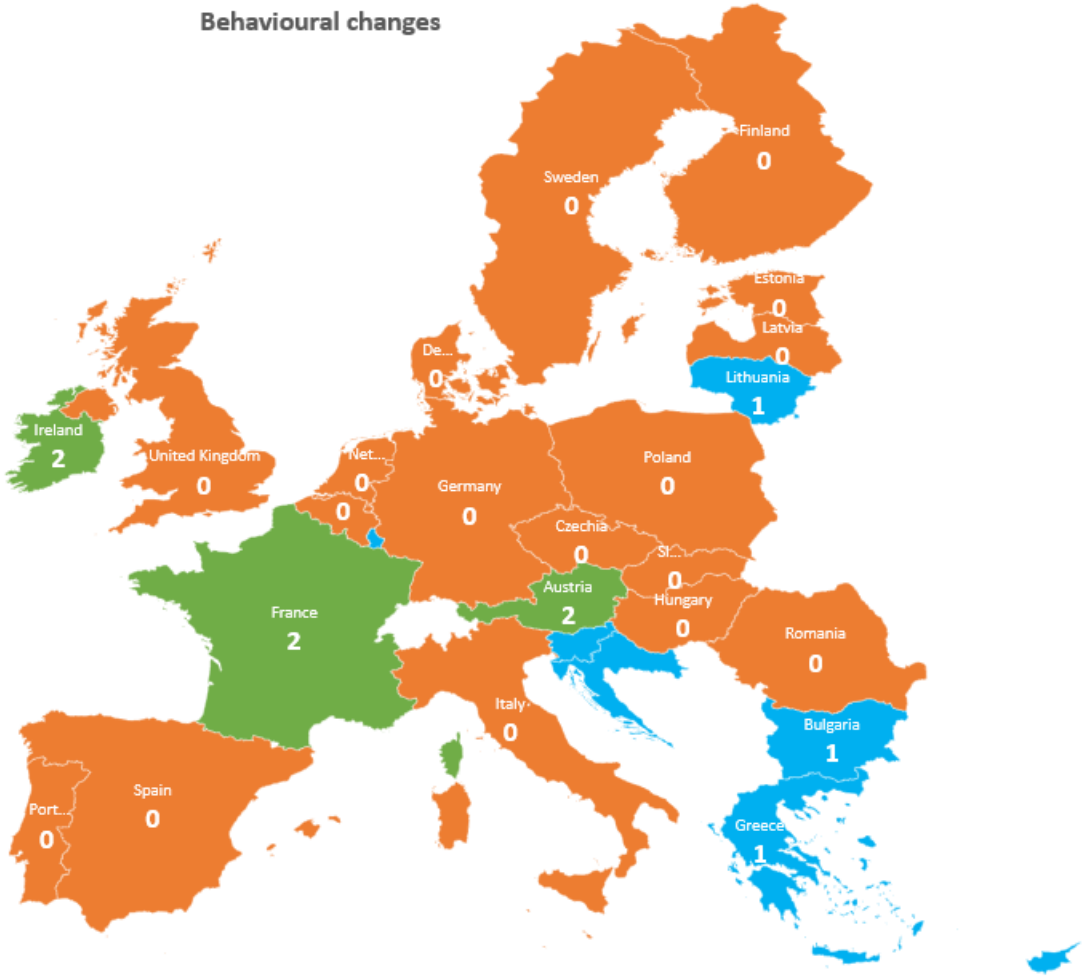
- *Greenhouse gas savings =>* $GHGSAV = TFES \times f_{GHG,electricity} \times 10^{-6}$

GHGSAV	Greenhouse gas savings [t CO_2 p.a.]
TFES	Total final energy savings [kWh/a]
$f_{GHG,electricity}$	Emission factor for electricity [g CO_2/kWh]

Feedback and tailored advice for behaviour changes

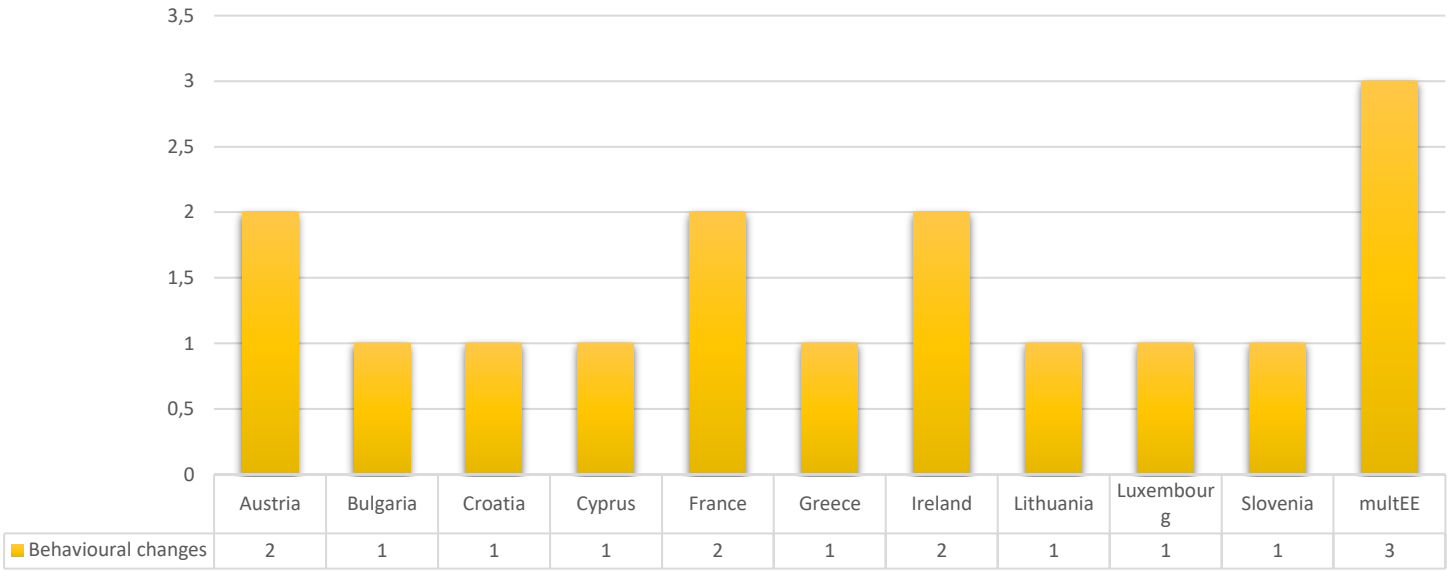
Collected methodologies

- Existing Methodologies (identified in Task 2.1):
- Total of 16 methodologies from 10 different countries and one European project (multEE);
- Main target is electricity consumption in residential sector.



Feedback and tailored advice for behaviour changes

Collected methodologies



- They follow similar simplified formula (as suggested by the EED);
- Indicative values are presented in most of them:
  - Very few present the sources and are based on old studies (from 1993 to 2007);
  - Mainly national statistics;
  - Previous studies or ex-post surveys;

- Example:
  - Croatia calculates first-year savings for *"Educational and information campaigns"* using the following formulas:

$$UFES = FEC_{HHS} \times S$$

$$FES = N \times UFES$$

FES [kWh/a]	Total annual energy savings in final consumption
FEC_{HHS}	Energy consumption in the segment processed by the leaflet per campaign participant (household)
S [%]	Energy saving factor
N	Number of households in the program
UFES [kWh/a]	Unit final energy savings

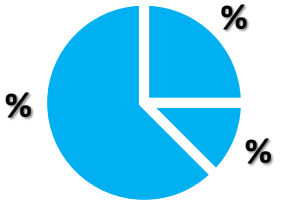
Feedback and tailored advice for behaviour changes

Indicative values

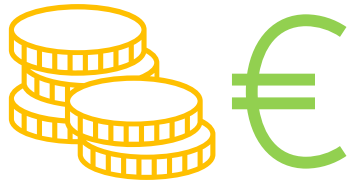
- Data sources and indicative values:

1. UFEC => Unitary Final Energy Consumption [kWh/a]
   - Data available at EUROSTAT, Odyssee-MURE, JRC-IDEES.

2. S => Energy saving factor [%]
   - Sources for each type of measure/action:
     - Awareness raising campaigns, Feedback mechanisms (e.g., information displays), Home Energy reports/audits/consulting;
     - More recent data sources are being collected.



3. Costs related with the actions:
   - Challenging to obtain this data.



Feedback and tailored advice for behaviour changes

Indicative values

- Data sources and indicative values:

4. Lifetime of savings:
   - Not included on Appendix VIII of the EED, however it states:
     - *(…) Member States may assume by default that the lifetime applied equals the duration of the intervention promoting the energy-efficient behaviours. They may claim another value, but in any case must describe in their integrated NECP the applied lifetimes and how they are calculated or what they are based on.*

5. Double-counting factor:
   - when the policy measure is implemented repeatedly, targeting the same group without direct monitoring of the participants;
   - proportion of those affected by the policy measure that have already been affected the previous time(s) (overlap in the effects);
   - it can be obtained using surveys (no indicative value can be provided);
   - EED Appendix VI states that:
     - *(…) if the lifetime of the energy savings is taken as the duration between two implementations of the policy measure (e.g., two communication campaigns), there is no risk of double-counting.*

Feedback and tailored advice for behaviour changes

Q&A

Guest presentation

- Methodology to assess the impacts of behavioural changes from the NUDGE pilot projects

by Dr. Stratos Keranidis

(see the separate presentation file)

PART 2: Small-scale RES for heating (including Domestic Hot Water)

streamSAVE methodologies
SCOPE and MOTIVATION

- Small-scale renewable central heating is a technology based on mini-plants powered by renewable resources that allow generating a significant proportion of the heating and hot water needs in buildings.
- In Europe, buildings and improving the energy efficiency of their heating, cooling and energy production systems are becoming increasingly important in achieving the goal of reducing the emissions of greenhouse gases and becoming more self-sufficient.
- The adoption of new technologies or methodologies, such as small-scale renewable central heating, which improve energy efficiency in buildings, is very important.

streamSAVE methodologies
SCOPE and MOTIVATION

- *Heat pumps*
  - *Aerotherm technology for heating and DHW, for residential buildings*
  - *Air – to – air technology for heating for non-residential buildings*

- *Solar hot water generation for residential buildings*

- *Biomass boiler for heating*

Collected Methodologies

- Austria:
  - Heat pumps in newly built residential buildings
  - Heat pumps in thermal refurbished residential buildings
  - Central space heating in the residential building stock

- France:
  - Individual Biomass Boiler

- Hungary:
  - Support for domestic hot water supply with solar collectors

- MultEE:
  - Heat pumps. Installing water or air-source heat pumps
  - Biomass boilers

- Greece:
  - Domestic hot water production using solar thermal systems

- Portugal:
  - Residential solar thermal and solar heating for services

- Croatia:
  - Heat pumps
  - Solar thermal systems for domestic hot water preparation in residential and service sector buildings

Heat pumps

Heat pumps (aerotherm technology for heating and DHW), for residential buildings

Calculation formula

$$TFES = A \times ((HD + HWD) \times eff_{baseline} - (HD + HWD) \times eff_{action}) \times rb \times so \times fr$$

TFES	Total final energy savings [kWh/a]
A	Gross floor area of the building or dwelling [m²]
HD	Area specific heating demand of the building or dwelling [kWh/m²a]
HWD	Area specific hot water demand of the building or dwelling [kWh/m²a]
$eff_{baseline}$	Efficiency of a reference heating system [-]
eff_{action}	Efficiency of the heat pump [-]
rb	Factor to calculate a rebound effect (=1)
so	Factor to calculate a spill-over effect (=1)
fr	Factor to calculate a free-rider effect (=1)

Problems encountered

Finding data sources at European level with standardized values

No formula about costs

Calculation formula (CO2)

$$E_{CO2} = \sum_{i=1}^{n} [(\frac{ep_{gas}}{\eta_{average}} - \frac{eel_{energy}}{SPF}) \times \frac{(SHD + SWD - \Delta E_{other}) \times A}{1000}]i$$

ECO2 [t CO2/	Greenhouse gas savings
ep_gas [kg CO2/kWh]	Emission factor of original energy source - natural gas
Eelenergy [kg CO2/kWh]	Emission factor for electricity

Data sources

https://www.eurovent-certification.com/en/

https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32009L0125

Baseline

Average heating system producing heat and hot water.

The space heating demand values should be corrected with the relevant heating degree days.

Heat pumps

Heat pumps for heating for non-residential buildings

Calculation formula

$$TFES = A \times ((HD + HWD) \times eff_{baseline} - (HD + HWD) \times eff_{action}) \times rb \times so \times fr$$

TFES	Total final energy savings [kWh/a]
A	Gross floor area of the building or dwelling [m²]
HD	Area specific heating demand of the building or dwelling [kWh/m²a]
~~HWD~~	~~Area specific hot water demand of the building or dwelling [kWh/m²a]~~
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ECO2 [t CO2/	Greenhouse gas savings
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Problems encountered

Finding data sources at European level with standardized values

No formula about costs

Baseline

Average heating system producing heat and hot water.

The space heating demand values should be corrected with the relevant heating degree days.

Solar Thermal

Solar hot water generation for residential buildings

Calculation formula (Energy savings)

$$EE = \frac{USAVE}{\eta} \times A$$

Definition	
EE	Energy savings
USAVE	Thermal production (toe/m^2)
η	Performance of water heaters (%)
A	Area installed per year (m^2)

Data sources

Standard EN 12975-2:2006

- ISO/TC 180 Solar Energy
- CEN/TC 312 Thermal solar systems and components

Solar Heat Europe (ESTIF) – solarheateurope.eu

Calculation formula (CO2)

$$E_{CO2} = FES \times e/1000$$

ECO2 [t CO_2/a]	Greenhouse gas savings
FES [kWh/a]	Total final energy savings
e [kg CO2/kWh]	Emission factor

Problems encountered

Finding data sources at European level with standardized values

Baseline

Existing heating system fired by oil, gas, biomass etc.

Biomass

Biomass boiler for heating

Calculation formula

$$TFES = A \times ((HD + HWD) \times eff_{baseline} - (HD + HWD) \times eff_{action}) \times rb \times so \times fr$$

TFES	Total final energy savings [kWh/a]
A	Gross floor area of the building or dwelling [m²]
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fr	Factor to calculate a free-rider effect (=1)

Data sources

- Standard EN-303-5

Problems encountered

Finding data sources at European level with standardized values

No formula about emissions and costs

Baseline

Replacement at the end of the boiler's lifetime: average oil, gas or biomass fired boiler generating heat and hot water available on the market.

Replacement before the end of the boiler's lifetime: average efficiency of oil and gas boilers in stock.

The space heating demand values should be corrected with the relevant heating degree days.

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

Q&A

Guest presentation

- Insights from the ‘REPLACE your Heating System Calculator’
  by Tadeja Janša (Jožef Stefan Institute – Slovenia)

(see the separate presentation file)

Next steps

Next steps

- Meeting minutes
  - please feel free to send us your suggestions, either in the online forum or to dialogues@streamsave.eu

  The minutes and presentation files will be available at: https://streamsave.flexx.camp/support-contribution-400

- All information will be included on the platform
  - in case you are not registered yet, we will show you how

- The discussions continue in the online forum
- Next meeting on 24 May on motor replacement and modal shift (registration link)

Feedback

- Please, fill out our quick feedback survey

- You may also leave us a longer message
  - Via forum on the streamSAVE platform
  - Via the anonymous form (link in the chat)
  - Via dialogues@streamsave.eu
    - Please accept as sender

- To receive more info → register on the streamSAVE platform: https://streamsave.flexx.camp/signup-0818ml

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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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