

Assessing the impacts of energy efficiency schemes alleviating energy poverty

A streamSAVE Workshop



This project has received funding from the Horizon 2020 programme under grant agreement n°890147. The content of this presentation reflects only the author's view. The European Commission is not responsible for any use that may be made of the information it contains.

Agenda

What is different when calculating energy savings from energy efficiency measures also tackling energy poverty?

Guillermo Borragán Pedraz (VITO / streamSAVE)

Challenges in monitoring and assessing impacts of energy efficiency measures to alleviate energy poverty

Katarina Trstenjak, JSI (Jozef Stefan Institute, Slovenia)

Assessing and comparing the impacts of measures to reduce energy poverty: results from the EmpowerMed project

Mariana Jiménez, IREC (Catalonia Energy Research Institute, Spain/ EmpowerMed)

Impacts from overcoming challenges in household energy data collection – insights from the EnergyMeasures project

Niall Dunphy, UCC (University College Cork, Ireland/ EnergyMeasures)

Project objectives

- **Building capacity** among public authorities on Article 3 & Article 7 of the Energy Efficiency Directive
- Streamline methodologies to estimate energy savings of **10 priority actions**
- Peer-to-peer capacity building through **dialogue and capacity support** to address MS needs
- Sustainability and replicability of streamSAVE outcomes: **lively community and active streamSAVE platform** beyond the life of the project



How do we realize these objectives?



HEAT
RECOVERY



BACS/BEMS



REFRIGERATION
SYSTEMS



ELECTRIC
VEHICLES



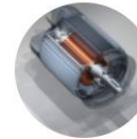
LIGHTING
SYSTEMS



SMALL-SCALE
RENEWABLE CENTRAL
HEATING



ACTIONS TO
ALLEVIATE
ENERGY POVERTY



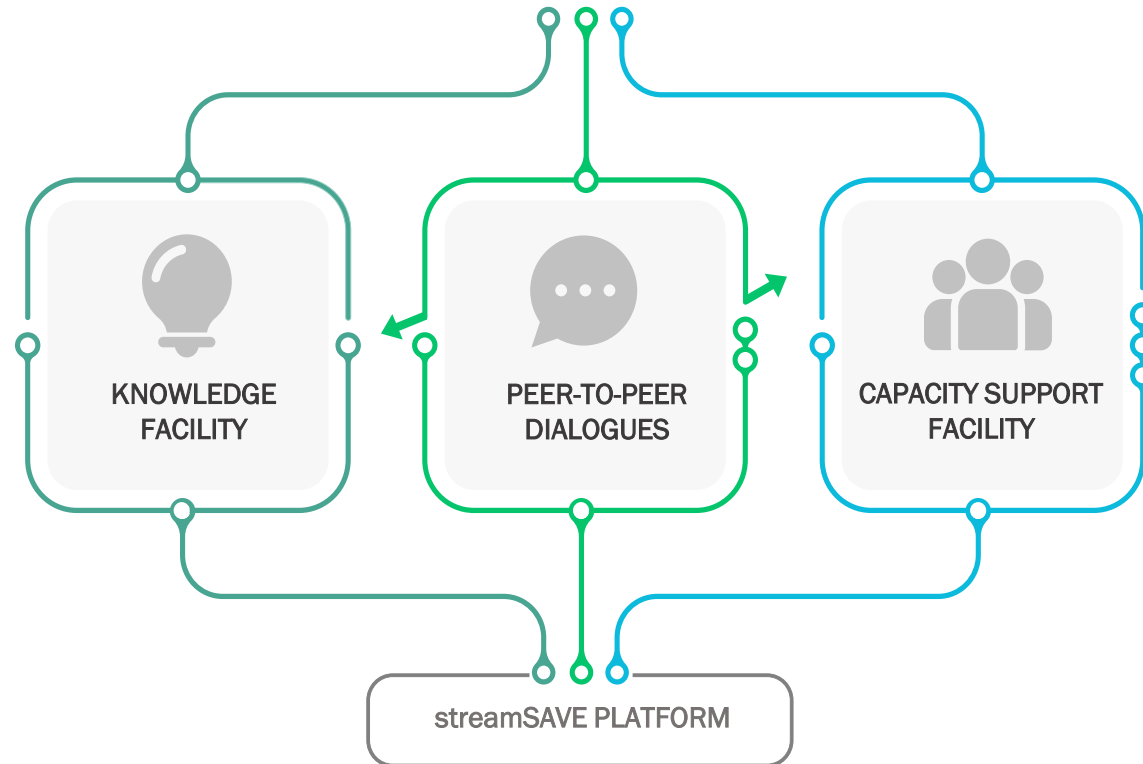
REPLACEMENT
OF
ELECTRIC MOTORS



BEHAVIOURAL
CHANGES



MODAL SHIFT
FOR FREIGHT
TRANSPORT



Meeting need with ambition:
Boosting energy efficiency to alleviate
rising energy poverty in Europe

STREAMLINING ENERGY SAVINGS CALCULATIONS



Guillermo Borragán and
Kelsey van Maris

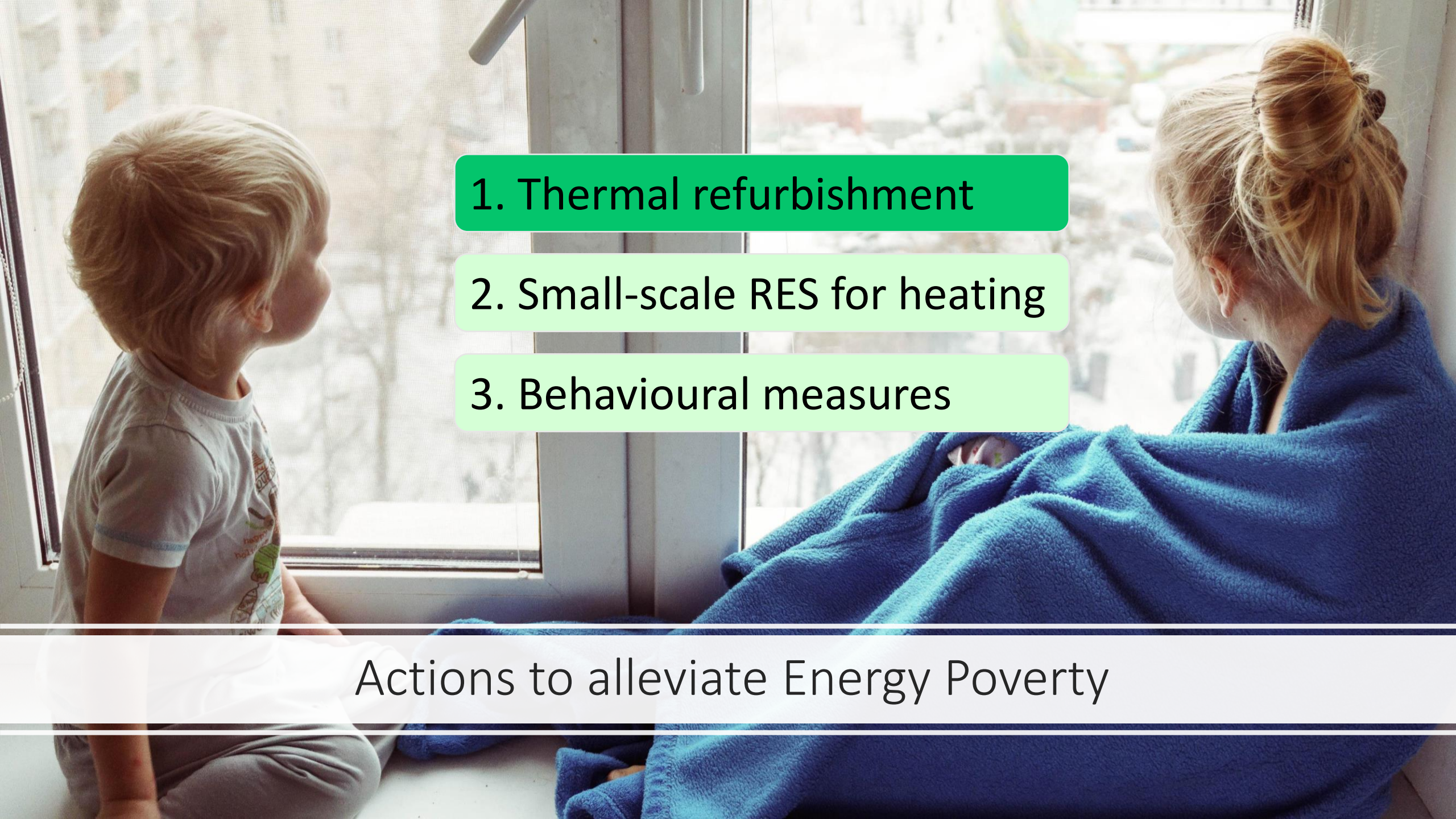


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PRIORITY ACTION EIGHT



A young child with blonde hair is sitting on the left, looking out a window. A woman with blonde hair in a bun is sitting on the right, also looking out the window. They are both looking at a list of three items in the center. The background shows a cityscape with buildings and trees.

1. Thermal refurbishment

2. Small-scale RES for heating

3. Behavioural measures

Actions to alleviate Energy Poverty



Calculation methodology – Art. 7

Thermal refurbishment



$$TFES = (FEC_{baseline} - FEC_{action}) \cdot (1 - f_{BEH})$$

$$TFES = A \cdot \left(\frac{SHD_{baseline} \cdot (1 - f_{prebound\ EPOV}) + DHW}{eff} - \frac{SHD_{action} + DHW}{eff} \right) \cdot (1 - f_{BEH})$$

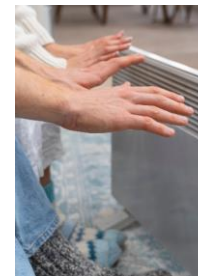
TFES	Total Final Energy Savings [kWh/a]
$FEC_{baseline}$	Final energy consumption for end-use, before building refurbishment [kWh/a]
FEC_{action}	Final energy consumption for end-use, after building refurbishment [kWh/a]
A	Useful floor area of the refurbished building [m ²]
$SHD_{baseline}$	Specific space heating demand of the reference building [kWh/m ² /a]
SHD_{action}	Specific space heating demand of the efficient building [kWh/m ² /a]
DHW	Specific domestic hot water demand [kWh/m ² /a]
eff	Conversion efficiency of the heating system [dmnl]
$f_{prebound\ EPOV}$	Factor for adjusting baseline consumption of average household to energy poor household [dmnl]
f_{BEH}	Factor to adjust for rebound effects of the action [dmnl]





Calculation methodology – Art. 7

Thermal refurbishment



- Rebound effects (0,25) & prebound effects (0,35): based on literature review; median of all scores reported (n=5 for prebound; n=14 for rebound)
- Conversion efficiency of heating systems EPOV: less efficient systems
- EU indicative values to be adjusted to national circumstances!



f_{BEH}	[dmnl]
Residential – average* and EPOV	0.25
$f_{prebound\ EPOV}$	[dmnl]
Residential – average*	0.00
Residential - EPOV	0.35
eff	[dmnl]
Residential – average	0.712
Residential - EPOV	0.630
$SHD_{baseline}$	[kWh/m ² useful floor area a]
Residential	92.1
SHD_{action}	[kWh/m ² useful floor area a]
Residential	Depending on type and degree of refurbishment
HWD	[kWh/m ² useful floor area a]
Residential	19.2
Lifetime of savings	[years]
Lifetime of savings	>25

***Note:** Average represents the indicative values for an average, EU27 household, while EPOV is representing values specifically for energy poor households.



Impact on energy consumption (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]
<u>share_{ec}</u>	Share of final energy carrier on final energy consumption [<u>dmnl</u>]
<u>f_{PE,ec}</u>	Final to primary energy conversion factor of the used energy carrier [<u>dmnl</u>]
Baseline	Index for the baseline situation of the action
Action	Index for the situation after the implementation of the action
<u>ec</u>	Index of energy carrier

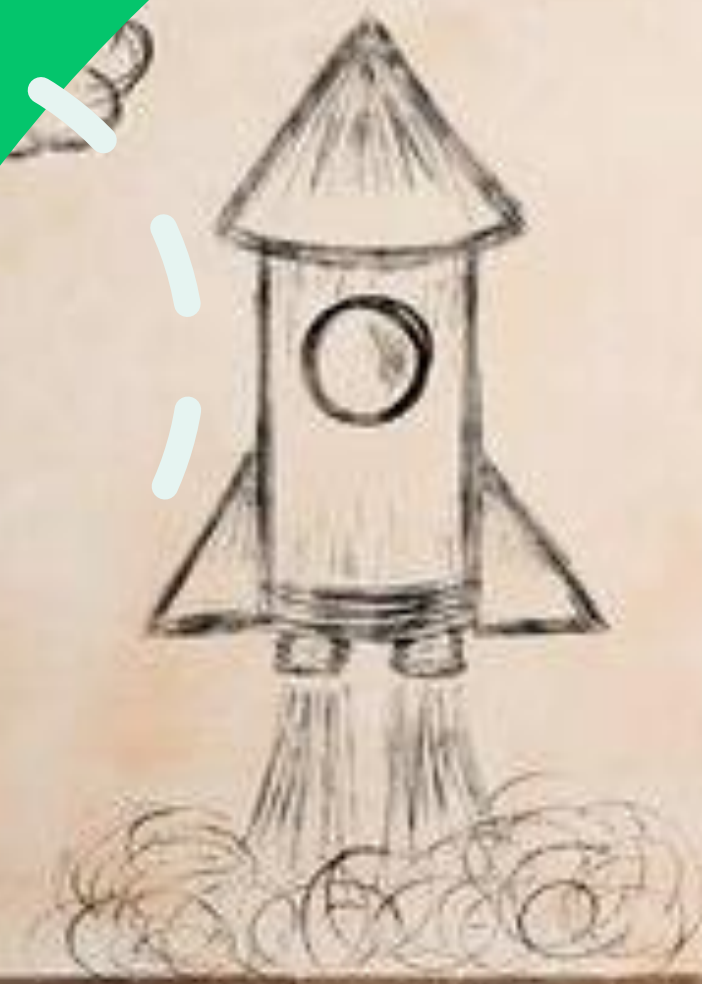


Calculation of CO2 savings

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

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]
<u>f_{GHG}</u>	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
<u>ec</u>	Index of energy carrier

**WHERE TO
FIND IT?**





Collaborative Platform



<https://streamsave.flexx.camp/forum>



Forum

Share your experiences for each Priority Action with your peers

Add new discussion

Keyword research



[Training module](#)

Filter by priority action

See all

BACS

Electric vehicles

Energy poverty

Feedback towards households

General discussion

Heat recovery

Lighting systems

Modal shift

Motor replacement

RES Heating

Refrigeration systems

Sort by date 1

Debugger



Extension of the period
for collecting feedback

General discussion

Can Europe learn from
the US experience on
measuring energy
savings from behavioural

SAVE THE DATES - new
series of dialogue
meetings November-
December 2022



Training module for Energy Poverty

- Overall potential calculates the energy savings resulting from the overall modal shift potential. Another Excel sheet is available to assess the savings resulting from modal shift potential per distance class and group of goods.
- Potential per distance class and group of goods calculates the modal shift potential per distance class and group of goods. Another Excel sheet is available to assess the savings resulting from the overall shift potential.



Small-scale renewable heating technologies

 Heat pumps

 Biomass boilers

The scope of this Priority Action is to estimate the annual energy and emission savings that can be achieved with the installation of small-scale renewable energy systems for central heating in buildings. The developed methodologies cover residential as well as non-residential buildings. Methodologies have been prepared for the following technologies:

- Heat pumps for heating and domestic hot water
- Biomass boilers for heating and domestic hot water



Energy Poverty

 Feedback and tailored advice

 Small scale renewable heating systems

 Thermally refurbished buildings

Energy or fuel poverty can be defined as the incapacity of a household to maintain reasonable conditions of indoor comfort. As part of one of the Priority Actions of streamSAVE, the developed methodologies introduce formulas and a series of corrections factors that can be applied to adjust the real outputs of different energy savings actions that target households in energy poverty. The following actions are covered:

- Thermally improved building envelope of refurbished buildings of energy poor households
- Small-scale renewable energy systems in buildings for energy poor households
- Feedback and tailored advice addressing energy poor households



Example: Thermal refurbishment

 Practical Guidance

 Empty excel template

Data Input

Calculation results

national values		indicative calculation values		
 TFES Article 7	insufficient data	kWh/a	-3,453.75	kWh/a
 TFES Article 3	insufficient data	kWh/a	-3,453.75	kWh/a
 EPEC Article 3	insufficient data	kWh/a	-15,528.13	kWh/a
 GHGsav	insufficient data	tCO2	0.19	tCO2

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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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