Coordination and Support Action

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Overall synthesis of the peer-to-peer dialogue activities

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Abbreviations and acronyms

Acronym	Description
BACS	Building Automation & Control Systems
DHW	Domestic Hot Water
EED	Energy Efficiency Directive
EEOS	Energy Efficiency Obligation Schemes
EPBD	Energy Performance of Buildings Directive
EPC	Energy Performance Certificates
ESEER	European Seasonal Energy Efficiency Ratio
EV	Electric Vehicle
HVAC	Heating, Ventilation and Air Conditioning
M&V	Monitoring & Verification
PA	Priority Action
SEPR	Seasonal Energy Performance Ratio
TCO	Total Cost of Ownership
WP	Work Package

Summary

streamSAVE is a 36-month Horizon 2020 project aiming to streamline energy savings calculations under Articles 3 and 7 of the Energy Efficiency Directive (EED). The project deals with calculation methods for a selection of **Priority Actions**. These are technical energy saving solutions with high energy savings potential selected based on stakeholder needs.

One of the core activities of streamSAVE is to foster experience sharing. **Dialogue groups** have been set up to gather experts and policy officers from various EU Member States, for them to share experiences and discuss technical and economic issues related to the savings calculations for each Priority Action. The streamSAVE consortium facilitates the exchanges by organising dialogue meetings, providing an online forum and summarising the main lessons learnt from the discussions.

The **bi-annual summaries** provide an overview and key information from the dialogue meetings for each semester of the project. This report includes a synthesis of the four bi-annual summaries covering the two cycles of dialogue activities.

The first cycle (March 2021-April 2022) groups discussed methodologies and issues related to the calculation of energy savings from the following five Priority Actions:

HEAT RECOVERY

BUILDING AUTOMATION & CONTROL SYSTEMS

REFRIGERATION SYSTEMS

ELECTRIC VEHICLES

LIGHTING SYSTEMS

The second cycle (May 2022-May 2023) groups discussed methodologies and issues related to the calculation of energy savings from the following five Priority Actions:

SMALL-SCALE RENEWABLE CENTRAL HEATING

ACTIONS TO ALLEVIATE ENERGY POVERTY

REPLACEMENT OF ELECTRIC MOTORS

BEHAVIOURAL CHANGES

MODAL SHIFT FOR FREIGHT TRANSPORT

This report summarizes the main issues discussed for each Priority Action during the multiple dialogue meetings and workshops.

Keywords

Peer-to-peer dialogue, experience sharing, energy savings calculations, stakeholder engagement

Introduction

streamSAVE is a 36-month Horizon 2020 project aiming to streamline energy savings calculations under Articles 3 and 7 of the Energy Efficiency Directive (EED).

What are Priority Actions?

The project deals with calculation methods for a selection of Priority Actions. These are **technical energy saving solutions** with high energy savings potential selected based on stakeholder needs. streamSAVE covered a total of **10 Priority Actions over two cycles** of experience sharing and capacity building.

What is a Dialogue Group?

A Dialogue Group gathers **experts and policy officers from various EU Member States** to **share experience and discuss** technical and economic issues related to the savings calculations for a given Priority Action. The streamSAVE team facilitated the exchanges by organising web-meetings, providing an online forum and preparing proceedings.

The 5 Priority Actions addressed in the first cycle of Dialogue Groups

HEAT RECOVERY

BUILDING AUTOMATION & CONTROL SYSTEMS

REFRIGERATION SYSTEMS

ELECTRIC VEHICLES

LIGHTING SYSTEMS

Duration of the first cycle of dialogues: **March 2021 to April 2022**.

The 5 Priority Actions addressed in the second cycle of Dialogue Groups

SMALL-SCALE RENEWABLE CENTRAL HEATING

ACTIONS TO ALLEVIATE ENERGY POVERTY

REPLACEMENT OF ELECTRIC MOTORS

BEHAVIOURAL CHANGES

MODAL SHIFT FOR FREIGHT TRANSPORT

Duration of the second cycle of dialogues: **May 2022 to May 2023**.

How can I access streamSAVE's online forum?

The online forum is part of the streamSAVE platform:
https://streamsave.flexx.camp/forum

Where can I find the proceedings from the Dialogue meetings?

The **agendas**, **minutes** and **presentation files** of each dialogue meeting are made publicly available on the streamSAVE platform. You can use filters to select the contents related to the Priority Action(s) you are interested in. The platform also includes **bi-annual summaries** that provide an overview and the key information from the dialogue meetings, for each semester. This report includes a synthesis from the four bi-annual summaries, covering the two cycles of Dialogue activities.

Chapter 1 Overview of the dialogue activities

The table below provides the list of dialogue activities organised between March 2021 and May 2023. Reference is also made to the meeting minutes of each activity. The minutes of the online meetings are available on the streamSAVE platform: https://streamsave.flexx.camp/support

Dialogue activities of the first cycle

Table 1. List of dialogue activities of the first cycle.

What	When	Which Priority Actions
Kick-off meeting of the dialogue groups	5 March 2021	All Priority Actions
Dialogue meeting 2	18 May 2021	BACS
Dialogue meeting 2	01 June 2021	Public Lighting
Dialogue meeting 2	15 June 2021	Electric Vehicles
Dialogue meeting 2	22 June 2021	Heat Recovery
Dialogue meeting 2	29 June 2021	Refrigeration Systems
Dialogue meeting 3	19 October 2021	Heat Recovery and Refrigeration Systems
Dialogue meeting 3	9 November 2021	BACS and Public Lighting
Dialogue meeting 3	23 November 2021	Electric Vehicles
Workshop 1	15 February 2022	Cross-cutting: focus on additionality (jointly with ENSMOV)
Workshop 2 (confidential)	23 March 2022	Cross-cutting workshop at the Concerted Action for the Energy Efficiency Directive

The first cycle in figures:

- 9 web-meetings and 2 workshops
- 176 single participants (from 29 countries) to the dialogue meetings
- 24 participants per dialogue web-meeting on average (not including the kick-off)
- 87 single participants (from 25 countries) to workshop 1
- 8 external presentations
- 136 single users registered to the streamSAVE platform
- 16 posts and 1 discussion with streamSAVE stakeholders on the online forum

Dialogue activities of the second cycle

Table 2. List of dialogue activities of the second cycle.

What	When	Which Priority Actions
Dialogue meeting 1	11 May 2022	Feedback and tailored advice for behaviour changes and Small-scale RES for heating (including Domestic Hot Water)
Dialogue meeting 1	24 May 2022	Accelerated replacement of inefficient electric motors and Modal shift for freight transport
Dialogue meeting 1	14 June 2022	Energy efficiency measures to alleviate energy poverty
Dialogue meeting 2	15 November 2022	Feedback and tailored advice for behaviour changes and Small-scale RES for heating (including Domestic Hot Water)
Dialogue meeting 2	29 November 2022	Accelerated replacement of inefficient electric motors and Modal shift for freight transport
Dialogue meeting 2	9 December 2022	Energy efficiency measures to alleviate energy poverty
Workshop 3	21 February 2023	Energy savings in freight transport: opportunities, examples and impacts
Workshop 4	16 March 2023	Boosting energy efficiency to alleviate rising energy poverty in Europe (jointly with SocialWatt)
Final dialogue	17 May 2023	More energy savings: yes, we can!

The second cycle in figures:

- 7 web-meetings and 2 workshops
- 230 single participants (from 30 countries) to the dialogue meetings
- 28 participants per dialogue meeting on average (not including the final dialogue)
- 43 participants to the final dialogue (from 18 countries)
- 21 external presentations
- 208 single users registered to the streamSAVE platform
- 16 posts and 1 discussion with streamSAVE stakeholders in the online forum

Chapter 2 Summary about Building Automation & Control Systems (BACS)

BACS are comprised of all products and engineering services for automatic controls, monitoring, optimisation, for operation, human intervention and management to achieve energy-efficient, economical, and safe operation of building services: heating, ventilation and air conditioning (HVAC), domestic hot water (DHW), lighting, metering, technical building management, access control, security and fire safety.

Figures about the Dialogue Group on BACS

- 29 participants to the dialogue meeting 2
- 22 participants to the dialogue meeting 3
- 2 external presentations: Hadrien Serougne (ADEME), Bonnie Brook (eu.bac)
- 56 single users registered to this Dialogue Group
- 2 posts related to this PA in the online forum

Main issues discussed

Main issues raised by stakeholders in the **stakeholders' survey** conducted in autumn 2020 include:

- Lifetime of savings (and especially providing evidence about savings lifetime);
- What data to collect (and data needed to calculate the baseline);
- How to manage double counting and additionality;
- Evaluation of multiple benefits from implementing BACS (going beyond energy savings, e.g., comfort, productivity, health)

Main issues raised during the **kick-off meeting** (5 March 2021):

- Connection with EPBD (Energy Performance of Buildings Directive) and its provisions about installing and valuating BACS;
- Issues with measurement and verification, including definition of baseline, data collection, behavioural influence on the savings, etc. (e.g., difficulty in defining the baseline of the building energy use because of lack of comprehensive normalisation procedure; difference between calculated and measured energy consumption; how to distinguish savings from BACS and savings from other effects)

Main issues discussed during the **second meeting** (18 May 2021):

- Diversity in Member States' practices as regards requirements for BACS and calculation approaches (cf. based on energy statistics or EPCs – Energy Performance Certificates).
- Little information about BACS factors and existing BACS situation is available. Support and resources, especially about BACS factors and how to set a baseline to calculate energy savings from BACS, would be welcome by practitioners.
- Data may also be found from the reporting related to the inspection of heating and air conditioning systems (cf. Articles 14 and 15 EPBD) and monitoring of incentive schemes.

- Databases of EPCs can also be useful sources about unitary energy consumption of buildings. However, this data should be considered with caution, as EPCs might sometimes overestimate energy consumption.

Main issues discussed during the **third meeting** (19 October 2021):

- **How the BAC classes are defined**: they are defined partly according to the scope covered by the control systems (the narrower the scope, the less efficient), and partly according to the degree of automation and optimisation enabled by the control systems. Class D corresponds to an inefficient energy management (mostly manual controls). Class C is a "basic" energy management (minimum set of automated controls). Classes B and A include additional control systems improving the degree of automation and optimisation (e.g., variable temperature controls).
- **Data about the distribution of the building stock according to BAC classes**: no straightforward source to get national data. Surveys might be needed, especially as disaggregated data per sub-sector (in services) might be needed to match data on BAC classes with data on energy consumption.
- **Cost data**: A new addition to the methodology deals with indicative costs of BACS (expressed as a function of the building type, and the BACS class, for classes A and C).

- **Influence of the EPBD Articles 14(4) and 15(4)** (cf. mandatory installation of BACS systems after 31/12/2025): Class B is compliant with the EPBD requirements. In terms of savings calculations, the streamSAVE methodology explains how to take this EPBD requirement into account to estimate the related energy savings.

Titles of the external presentations:

- *French standardised calculation methods for energy savings from BACS* (by Hadrien Serougne, ADEME)
- *Insights on the BAC classes* (by Bonnie Brook, eu.bac)

Main messages from the discussions

- Importance of the new provisions on BACS included in the Articles 14 and 15 of the EPBD, especially for non-residential buildings from 2025.
- Importance of ensuring a proper commissioning and maintenance of BACS.
- BACS might develop the availability of measured/metered data at project/building level. However, it remains difficult to collect measured/metered data for the monitoring of a policy or programme with a large number of actions. Therefore, simplified approaches can be useful at programme/policy level.
- BACS represent a significant and cost-effective energy savings potential (hence the new provisions on BACS in the amending EPBD2018)
- No generic source of data that would provide the share of BAC classes in each Member State's buildings stock. But, streamSAVE provides indicative values for three EU regions: North, West and South. National surveys might be needed to further define the baseline.
- Due to the diversity of the service sector, deemed unitary savings for BACS should be differentiated according to the branches or sub-sectors.

- Deemed unitary savings can be useful to monitor energy savings from BACS for large schemes such as EEOS (Energy Efficiency Obligation Schemes). However, at project level, BACS should enable to use measured data.

Interesting sources to look further

Table 3. Sources to look further about BACS.

Name of the source	Why it is relevant / interesting
Standard EN 15232 (Energy performance of buildings: impact of building automation, controls and building management)	The streamSAVE methodology is based on the use of BACS factors, which requires referring to benchmarks as set in the BACS efficiency class as specified in this standard It describes buildings' energy systems, with the demand (rooms, end-uses) and supply (energy generation and distribution) sides. This shows that demand control is essential to optimize the energy use. The standard also describes the interactions between each component or system of the building.
Siemens (2018). Building Automation –Impact on Energy Efficiency Application of EN 15232-1:2017	Publicly available study explaining the standard EN 15232. Report providing data about the impacts of BACS
Commission Recommendation (EU) 2019/1019 of 7 June 2019 on building modernisation	guidance note published by the European Commission (DG ENER) about the amending EPBD 2018
https://epb.center/epb-standards/energy-performance-buildings-directive-epbd/	Source where the standards related to the EPBD can be found
Eu.bac (2020) compliance verification checklist	The compliance verification checklist helps with the implementation of the EPBD provisions on BACS.

Chapter 3 Summary about Public Lighting

Figures about the Dialogue Group on Public Lighting

- 28 participants to the dialogue meeting 2
- 22 participants to the dialogue meeting 3
- 1 external presentation: Dr. Boris Sucic (Jozef Stefan Institute)
- 62 single users registered to this Dialogue Group
- 5 posts related to this PA in the online forum

Main issues discussed

Main issues raised by the stakeholders during the **kick-off meeting**:

- How to calculate energy savings through lighting controls?
- Additionality: how to consider Ecodesign standards in the evaluation of savings?
- M&V (Monitoring & Verification) issues: Baseline definition and data scarcity; Disaggregation of energy savings when no individual load monitoring; How to consider patterns of behaviour, safety standards, lighting levels and quality of service

Main issues discussed in the **second meeting**:

- The methodology is simplified compared to detailed related technical standards. However, it remains in line with these standards.
- The two approaches (project-based and simplified) included in the methodology are meant to give comparable results. The calculation principle (physics) remains the same. The difference lies in the type and number of data specific to the actions implemented that are needed as inputs.
- While detailed data might be available at local level, there seems to be a lack of national databases that would facilitate detailed calculations when monitoring a national scheme; which supports the choice of developing a simplified approach.

Main issues discussed during the **third meeting** (19 October 2021):

- **Deemed savings vs. scaled savings**: both approaches have their own pros and cons. Deemed savings can help monitor a large number of projects. Scaled savings provide more precise and specific data. Deemed savings can be defined based on actual measurements for standard cases (e.g., with laboratory tests and field measurements) to improve reliability.
- **Frequency to update standard or indicative values** (used for deemed savings): It is not always needed to update these values, but this is important to revise them regularly to see whether an update would be needed.
- **Possible difficulties in data collection**: experience with savings calculations for public lighting shows that there is no major difficulty for collecting data for this action type. The lighting system operators usually have the main data needed.

Title of the external presentation:

- *Monitoring and verification of energy savings due to renovation of outdoor lighting systems – case study Slovenia* (by Dr. Boris Sucic, Jozef Stefan Institute)

Main messages from the discussions

- Considering the difficulties associated with gathering local detailed data at national level, the objective is to provide approaches that can be used with data commonly available and easy to collect.
- Providing indicative values is welcome, especially in terms of energy savings per lighting source and about dimming effects.
- Conservative values of deemed savings can be a way to encourage the use of standard methods with data specific to the energy efficiency projects, when specific data can easily be collected (e.g., for road lighting projects).
- Offering two alternatives (deemed savings or scaled savings) can provide flexibility for project holders to report data in a cost-effective manner.
- The case of new lighting points (e.g., new roads or districts) might require a specific formula (or specific guidelines).
- Knowledge and skills are essential to ensure that energy efficiency improvements are achieved as expected. Likewise, for developing calculation methods.
- The calculation methods can build on the knowledge and experience of energy efficiency experts (e.g., energy managers or auditors).
- Uncertainties in key parameters such as electricity prices in the case of road lighting can have a major influence on the cost-effectiveness of energy efficiency projects

Interesting sources to look further

Table 4. Sources to look further about Road Lighting systems.

Name of the source	Why it is relevant / interesting
Standard EN 13201-5 (Road lighting - Part 5: Energy performance indicators)	Standard taken into account when developing the methodology. It goes into more details, while the objective of streamSAVE is to develop simpler calculation methods, also taking into account the current practices of Member States.

Chapter 4 Summary about Electric Vehicles (EVs)

Figures about the Dialogue Group on Electric Vehicles

- 25 participants to the dialogue meeting 2
- 29 participants to the dialogue meeting 3
- 1 external presentation: Matteo Prussi (DENER, Politecnico di Torino, Italy)
- 61 single users registered to this Dialogue Group
- 3 posts and 1 discussion with streamSAVE stakeholders related to this PA in the online forum

Main issues discussed

Main issues discussed at the **kick-off meeting**:

- Need for a uniform methodology to calculate the savings with electric vehicles (fuel switching)
- How to avoid double counting between EVs and charging infrastructures
- How to take into account in the baseline the EU emission standards for new vehicles, and possible waterbed effects (higher efficiency in one country compensated by lower efficiency in another)
- How to calculate energy savings from hybrid vehicles

Main issues discussed in the **online forum**:

- Discussions about whether energy savings can be attributed to charging infrastructures, and the decision to exclude infrastructures from the streamSAVE methodology, due to the new Alternative Fuels Infrastructure Directive that will likely make that energy savings from infrastructures could not be additional (and thereby eligible) according to the article 7 (and Annex V) of the EED.
- Large potential for well-to-wheel energy savings from electric vehicles replacing gasoline vehicles.

Main issues discussed in the **second meeting**:

- Key parameters include the specific energy consumption of the vehicles (both the reference/baseline vehicle and the “efficient” one/EVs) and the average distance travelled.
- The key parameters for the indicative values were calculated based on public literature and regulations (e.g., emissions standards and emissions monitoring). However, using national, or even more specific, values is recommended whenever possible to increase the reliability of the calculations.
- Further analyses would be needed to consider the possibility to define indicative values for behavioural effect, for instance, whether the use of EVs would be related to smaller distances travelled compared to the average for the whole stock of vehicles.
- The values from the European standards on CO_2 emissions from vehicles can provide a basis for a harmonised baseline in the context of Article 7 EED.

- Cost data to compare reference and efficient vehicles should be based on TCO (Total Cost of Ownership), considering the different taxes applying to vehicles, insurance, maintenance, fuel/electricity prices per km, etc. Which prevent defining indicative European average values due to the strong differences among countries

Main issues discussed during the **third meeting** (23 November 2021):

- **Scope of analysis**: a reminder that the streamSAVE methodology is focused on savings calculations from fuel switching from conventional to electric vehicles. Depending on the policy objectives, it can be relevant to consider a broader scope (e.g., with lifecycle analysis).
- **Using indicative values or country-specific data**: while available sources provide indicative values (for both, baseline and efficient vehicles), there can be significant variations from one country to another in some parameters (e.g., about average distances travelled or emission factors for electricity).
- **Losses between the plug and batteries**: these losses are not always included in the data provided by the manufacturers (which might create a bias)
- **Case of schemes promoting early replacement (scrappage schemes)**: use of a staircase approach, considering two different periods (before and after the early replacement period) with different energy consumption for the reference vehicle (replaced vehicle and average from the market respectively)
- **Rebound effects**: they might be relevant to consider, but cannot be addressed with EU indicative values. It requires empirical data (e.g., surveys).

Title of the external presentation:

- *Well-to-Wheels analysis of future automotive fuels and powertrains in the European context* (by Matteo Prussi, DENER, Politecnico di Torino, Italy)

Main messages from the discussions

- Collecting national data improves the reliability of the calculations. National databases already in place for other purposes and the monitoring databases of the policies can be useful data sources.
- The use of indicative values to set the baseline would help for harmonized calculations, as the European standards on CO2 emissions can provide a common basis, and also ensure compliance with the additionality requirement (for Article 7 EED).
- Sources are available to provide indicative values for both, reference (baseline) and efficient vehicles. However, it is recommended to use national data whenever possible, especially for parameters such as distances travelled, or emission factors associated with the electricity mix.
- The way the electricity mix is considered (e.g., average or marginal emission factors) can have a major impact on the calculation of CO2 savings.
- Beyond the scope of the EED, it is relevant to consider multiple indicators when assessing transport technologies. A single indicator cannot capture the various impacts to be considered.
- Similarly, it is important to make explicit the cycle considered (whole lifecycle, well-to-wheel, tank-to-wheel). For example, the charging losses should not be neglected.

Interesting sources to look further

Table 5. Sources to look further about Electric Vehicles.

Name of the source	Why it is relevant / interesting
European regulation for CO_2 emission performance standards for cars and vans	Key reference considered for the streamSAVE methodology. These standards are however set in terms of specific CO_2 emissions (gCO_2/km): the values from the standards thus need to be converted into specific energy consumption (e.g., kWh/km) by applying the emission factor according to the type of fuel considered for the reference vehicle.
EC (2021) CO_2 Emission Performance Standards for Cars and Vans. EEA (2021) Monitoring of CO_2 emissions from passenger cars Regulation 2019/631. EEA (2021) Monitoring of CO_2 emissions from vans Regulation 510/2011. ACEA (2020) CO_2 emissions from heavy duty vehicles Preliminary CO_2 baseline (Q3 Q4 2019) estimate.	Sources of indicative values about unitary emissions per type of reference vehicle (in gCO2/km):
Annex VI of the Regulation on the monitoring and reporting of greenhouse gas emissions (2018/2066/EU).	Sources of indicative values about Net Calorific Value and Specific CO2 Emissions
Cars -JEC (2020) Tank-to-Wheels Report v5: Passenger cars. Vans-EV-database (2021) Energy consumption of full electric vehicles. Electric Vehicle Database. Truck and Bus -JEC (2020) Tank-to-Wheels Report v5: Heavy duty vehicles.	Sources of indicative values about specific energy consumption per type of efficient vehicle
Eurostat (2021) Transport Database. (Road traffic statistics by type of vehicles) ACEA (2021) Vehicles-in-use-Europe 2021. European Automobile Manufacturers' Association. (Number of vehicles by type)	Sources of indicative values about distances travelled
study in Germany from ADAC (German Automobile Club)	Interesting about cost data. It covers more than 100 models often showing total costs accumulated over the first 5 years in use for one similar model with fuel vs respective PHEV (Plug-in Hybrid Electric Vehicle) and BEV (Battery Electric Vehicle).
LeasePlan (2020). 2020 Car Cost Index.	Sources of indicative values: about investment and maintenance costs

Chapter 5 Summary about Heat Recovery

Figures about the Dialogue Group on Heat Recovery

- 20 participants to the dialogue meeting 2
- 27 participants to the dialogue meeting 3
- 1 external presentation: Johann Geyer, ENERTEC (Austria)
- 62 single users registered to this Dialogue Group
- 3 posts related to this PA in the online forum

Main issues discussed

Key issues raised in the **stakeholders' survey** and **kick-off meeting**:

- Need for a clear definition of the terms and boundaries when considering heat recovery
- How to define the savings lifetime
- How to set a baseline due to the diversity of industrial processes and technological options
- How to handle changes in production volumes

Key issues discussed during the **second meeting**:

- In the case of heat recovered for another end-use onsite, the difference in the ancillary electricity consumption (e.g., circulation pumps) between the baseline and "heat recovery" cases are assumed to be negligible, allowing a simplified calculation.
- Whereas in the case of heat recovered directly fed back to the same process, the ancillary consumption of the heat recovery system is additional (compared to the baseline case) and should therefore be deducted from the gains of the heat recovered.
- In the case of heat recovered to supply district heating, final energy savings may occur when the supply with heat recovery enables to connect new end-users/buildings, by comparing with the efficiency of the replaced/baseline heating system that would have been used in the absence of connection to district heating.

Main issues discussed during the **third meeting** (9 November 2021):

- **Scope**: The scope considered is very important when assessing final energy savings from heat recovery systems, hence the distinction between three main cases.
- **Focus**: The streamSAVE methodology is focused on heat recovery in industry, due to the large final energy savings potential in this sector. Industry indeed represents 26% of the EU27 final energy consumption, with about two thirds being related to heat demand. Moreover, part of this heat demand is about high temperature heat. Industry is therefore both a source of excess heat and a large user of heat, which creates favourable conditions for heat recovery.
- **Data sources and collection**: For projects in industry, part of the data needed can often be collected from meters or other measurement devices already in place for

other purposes (e.g., safety, optimisation). However, projects in industry might also deal with various processes and complex interactions, making the assessment of energy savings also complex.

- **Rebound effect**: assessing the rebound effect mostly depends on the perspective you adopt (policy or project). Moreover, the notion of rebound effect in industry might not always be relevant and be related in practice to productivity gains.

Title of the external presentation:

- *Savings calculation for heat recovery in industry to supply another site – a best practice example from Austria* (by Johann Geyer, ENERTEC)

Main messages from the discussions

- The amending Energy Efficiency Directive (EED) adopted in 2018 makes that only small final energy savings from district heating can be reported to EED Article 7. However, the use of heat recovery for district heating still provides large primary energy savings in the context of EED Article 3 (and reductions in GHG emissions).
- The scope of final energy consumption to consider in the savings calculations depend on the case of application: heat recovered directly fed back in the same process; heat recovered used on-site but for another end-use; heat recovered used to supply other sites via district heating
- Heat recovery represent significant potentials of final energy savings, especially in industry.
- Projects in industry are sometimes complex and require using specific data to calculate the savings. A standard method then helps to ensure that the calculations are done in line with the rules set in the scheme it is reported to.

Chapter 6 Summary about Refrigeration systems

Figures about the Dialogue Group on Refrigeration systems

- 14 participants to the dialogue meeting 2
- 27 participants to the dialogue meeting 3
- 1 presentation about a national experience: France (presented by Jean-Sébastien Broc, IEECP, with inputs from ADEME and ATEE)
- 52 single users registered to this Dialogue Group
- 3 posts related to this PA in the online forum

Main issues discussed

Main issues raised in the **stakeholders' survey** and during the **kick-off meeting**:

- Calculation of cooling efficiency and on-site data collection are complicated. Therefore, simplified calculation methods and indicative values would be welcome.
- Difficulty to set a baseline that complies with additionality requirements.
- Highest interest (in terms of scope) in central compression refrigeration units, replacement of electric compression refrigeration units with direct or indirect absorption cooling units
- How to account for different needs of different refrigerated products / standard approach for comparison of different systems with different refrigerants

Main issues raised during the **second meeting**:

- The discussions confirmed that it is relevant to use SEPR (Seasonal Energy Performance Ratio) instead of ESEER (European Seasonal Energy Efficiency Ratio) in this calculation methodology.
- ESEER is indeed not used any more: due to the change in the regulation, certification of equipment does no longer include ESEER values. From 2016, the European regulation makes that the certification of equipment includes SEER or SEPR values (according to the type of equipment).
- The standard EN14825:2018 (Air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling - Testing and rating at part load conditions and calculation of seasonal performance) may include complementary indicative values that could be relevant for the streamSAVE methodology.

Main issues discussed during the **third meeting** (9 November 2021):

- **Focus**: the streamSAVE methodology is focused on industrial and commercial refrigeration and the utilization of central compression refrigeration units. It does not apply to comfort/space cooling.
- **Choice of the efficiency indicator**: according to the relevant Ecodesign regulation ((EU) 2016/2281), the recommended efficiency indicator is now SEER (Seasonal Energy Efficiency Ratio) or SEPR (Seasonal Energy Performance Ratio). Based on the review done to prepare the methodology and the discussions at the previous dialogue meeting, it was chosen to use the SEPR indicator in the streamSAVE methodology

- **Cost data**: Indicative cost values about refrigeration systems can be found in the preparatory studies (impact assessments) in frame of the Ecodesign Directive. These values can be presented in absolute ranges to give an order of magnitude of the cost of a project, or in relative terms (cost per kW of capacity), as the capacity has a strong influence on cost. There can indeed be major variations according to the capacity of the refrigeration system. In particular, capacity and size have a strong influence on the investment cost. It will be considered whether the streamSAVE methodology could include cost data in terms of euros/kW.

Title of the external presentation:

- *Calculation methods for refrigeration systems in the French white certificates scheme* (by Jean-Sébastien Broc, IEECP, with inputs from ADEME and ATEE)

Main messages from the discussions

- The scope of the methodology: focus on new installations or the replacement of air-chilled or water-chilled central compression refrigeration units, and high temperature process chillers.
- The Ecodesign regulation for air heating and cooling products (EU) 2016/2281, makes that the calculation methodology previously using ESEER (European Seasonal Energy Efficiency Ratio) as efficiency parameter should be updated to use the new efficiency parameters set in the current regulation: SEER (Seasonal Energy Efficiency Ratio) or SEPR (Seasonal Energy Performance Ratio) (according to the type of equipment)
- Refrigeration systems represent significant potentials of final energy savings.
- For refrigeration systems, the efficiency indicators to be documented by the manufacturers have evolved. Which might require to update the calculation methods used by Member States accordingly.
- A set of deemed savings can be used to provide a standardised way to monitor energy savings while reflecting variations according to key parameters that can easily be reported by stakeholders.
- The indicative cost values provide a general benchmark but should not be used for a particular case.

Interesting sources to look further

Table 6. Sources to look further about Refrigeration systems.

Name of the source	Why it is relevant / interesting
Commission regulation ((EU) 2016/2281) setting of ecodesign requirements for energy-related products, with regard to ecodesign requirements for air heating products, cooling products, high temperature process chillers and fan coil units	Definition about the efficiency indicators. Key source used to develop the streamSAVE methodology (see also the related guidelines published by the European Commission)
Database of Eurovent certified air-chilled and water-chilled refrigeration units under the LCP-HP (Liquid Chilling Packages and Heat Pumps)	Source of indicative values for SEPR (Seasonal Energy Performance Ratio)

Impact assessment for the ecodesign requirements for electric motors and variable speed drives (SWD/2019/0343 final)	Other source of relevant data
standard EN14825:2018 on air conditioners, liquid chilling packages and heat pumps, with electrically driven compressors, for space heating and cooling	Other possible data source

Chapter 7 Feedback about the first cycle of dialogue meetings

Feedback questionnaire done after each dialogue meeting

Short questionnaires (online) were shared with participants after each dialogue meetings to get feedback about their expectations and whether they were met. The main results from these short surveys are compiled below, comparing the answers received during the second series of meetings (Spring 2021) and the third series of meetings (Autumn 2021).

Overall, the respondents were satisfied with the quality of the meeting organisation. The answers were even more positive about the 3rd series of meetings. This might be explained by the experience gained along the 2nd series of meetings, and the resulting improvements in the organisation and moderation of the meetings.

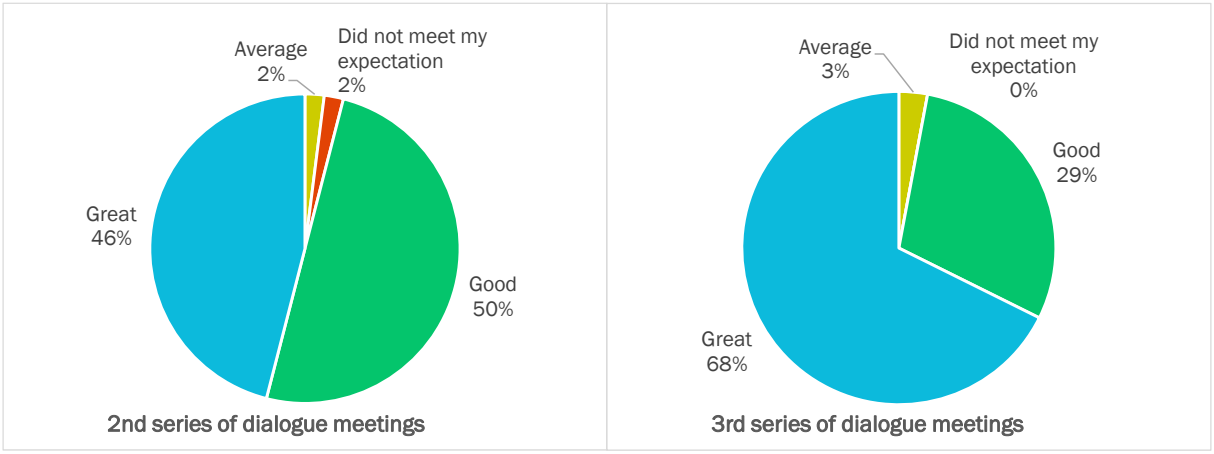


Figure 1. How do you rate the overall meeting organization?

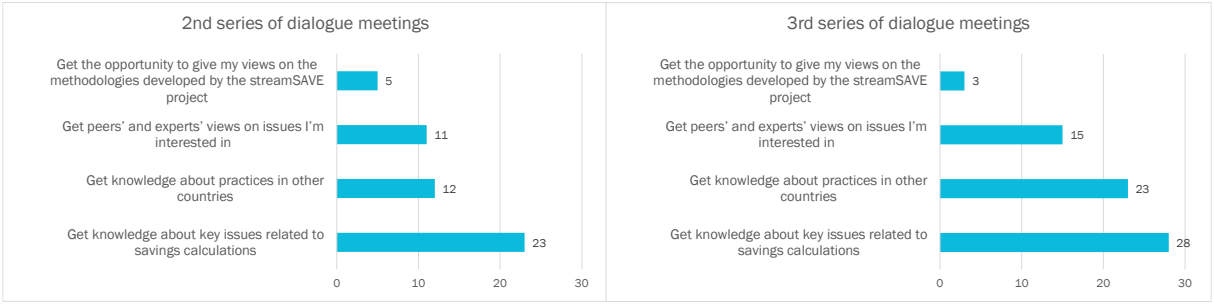
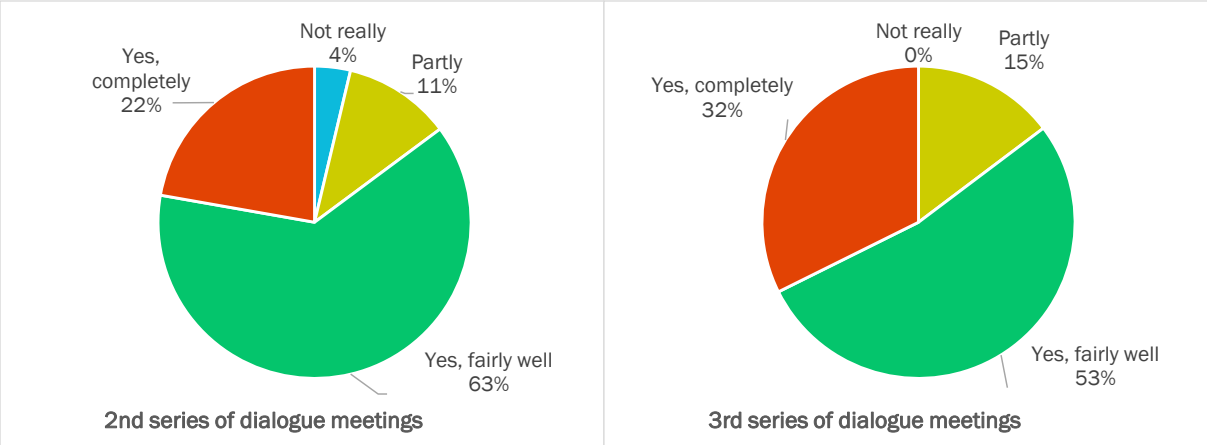


Figure 2. What were your objectives for this meeting? (multiple choice possible)

The hierarchy in the objectives of the respondents remain overall the same between the 2nd and 3rd series of meetings. Respondents' main objective is to gain knowledge on issues related to savings calculations, which is in line with the main objective of the dialogue meetings. Participants are also interested in sharing experience (see response options "get knowledge about practices in other countries" and "get peers' and experts' views on issues I'm interested in"). The respondents were relatively less interested in giving their views on the streamSAVE methodologies. This aspect is indeed better addressed in the national case studies, part of the complementary streamSAVE activity – Capacity Support Facility – to exchange with national stakeholders and experts.

Overall, almost all respondents considered that the meetings reached their objectives at least partly or even more for most of them. An improvement can also be seen in the answers of the 3rd series.



Note: no participant answered "1-not at all", hence this option is not included here.

Figure 3. Did the meeting reach your objectives? (rate from 1-not at all to 5-yes, completely)

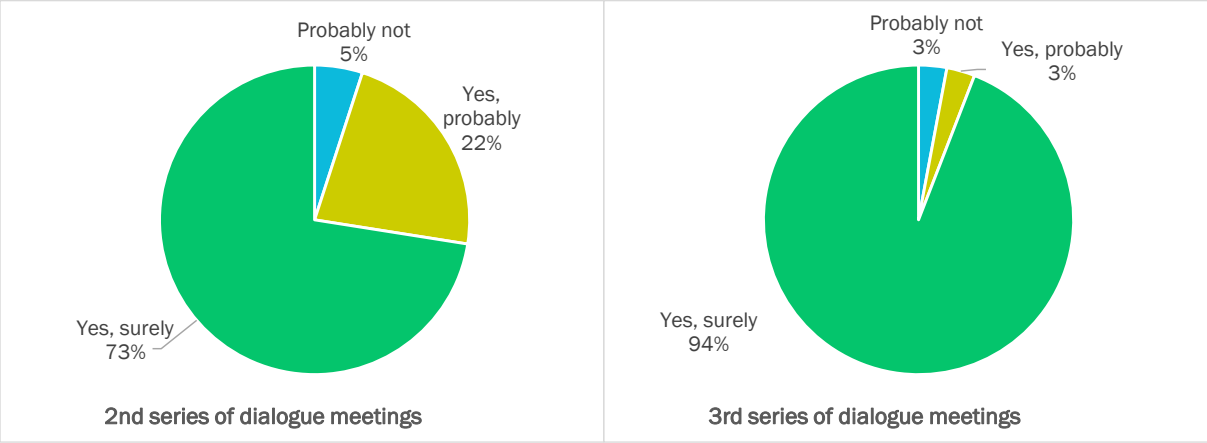


Figure 4. Do you plan to attend another streamSAVE meeting?

Respondents' satisfaction and interest in the dialogue meetings are confirmed by the fact that most of them plan to attend further meetings. The likelihood for them to attend further meetings even increased in the answers after the 3rd series of meetings (cf. 94% of "yes, surely").

In addition to the questions shown above, the short surveys done after the 2nd series of meetings were used to get feedback about their design. Overall, most respondents (91%) found the length (1 hour per PA) adequate. Likewise, most respondents (87%) found the balance between presentations and discussions fine for them.

The questions about the 2nd series of meetings were also used to prioritize the issues on the agenda of the 3rd series of meetings that closed this first cycle.

Feedback from the general online survey about the first cycle of streamSAVE activities

A general online survey was done in December 2021-January 2022 to collect feedback on the first cycle of streamSAVE activities (including, though not only, the dialogue meetings), and to select the topics for the next cycle (especially the new set of Priority Actions).

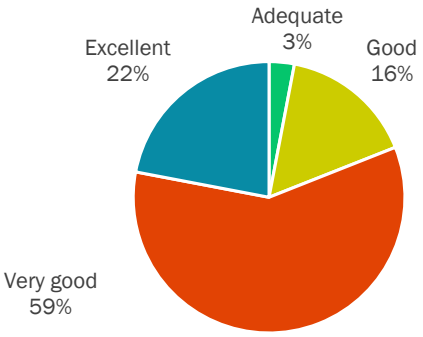


Figure 5. How do you rate the overal organisation of the dialogue activities (e.g. quality of presentations and moderation, invitations, level of interaction, duration & number of meetings)?

The answers about the overall organisation of the dialogue meetings are in line with the ones from the short feedback survey, with a very good rating.

Looking more in the details (see Figure 6 below), the respondents rated very positively the achievement of all main objectives of the dialogue meetings.

The rating is in particular very good for the objectives of providing a better understanding of key issues related to savings calculations, and a better knowledge on practices related to savings calculations in other EU countries in the context of the EED. Both aspects are the dialogue meetings' primary objectives, that can then be considered met. The rating is slightly less but still very positive about getting peers' and experts' views on issues respondents are interested in.

Finally, the rating is more balanced about getting to know experts or other policy officers active in the topics that the respondents are interested in. This can be explained by the fact that the dialogue meetings are online meetings, that make new contacts less easy than in-person meetings. Multiple ways to improve this aspect were considered for the second cycle, such as reminding participants that the participants' lists are included in the minutes of the dialogue meetings, including at least one external presentation in each dialogue meeting (as done in the third series of the first cycle), or looking for opportunities to organise the workshops as in-person events back-to-back or as part of other in-person events (as done in March 2022 at the Concerted Action EED, see below in the Conclusion).

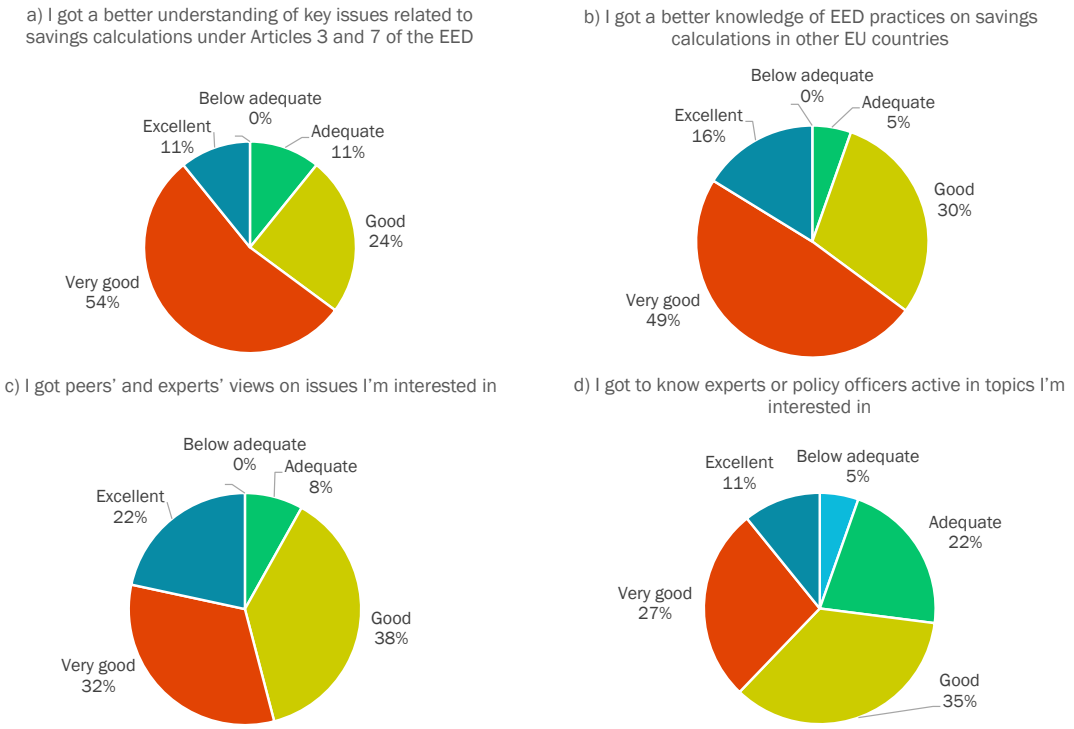


Figure 6. How would you rate the web-meetings' achievement of following objectives?

Chapter 8 Summary about Feedback and tailored advice for behavioural changes

This Priority Action deals with behavioural changes related to using energy. Behaviours related to investment decisions (e.g., adopting a new technology) is out of its scope.

Figures about the Dialogue Group on Feedback and tailored advice for behavioural changes

- 34 participants to meeting 1 of the dialogue group
- 28 participants to the dialogue meeting 2
- 2 external presentations: Dr. Stratos Keranidis (domX, Greece; NUDGE project) and Adam Thomas, Principal Consultant at ADM Associates, the USA)
- 15 single users registered to this Dialogue Group
- 2 posts related to this PA in the online forum

Main issues discussed

Main issues and messages discussed during the **first meeting** (11 May 2022):

- The European Commission's recommendation (EU) 2019/1658 on the implementation of Article 7 EED published in September 2019 provides guidelines for the calculation of energy savings from behavioural measures.
- The literature review shows that the savings lifetime is commonly assumed to be equivalent to the duration of the intervention promoting behaviour changes.
- The methodologies available from Member States about energy savings from behaviour changes are mostly focused on electricity savings in the residential sector. However, very few of these methodologies present the sources they have used. The streamSAVE team is therefore reviewing recent studies and sources to provide an updated list of sources and indicative values.
- The approaches used in the behaviour change interventions vary broadly, and so their results. Which makes it difficult to compare their results.
- The data collection should not be limited to direct monitoring of energy consumption, and should also include complementary relevant data / variables.
- It can be difficult to separate the effects of the behaviour interventions from other factors, especially in a context of rapidly changing energy prices.
- Requiring empirical studies to prove the effects of the behaviour interventions can be a way to improve the reliability of the reported energy savings, especially when the studies include pilot trials and a well-documented methodology.

Main issues and messages discussed during the **second meeting** (15 November 2022):

- 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.

Titles of the external presentations:

- *Methodology to assess the impacts of behavioural changes from the NUDGE pilot projects*, by Dr. Stratos Keranidis (domX, Greece)
- *US experience with measuring energy savings from behavioural programmes*, by Adam Thomas, Principal Consultant at ADM Associates

Main messages from the discussions

- Requiring empirical studies to prove the effects of the behaviour interventions can be a way to improve the reliability of the reported energy savings, especially when the studies include pilot trials and a well-documented methodology.
- The evaluation of the behavioural savings using Randomised Control Trials (RCTs) pays off. RCTs can also help distinguish external factors from behavioural measures, which is essential in context such as rapidly changing energy prices.
- RCTs or similar methods have been consistently used in the US to provide reliable savings, and are now an important component of energy savings in the residential sector.
- The literature review shows that the savings lifetime is commonly assumed to be equivalent to the duration of the intervention promoting behaviour changes.

Chapter 9 Summary about Small-scale RES for heating (including Domestic Hot Water)

This Priority Action deals with technology using RES (renewable energy sources) to generate a significant share of space heating or domestic hot water in buildings, focusing on heat pumps and biomass boilers.

Figures about the Dialogue Group on Small-scale RES for heating (including Domestic Hot Water)

- 34 participants to the dialogue meeting 1
- 28 participants to the dialogue meeting 2
- 2 external presentations: Tadeja Janša and dr. Gašper Stegnar (Jožef Stefan Institute – Slovenia; REPLACE project), and Christos Tourkolias (CRES, Greece)
- 23 single users registered to this Dialogue Group
- 2 posts related to this PA in the online forum

Main issues discussed

Main issues and messages discussed during the **first meeting** (11 May 2022):

- The main parameters in the calculation formulas are the building area, the specific heat demand and demand in domestic hot water – DHW (in kWh/m².year) and the efficiency of the baseline and new systems for space heating and DHW.
- European standards and regulations provide a first basis, however difficulties were encountered in finding standardised data at European level, as the values used in the national methodologies used by Member States may vary significantly.
- The definition of the baseline might need to consider if the policy measure promotes fuel switching, as in this case it might be relevant to define a baseline according to the type of technology of the replaced system.
- The choice for the indicator of specific energy demand for domestic hot water might depend on the data availability: per person might be more accurate, but data per m² seem to be more commonly available.
- The requirements set in Article 7 and Annex V of the EED make that only final energy savings can be reported. In practice, small-scale RES technologies do not always lead to final energy savings. In this case, these actions are not eligible to Article 7.
- The strong changes in energy prices since 2021 have a major impact on the costs of the different options for heating systems. Which can have a major influence on the decision of the building owners.

Main issues and messages discussed during the **second meeting** (15 November 2022):

- 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.

- The calculation for the biomass boilers is 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.
- 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.

Titles of the external presentations:

- *Insights from the 'REPLACE your Heating System Calculator'* (Tadeja Janša and dr. Gašper Stegnar, Jožef Stefan Institute – Slovenia)
- *Example of the calculation methods for heat pumps used in Greece*, by Christos Tourkolias (CRES, Greece)

Main messages from the discussions

- The requirements set in Article 7 and Annex V of the EED make that only final energy savings can be reported. In practice, small-scale RES technologies do not always lead to final energy savings. In this case, these actions are not eligible to Article 7.
- The definition of the baseline might need to consider if the policy measure promotes fuel switching, as in this case it might be relevant to define a baseline according to the type of technology of the replaced system.
- The choice for the indicator of specific energy demand for domestic hot water (per person vs. per m^2) might depend on the data availability.
- The strong changes in energy prices since 2021 have a major impact on the costs of the different options for heating systems..

Interesting sources to look further

Table 7. Sources to look further about Small-scale RES for heating.

Name of the source	Why it is relevant / interesting
Ecodesign regulations 813/2013 and 2016/2281, and related impact assessments and preparatory studies	Source for reference data about heat pumps
CEN Standard EN-303-5 Heating boilers - Part 5: Heating boilers for solid fuels, manually and automatically stoked, nominal heat output of up to 500 kW - Terminology, requirements, testing and marking	Source for reference data about biomass boilers
REPLACE project (see the Heating System Calculator)	Source about cost data

Chapter 10 Summary about Accelerated replacement of inefficient electric motors

This Priority Action is focused on the replacement of old inefficient electric motors before their end-of-life, in industry and services. It deals with 3-phase motors, in the range of nominal power between 0.75 and 1000 kW (excluding the 'small' and 'large' motors).

Figures about the Dialogue Group on Accelerated replacement of inefficient electric motors

- 24 participants to the dialogue meeting 1
- 18 participants to the dialogue meeting 2
- 2 external presentations: Maarten van Werkhoven (TPA adviseurs, the Netherlands), Rita Werle (Impact Energy, Switzerland)
- 16 single users registered to this Dialogue Group
- 1 post related to this PA in the online forum

Main issues discussed

Main issues discussed and messages during the **first meeting** (24 May 2022):

- Harmonised data about the number of running hours and load factors are more difficult to source (while efficiency values are standardised). US studies provide more recent data than what is available from European studies, and could be used until more recent European data become available.
- One challenge about accelerated replacement is to determine how many years before the end of lifetime the motor is replaced. This is important when assessing 'additional energy savings' as defined in Article 7 EED.
- An alternative to indicative values is to use data monitored for the actions reported or a sample of actions. But default assumptions might still be needed about the replaced motors, when the information is no longer available (e.g., about its efficiency).
- Whenever possible, this is more accurate to use 'real-life' data instead of default or standard values. However, in practice, it is not always possible to get data specific to each project, depending on the context. For example, when assessing the energy savings at EU level, deemed savings are a pragmatic approach.
- A full optimization (including about the installed power) requires a whole system approach that is not yet always possible in practice. Information, capacity building and incentives are needed to make Minimum Energy Performance Standards fully effective and to tap the savings potential on the 'motor system level'.

Main issues discussed and messages during the **second meeting** (29 November 2022):

- Importance of the electricity consumption from motor systems (53% of the global electricity consumption of all end-use sectors, and 74% of electricity consumption in industry).
- Electric motors tend to be used for much longer than their expected lifetime, showing the relevance to consider policies for accelerated replacement. Several barriers can indeed explain why this cost-effective savings' potential still remain largely untapped.

- Indicative values could be defined from the literature, using conservative assumptions when relevant.
- These indicative values provide useful data for benchmarking or as a first basis to define national methods when assessing a large number of replacements or energy savings potentials. However, they cannot replace a specific assessment (e.g., energy audit) for a particular case or precise technical-economic analysis.
- As the electricity mix can vary significantly from one country to the other, it is strongly recommended to use national values for the primary energy factor and the emission factor, when assessing primary energy savings or CO2 savings.
- Investment costs vary strongly according to the size of the motor, which makes difficult to define average cost values per power range.
- When considering all the elements of the motor system, a savings' potential in the range of 20-30% can usually be achieved with solutions available today: the experience from the Swiss ProKiloKatt scheme shows that most savings were achieved in other elements than the electric motor itself.

Titles of the external presentations:

- *Electric motor systems detailed in Dutch energy savings policy,* by Maarten van Werkhoven (TPA adviseurs, the Netherlands)
- *Energy savings in motor systems – experience from Switzerland,* by Rita Werle (Impact Energy, Switzerland)

Main messages from the discussions

- Motor systems represent 53% of the global electricity consumption of all end-use sectors, and 74% of electricity consumption in industry. A savings' potential of 20-30% can be achieved with solutions available today when considering all the elements of the motor system. A full optimization (e.g., about the installed power) requires a whole system approach that is not yet always possible in practice.
- Determining how many years before the end of lifetime the motor is replaced is challenging. Harmonised data about the number of running hours and load factors are difficult to source. An alternative to indicative values is to use data monitored for the actions reported or a sample of actions. But default assumptions might still be needed about the replaced motors, when the information is no longer available (e.g., about its efficiency).
- It is strongly recommended to use national values for the primary energy factor and the emission factor, when assessing primary energy savings or CO2 savings (cf. strong differences in national electricity mix).
- Investment costs vary strongly according to the size of the motor, which makes difficult to define average cost values per power range.

Interesting sources to look further

Table 8. Sources to look further about Accelerated replacement of inefficient electric motors.

Name of the source	Why it is relevant / interesting
Ecodesign Regulation 2019/1781 and the related Ecodesign Impact Assessment related to the Ecodesign Regulation 2019/1781 for electric motors and variable speed drives:	Sources of data relevant to this Priority Action, and to define ranges of nominal power
EuP (Energy-using Products) motors preparatory studies (Lot 11 and Lot 30)	
US DoE (Department of Energy) Motor System Market Assessment (2021) Field assessment of motors in the US.	Useful complementary source of data (including measured and surveyed data)

Chapter 11 Summary about Modal shift for freight transport

The streamSAVE methodology is focused on calculating the theoretical potential for modal shift per Member State, influenced by the types of goods and transport distances. For this action it is not possible to define standardised values at EU level.

Figures about the Dialogue Group on Modal shift for freight transport

- 24 participants to the dialogue meeting 1
- 18 participants to the dialogue meeting 2
- 53 participants to the workshop 3
- 4 external presentations: Caroline Meunier (Total Energies, France), Conor Feighan (European Rail Freight Association), Maria Lelli (ENEA, Italy), James Nix (Transport & Environment)
- 12 single users registered to this Dialogue Group
- 3 posts related to this PA in the online forum

Main issues discussed

Main issues discussed and messages during the **first meeting** (24 May 2022):

- Impossible to define standardised values at EU level for this action type. Only France has standardised methods for freight transport. Other countries report energy savings from freight transport, but do not use deemed savings approaches for it.
- Therefore, the streamSAVE methodology provides a calculation of the theoretical potential for modal shift per Member State. Key parameters include the types of goods, categories of distances, and rail network density.
- The rail network density can be a limiting factor, meaning that a realistic assumption is that the freight volume could be at maximum doubled by 2030 (at EU level).
- One challenge is that freight can be both, national and international. Whereas only savings achieved within the Member State can be reported to the EED (both, Art.3 and Art.7). Assumptions might thus be needed to estimate the share of distances travelled on national territory and abroad.
- The calculations of the differences in energy consumption between the two modes (road and rail) should take into account the differences in distances and weight for each mode (as both modes used different routes and vehicles).
- The savings lifetime assumed in the calculations is often shorter than the technical lifetime of the transport modules.
- Market data from professional organisations can provide indicative values for typical consumption per km (per mode), distances travelled (in the country and abroad) and operational lifetime (that can be used as proxy for the savings lifetime).

Main issues discussed and messages during the **second meeting** (29 November 2022):

- Standardizing values at EU level for single actions was not possible for modal shift in freight. Instead the streamSAVE methodology enables to assess the technical and savings' potential per Member State. Moreover, the French example (presented in the previous meeting) showed that defining standardized values at national level is possible.
- The EUROSTAT freight transport statistics are a major data source, but the quality of available data varies among Member States.
- The potentials found are significant for most Member States, with the exception of small (e.g., Luxembourg) or insular (e.g., Ireland) countries. The largest potentials are found in Germany and Poland.
- The streamSAVE methodology does not aim at assessing economic feasibility. However, a literature review enabled to identify indicative values for cost data (from a Dutch study).

Main issues discussed during the **workshop** (21 February 2023):

About the development of markets for rail freight

- Expected strong increase in freight transport in Europe, of about 30% by 2030.
- EU objectives to increase rail freight volumes by 50% by 2030 and 100% by 2050, whereas recent years' trend was stagnant.
- Very different situation from one country to the other.
- Major changes in the market: most historical national rail freight companies have decreasing activities while new companies develop new services, and especially strong growth in intermodal trains (combined transport) and international trains (cross-borders).
- Need for policies to make it as easy for trains to cross borders as for trucks.
- Lack of capacities, whereas no major development in railways planned for the next 10 years, which means that improving capacity management is essential to avoid congestion issues where the rail freight markets grow. A Commission's proposal is expected by summer 2023 on capacity management.

About the calculating energy savings from the Italian programmes

- Key parameters are the traffic volumes shifted (in tons kilometres) and the specific energy consumption for each mode.
- Specific energy consumption per mode is the most challenging to estimate.
- There is sometimes an issue about when data becomes available. For example, the National Account (including data on traffic volumes) is published in July, whereas ENEA's energy efficiency report is released in April. Therefore other data sources are needed (e.g., from trade associations). Trade associations have also useful data sources about volumes shifted
- It is a good practice to search for all data available and then try different approaches, evaluate their differences and select the most reliable.
- It is useful to ask energy data to the operators applying for incentives, and to facilitating data exchange between administrations.

About energy efficiency in road freight transport

- truck tolling varies significantly among EU countries, whereas tolling can significantly boost efficiency.

- The 2022 EU Directive on toll reform requires toll rates to vary with CO_2 emissions. This will apply directly in countries with government-directed tolling, whereas the change may be deferred in case of concessions.
- CO_2-based toll rates can make electric vehicles cheaper than diesel vehicles (in total cost of ownership). In any case, most electric vehicles will be cheaper to run than diesel vehicles within a few years.
- Government support for zero emission trucks should bridge the investment gap, but also ensure the development of charging infrastructures.
- Trailer retrofitting is a cost-effective solution but faces split incentive as the owner of the trailer is often not the owner of the tractor unit (who benefits from the more efficient trailer).
- Europe is lagging behind about the equipment rate of trailers with side skirting. This may be improved with regulations from 2025 onwards.
- Typical energy and CO2 savings from trailer retrofitting can be about 10.7% in long haul and up to 6% in regional delivery (with a good scheme in Germany)

Titles of the external presentations:

- *Calculation methods about modal shift for freight transport – Examples from the French white certificates scheme,* by Caroline Meunier (Total Energies, France)
- *Opportunities and impacts of developing modal shift for freight*, by Conor Feighan, European Rail Freight Association
- *The example of the Ferrobonus and Marebonus programmes in Italy,* by Maria Lelli, ENEA – Italian Agency for New Technologies, Energy and Sustainable Economic Development
- *Discussing options to reduce the energy consumption and GHG emissions from road freight,* by James Nix, Transport & Environment

Main messages from the discussions

- Scenarios expect a strong increase in freight transport in Europe. Savings potentials are significant for most Member States, with the exception of small or insular countries.
- The rail network density can be a limiting factor, meaning that a realistic assumption is that the freight volume could be at maximum doubled by 2030 (at EU level).
- No major development in railways is planned for the next 10 years, which means that improving capacity management is essential to avoid congestion issues where the rail freight markets grow.
- Except France, the countries reporting energy savings from freight transport to Article 7 EED, do not use deemed savings but specific calculation methods (see for example Italy).
- Market data from professional organisations can provide indicative values for typical consumption per km (per mode), distances travelled (in the country and abroad) and operational lifetime (that can be used as proxy for the savings lifetime).
- Specific energy consumption per mode can be the most challenging to estimate.
- The calculations of the differences in energy consumption between the two modes (road and rail) should take into account the differences in distances and weight for each mode.

- The savings lifetime assumed in the calculations is often shorter than the technical lifetime of the transport modules.

Interesting sources to look further

Table 9. Sources to look further about Modal shift for freight transport.

Name of the source	Why it is relevant / interesting
EUROSTAT freight transport statistics	data on road freight transport volume per type of good and class of distance, for each Member State
Eurostat: The European Rail Freight Market: Competitive Analysis and Recommendations	Comprehensive study of 2022
European Environmental Agency: Rail and Waterborne – best for low carbon motorised transport	Useful data about emission rates per transport mode
IRG (Independent Regulators' Group) Rail: Annual Market Monitoring Reports	Useful data about market shares, competition, etc.
JEC well-to-tank report V5	JEC well-to-wheels analysis of future automotive fuels and powertrains in the European context
EMEP/EEA air pollutant emission inventory guidebook 2019 (Technical guidance to prepare national emission inventories; EEA Report No 13/2019)	See part b on sectoral guidance, then chapter 1-energy, and section 1.A.3.b.i-iv Road Transport, including emission factors 2019
Directive 2022/362 about tolling	It requires that toll rates vary according to CO_2 emissions
T&E's briefing How to buy an electric truck (November 2022) and T&E's report on clean trucks (June 2023)	Useful information about clean vehicles for freight transport
Greening Freight Package published by the Commission in July 2023:	Latest policy development at EU level about freight transport

Chapter 12 Summary about Energy efficiency measures to alleviate energy poverty

The context of developing a methodology for energy efficiency measures to alleviate energy poverty is that the currently proposed EED recast reinforces the requirements about alleviating energy poverty as part of Article 7 EED that should become Article 8 EED in the recast. The objective of the streamSAVE methodology is to investigate the possible differences in energy consumption, and thereby in energy savings, of energy poor households compared to other households, focusing on measures dealing with building renovation (insulation), heating installation (small-scale RES) and behavioural measures.

Figures about the Dialogue Group on Energy efficiency measures to alleviate energy poverty

- 32 participants to the dialogue meeting 1
- 30 participants to the dialogue meeting 2
- 7 external presentations: Anna Realini (RSE - Ricerca sul Sistema Energetico), Avishek Banerjee (BEIS – UK Department for Business, Energy and Industrial Strategy), Anika Batenburg and Arianne J. van der Wal (TNO, the Netherlands), Ute Dubois (ISG International Business School, France), Katarina Trstenjak (Jozef Stefan Institute, Slovenia), Mariana Jiménez (Catalonia Energy Research Institute, Spain / EmpowerMed project), Niall Dunphy (University College Cork, Ireland / EnergyMeasures project)
- 24 single users registered to this Dialogue Group
- 3 posts related to this PA in the online forum

Main issues discussed

Main issues discussed and messages during the **first meeting** (14 June 2022):

- There is a growing interest in energy efficiency measures to alleviate energy poverty and the related energy savings calculations. The proposed EED recast that reinforces the requirements related to energy poverty and the current energy crisis put these issues even higher on the agenda.
- The current practices of energy savings calculations for Article 7 EED rarely differentiate the calculations according to the type of households or dwellings, whereas there is a growing body of literature indicating significant differences in energy consumption, and thereby in energy savings, of energy poor households compared to other households.
- Likewise, studies have shown significant differences between theoretical energy consumption (as estimated by building energy models) and actual energy consumption (based on measurements or metering). These differences are larger for the least energy efficient dwellings (overestimations by the models).
- Differences between theoretical and actual energy savings can also be due to performance gaps (lower performance of the measure installed compared to the expectation, for example due to defaults in the installation, different conditions of use compared to the standard conditions used to define the manufacturer data, ...).

- A common approach to address these issues is to include correction factors in the calculation formula (e.g., prebound effect, rebound effect / comfort taking factor, performance gap / measure correction factor).
- The literature provides indicative values of such factors for space heating (but with variability from one study to the other). There is less evidence available for other end-uses (e.g., electrical appliances).
- While rarely implemented yet, another complementary approach would be to consider indicative values for key parameters (e.g., space heating demand, heating system efficiency) that would be differentiated by energy band of dwellings and/or by type of households.

Main issues discussed and messages during the **second meeting** (9 December 2022):

- There is a much higher attention on energy poverty: this is now part of the general public debate (like inflation, employment, etc.)
- The literature shows that reducing energy poverty brings multiple benefits that are likely more than compensating the intervention costs.
- Health benefits from building renovations are proven and are an essential benefit of energy efficiency interventions tackling energy poverty.
- Building renovations may also have negative effects for tenants, in case of increase in the rent.
- The literature provides evidence and indicative values about differences between energy poor households and other households as regards baseline energy consumption (before intervention).
- However, there is not enough data available to define indicative values about possible differences in the effects of energy efficiency interventions, especially for behavioural measures.
- The differences in energy consumption between energy poor households and all households may vary according to the type of energy or end-use, and the sub-groups of energy poverty (related to different energy poverty indicators).
- Finding control groups when assessing the effects of energy efficiency interventions is not always possible, leaving before/after comparison as only alternative.
- Combining quantitative and qualitative methods provide complementary evidence to better understand the effects of energy efficiency interventions, especially about multiple impacts / benefits.
- With the current energy crisis, considerable public budget is used to mitigate the impacts of increasing energy prices with short term measures. Which raises debates about the targeting of the measures, and the balance between short-term and long-term measures.
- Implementing deep renovations for energy poor households is a difficult but essential task to really take them out of energy poverty.

Titles of the external presentations:

- *Energy poverty quantitative measurement: methodology and case studies in Italy, by Anna Realini* (RSE - Ricerca sul Sistema Energetico)

- *Modelling real world energy savings in UK policy appraisal – challenges and potential approaches,* by Avishek Banerjee (BEIS – UK Department for Business, Energy and Industrial Strategy)
- *Insights from the National research program on energy poverty in the Netherlands,* by Anika Batenburg and Arianne J. van der Wal (TNO, the Netherlands)
- *The French framework on energy efficiency measures for energy poverty alleviation,* by Ute Dubois (ISG International Business School, France)
- *Challenges in monitoring and assessing impacts of energy efficiency measures to alleviate energy poverty,* by Katarina Trstenjak (Jozef Stefan Institute, Slovenia)
- *Assessing and comparing the impacts of measures to reduce energy poverty: results from the EmpowerMed project,* by Mariana Jiménez (Catalonia Energy Research Institute, Spain / EmpowerMed)
- *Impacts from overcoming challenges in household energy data collection - insights from the EnergyMeasures project,* by Niall Dunphy (University College Cork, Ireland / EnergyMeasures project)

Main messages from the discussions

- Current practices rarely differentiate energy savings calculations according to the type of households or dwellings, whereas the literature found significant differences in energy consumption, and thereby in energy savings.
- However, there is not enough data available to define indicative values about possible differences in the effects of energy efficiency interventions, especially for behavioural measures.
- Finding control groups when assessing the effects of energy efficiency interventions is not always possible, leaving before/after comparison as only alternative.
- Differences between engineering estimates and measured data are larger for the least energy efficient dwellings (overestimations by the models).
- Differences in energy savings results can be due to assumptions on behaviours, but also to performance gaps (e.g., defaults in installation).
- A complementary approach to correction factors would be to consider indicative values for key parameters (e.g., space heating demand, heating system efficiency) that would be differentiated by energy band of dwellings and/or by type of households.
- Implementing deep renovations for energy poor households is a difficult but essential task to really take them out of energy poverty.
- The literature shows that reducing energy poverty brings multiple benefits that are likely more than compensating the intervention costs. But building renovations may also have negative effects for tenants, in case of increase in the rent.
- Combining quantitative and qualitative methods provide complementary evidence to better understand the effects of energy efficiency interventions, especially about multiple impacts / benefits.

Interesting sources to look further

Table 10. Sources to look further about Energy efficiency measures to alleviate energy poverty.

Name of the source	Why it is relevant / interesting
Sunikka-Blank, M., & Galvin, R. (2012). Introducing the prebound effect: the gap between performance and actual energy consumption. *Building Research & Information*, 40(3), 260-273.	Paper defining the prebound effect

Chapter 13 Summary about the final dialogue meeting

The final Dialogue meeting aimed at providing a summary about what we learnt from the dialogue activities and the Capacity Support Facility, as well as at looking forward by discussing further types of energy saving actions in view of new energy savings targets

Figures about the final dialogue

- 43 participants to the final dialogue
- 5 external presentations: Çağatay Yılmaz (Research Institutes of Sweden), Václav Šebek and Jiří Karásek (SEVEn), Pr. Egbert Baake (Leibniz Universität Hannover), Sanjay Vermani (VITO/EnergyVille), and Gregor Thenius (Austrian Energy Agency)

Main issues discussed about further energy savings opportunities in buildings

Energy savings opportunities in data centres:

- Data centres are a major source of increase in energy consumption, targeted by the new Article 12 in the recast of the Energy Efficiency Directive.
- Significant energy savings can be achieved by applying a holistic approach to cooling management, and adapting cooling solutions to the shift from cloud computing to edge computing (i.e., with solutions for decentralized systems).
- Using waste heat from data centres is another major potential, that may require different technologies and approach according to the location, type of data centres, etc. Data centres can indeed be key components in electric and thermal microgrids.
- A comprehensive optimisation of energy efficiency in data centres requires tailored strategies, considering the specificities and opportunities of each case.

Energy savings opportunities in existing residential buildings:

- Most of the improvements made to buildings so far have been shallow renovations, while improvements reaching the deep renovation standards were a small share.
- Financial incentives now tend to prioritize renovation projects achieving at least 30% of energy savings or more, leaving untapped energy savings potentials as complementary renovation measures are then not eligible.
- Building renovation passports or other assessment tools or criteria could help implementing schemes that would address buildings where complementary measures would be relevant.

Titles of the presentations:

- *Achieving Sustainable Digitalization: Strategies for Energy Savings in Data Centres*, by Çağatay Yılmaz (Research Institutes of Sweden, project coordinator of the ECO-Qube project)
- *Complementary measures for building renovations*, by Václav Šebek and Jiří Karásek (SEVEn)

Main issues discussed about further energy savings opportunities in industry

About decarbonization of industrial heating processes:

- Two-thirds of industrial processes energy consumption is for heating, whose 80% still comes from fossil fuels: this a major energy and CO_2 savings' potential.
- The broad spectrum of temperatures and applications means distinct energy requirements and thereby solutions, sometimes already available, sometimes still needing research and development.
- Real-world examples already demonstrate the substantial energy and CO_2 savings from electro technologies that have higher efficiency than fossil fuel technologies.
- Heat pumps for industry can be used for higher temperature ranges, from 90 to 160 °C. This can achieve large energy and CO_2 savings, by integrating heat upgrade technologies in existing industrial processes. Demonstrations in real conditions are developing to assess feasibility and viability, as barriers are not technical only.
- Ongoing developments in using natural refrigerants aim at reducing environmental impact of heat pumps' refrigerants.
- A key issue when estimating savings for heat upgrade technologies is related to diverse nature of industrial installations. This can be addressed by classifying technologies by industry and using real-time monitoring data to improve accuracy.

Titles of the presentations:

- *Decarbonization of industrial heating processes using electrotechnologies: potentials and challenges,* by Pr. Egbert Baake (Leibniz Universität Hannover)
- *Deploying heat pump heat upgrading technologies: insights from PUSH2HEAT,* by Sanjay Vermani (VITO/EnergyVille)

Main issues discussed about further energy savings opportunities from modal shift to e-bikes

- Standardised calculation methods for mobility remain a challenge, with the exception of vehicle replacement (see e.g., case of electric vehicles covered in streamSAVE). Partly because the energy efficiency community has less experience in dealing with transport, compared with buildings or industry.
- The Austrian EEOS included a method for e-bikes, built on a previous method used for car replacement, and using information specific to e-bikes about average mileage, average specific energy consumption (kWh/100km), and a factor assessing the share of distances travelled with e-bikes that substitute the use of cars.
- This factor is the most challenging to assess, and is essential. As the electricity consumption used for distances travelled where there is no modal shift should be deducted from the energy savings calculated about the distances with modal shift.
- The method was little used, probably because the ratio of savings per action is much smaller than for other action types.
- The overall energy savings' potential from e-bikes cannot be assessed from the actions reported to the EEOS. A specific analysis considering various assumptions

about modal shift rates for different ranges of commuting distances found a potential of 124 GWh/year for the range with maximum effect (5 to 10 km). Which remains very small (0.04%) compared to the total national energy consumption.

Title of the presentation:

- *Assessing energy savings from policy measures promoting modal shift to e-bikes: the Austrian experience*, by Gregor Thenius (Austrian Energy Agency)

Chapter 14 Feedback about the second cycle of dialogue meetings

Feedback questionnaire done after each dialogue meeting

Similar to the first cycle, short online questionnaires were shared with participants after each dialogue meetings (still while the participants were connected to the Zoom client) to get feedback about their expectations and whether they were met. The main results from these short surveys are compiled below, comparing the answers received during the fourth series of meetings (Spring 2022), the third series of meetings (Autumn 2022) including the final Dialogue Meeting (May 2023).

Overall, the respondents were satisfied with the quality of the meeting organisation with the approval rate even increasing by the end of the series. This might be explained by holding the continuous meetings for two years in total with stakeholders getting accustomed to the format and content of the meetings.

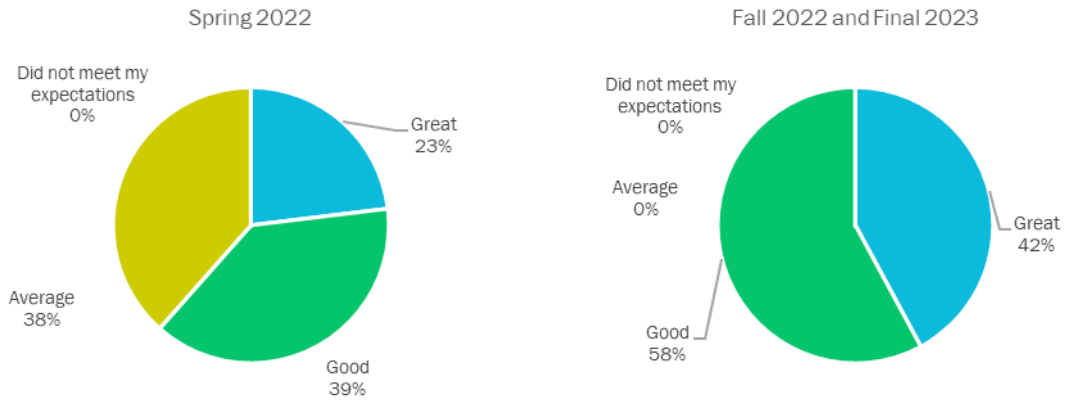


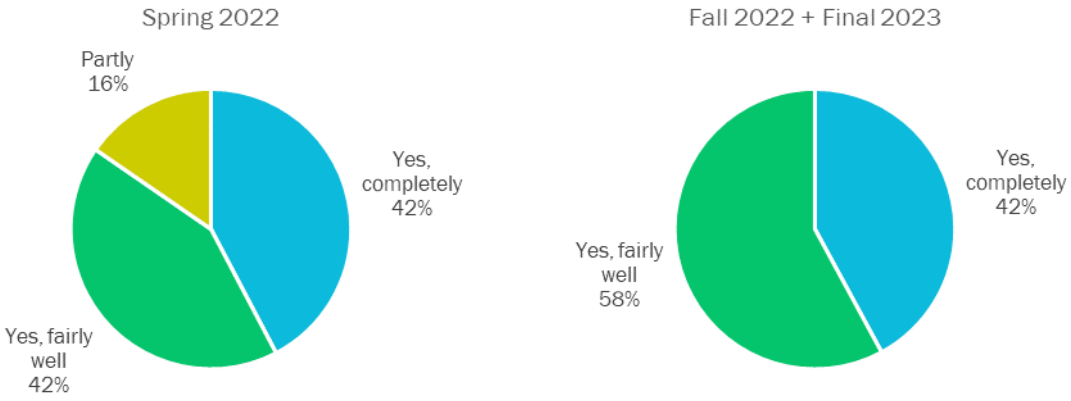
Figure 7. How do you rate the overall meeting organization (quality of the moderation etc.)?

Figure 8. What were your objectives for this meeting? (multiple choice possible)

The hierarchy in the objectives of the respondents remain the same between the Spring and Fall 2022 series of meetings. Respondents' main objective is to gain knowledge on issues related to savings calculations, which is in line with the main objective of the dialogue meetings. Participants are also interested in sharing experience (see response

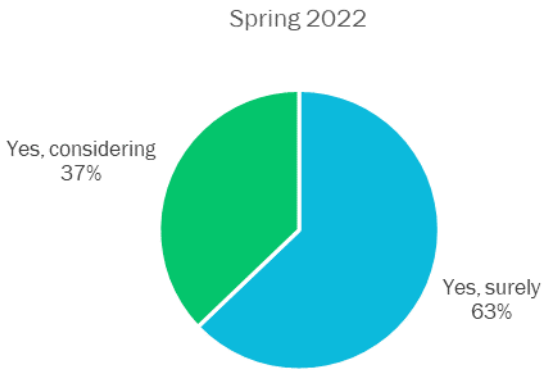
options “get knowledge about practices in other countries” and “get peers’ and experts’ views on issues I’m interested in”). The respondents were relatively less interested in giving their views on the streamSAVE methodologies. Participants’ priorities had not really changed between the first and second cycles of meetings.

Overall, almost all respondents considered that the meetings reached their objectives at least partly or even more for most of them. An improvement can also be seen in the answers of the 3rd series.



Note: no participant answered “1-not at all”, hence this option is not included here.

Figure 9. Did the meeting reach your objectives? (rate from 1-not at all to 5-yes, completely)



Note: Question on future participation has been omitted in the last round of meetings.

Figure 10. Do you plan to attend another streamSAVE meeting?

All respondent indicated their future participation on the meetings with two thirds signalling firm intent to show up, and more than a third considering participating. This trend has been confirmed by people actually participating the meetings. A targeted audience remained the same throughout the meetings and there emerged core participants taking part in each meeting.

Feedback from the general online survey about the first cycle of streamSAVE activities

Another general online survey was done in December 2022-February 2023 to collect feedback on the second cycle of streamSAVE activities (including, though not only, the dialogue meetings). One part of the survey asked questions explicitly about the Dialogue Meetings. Key answers are summarized below.

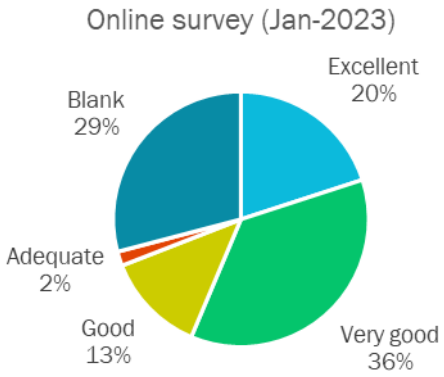


Figure 11. How do you rate the overal organisation of the dialogue activities (e.g. quality of presentations and moderation, invitations, level of interaction, duration & number of meetings)?

The answers about the overall organisation of the dialogue meetings are in line with the ones from the short feedback survey, with a very good rating and virtually no negative answer. Looking more in the details (see Figure 12 below), the respondents rated very positively the achievement of all main objectives of the dialogue meetings.

The rating is in particular very good for the objectives of providing a better understanding of key issues related to savings calculations, and a better knowledge on practices related to savings calculations in other EU countries in the context of the EED, similarly to the first round' survey. Both aspects are the dialogue meetings' primary objectives, that can then be considered met. The rating is slightly less but still very positive about getting peers' and experts' views on issues respondents are interested in.

Finally, the rating is more balanced about getting to know experts or other policy officers active in the topics that the respondents are interested in. This can be explained by the fact that the dialogue meetings are online meetings, that make new contacts less easy than in-person meetings. Still, even in this question, roughly two thirds of answers remain positive, being at least "good" or better.

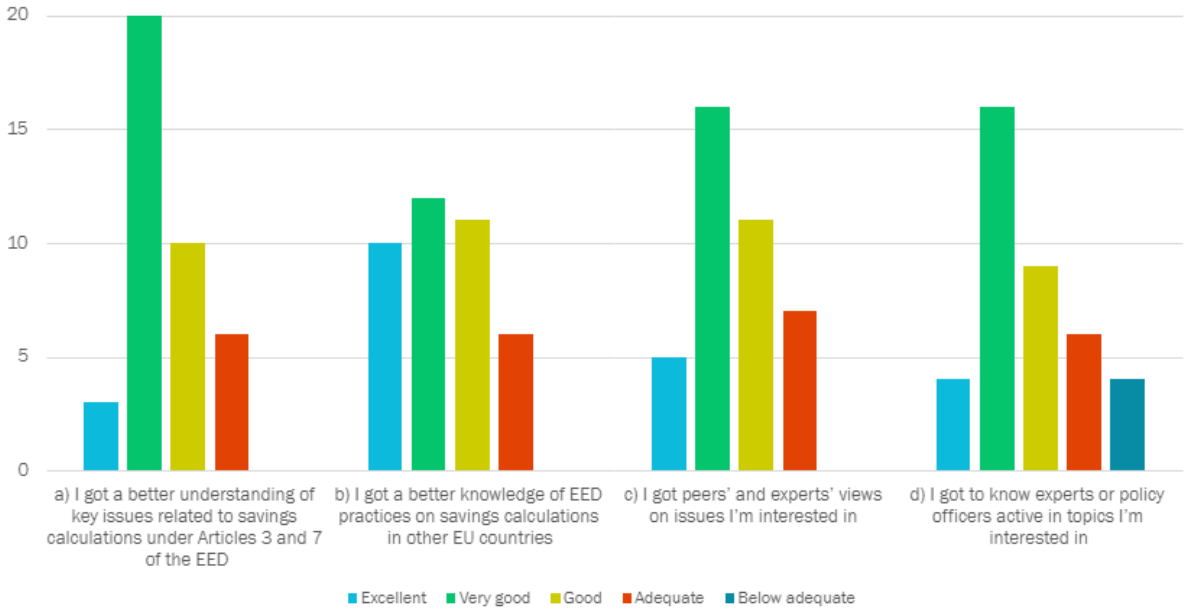


Figure 12. How would you rate the web-meetings' achievement of following objectives?

Conclusion

According to the feedback from the participants, the dialogue meetings have achieved their primary objectives, namely providing them with a better understanding of key issues related to savings calculations, and a better knowledge on practices related to savings calculations in other EU countries in the context of the EED.

This was achieved by a combination of presentations from the streamSAVE partners about the calculation methodologies developed within the project, and from external experts sharing their experience.

The discussions during these meetings highlighted key messages summarised below:

- The ten Priority Actions analysed in the two cycles represent significant energy savings potentials, and thereby opportunities to contribute to the targets of the EED.
- Knowledge and skills are essential to ensure that energy efficiency improvements are achieved as expected. Likewise, for developing calculation methods. The calculation methods can, for example, build on the knowledge and experience of energy efficiency experts (e.g., energy managers or auditors).
- Specific data are sometimes easily available at the project level, either due to the technology itself (e.g., BACS) or because the data are needed for other purposes than savings calculations (e.g., monitoring of public lighting or industrial processes including motor systems). These specific data can then be used directly by the project holder (e.g., to assess cost-effectiveness). However, it might be difficult or costly to collect specific data from a large number of projects for the monitoring of a national energy efficiency scheme.
- Offering alternatives (deemed, scaled or metered savings) can provide flexibility for project holders to report data in a cost-effective manner, while taking into account what is monitored and assessed anyway (e.g., for feasibility studies).
- Deemed savings and scaled savings have both pros and cons. Collecting data specific to each savings project increases the reliability of energy savings (e.g., when using scaled savings from energy audits or alike). But simplified methods with indicative values are useful to monitor schemes dealing with large number of projects/actions.
- Developing a simplified calculation methodology requires defining well its scope.
- Ecodesign regulations and EPBD provisions are important to take into account in the calculation methods, especially for defining the baseline in the context of the EED.
- Availability of indicative values varies according to the action types. Indicative values can be defined at EU level for most of the Priority Actions covered in streamSAVE, providing a first benchmark. However, it is recommended to use national data whenever possible, especially for parameters that may vary significantly from one country to the other (e.g., share of BAC classes in the building stock for BACS; distances travelled for transport actions; electricity mix when calculating primary energy or CO_2 savings). When these national data are not available, this might require doing surveys or other assessments.
- Likewise, projects in the industry are sometimes complex and require specific data to calculate savings. A standardized method then helps to ensure that the calculations are done in line with the rules set in the scheme it is reported to.

- Setting conservative values of deemed savings can be a way to encourage the use of standardized methods fed with data specific to the energy efficiency projects, at least if these can be easily collected (e.g., for road lighting projects or electric motors).
- Deemed savings might need to be differentiated according to sub-sectors (e.g., in services) or sub-types of actions (e.g., for refrigeration or heating systems), when significant differences are observed. A set of deemed savings can then be used to provide a standardised way to monitor energy savings while reflecting variations according to key parameters that can easily be reported by stakeholders.
- Special cases might require slight adaptations to the calculation formulas (e.g., new lighting points for road lighting; early replacements for electricity vehicles).
- Reliable data on costs are difficult to identify or access. The indicative cost values included in the streamSAVE methodologies provide a general benchmark, but should not be used for a particular case (e.g., for feasibility studies).
- Uncertainties in key parameters (e.g., energy prices) can have a major influence on the cost-effectiveness of energy efficiency projects.

The calculation methodologies for the 10 Priority Actions (cf. Guidance) have been tested in country cases. They can be used directly from the streamSAVE Training Module.

The proceedings of all the dialogue activities are available on the streamSAVE platform, where contents can be filtered per type of Priority Action. The table below provides the whole list of external presentations made in the dialogue activities.

Table 11. Full list of external presentations done during the dialogue activities

Priority Action	External Presentation	Speaker
BACS	French standardised calculation methods for energy savings from BACS	Hadrien Serougne, ADEME (France)
	Insights on the BAC classes	Bonnie Brook, eu.bac
Heat recovery	Savings calculation for heat recovery in industry to supply another site – a best practice example from Austria	Johann Geyer, ENERTEC (Austria)
Commercial and industrial refrigeration systems	Calculation methods for refrigeration systems in the French white certificates scheme	Jean-Sébastien Broc, IEECP (with inputs from ADEME and ATEE)
Electric vehicles	Well-to-Wheels analysis of future automotive fuels and powertrains in the European context	Matteo Prussi, DENER - Politecnico di Torino (Italy)
	How to notify article 7 energy efficiency savings conform to Annex V: introducing EVs in the federal car fleet (Belgium)	Niels Smeets, Federal ministry of economy (Belgium) and Kelsey van Maris, VITO
Road lighting	Monitoring and verification of energy savings due to renovation of outdoor lighting systems – case study Slovenia	Dr. Boris Sucic, Jozef Stefan Institute (Slovenia)
Accelerated motor replacement	Electric motor systems detailed in Dutch energy savings policy	Maarten van Werkhoven, TPA adviseurs (the Netherlands)

Priority Action	External Presentation	Speaker
	Energy savings in motor systems – experience from Switzerland	Rita Werle, Impact Energy (Switzerland)
Behavioural changes	Methodology to assess the impacts of behavioural changes from the NUDGE pilot projects	Dr. Stratos Keranidis, domX (Greece)
	US experience with measuring energy savings from behavioural programmes	Adam Thomas, ADM Associates (US)
EE actions alleviating poverty	Energy poverty quantitative measurement: methodology and case studies in Italy	Anna Realini, RSE - Ricerca sul Sistema energético (Italy)
	Modelling real world energy savings in UK policy appraisal – challenges and potential approaches	Avishek Banerjee, BEIS – Department for Business, Energy and Industrial Strategy (UK)
	Insights from the National research program on energy poverty in the Netherlands	Anika Batenburg and Arianne J. van der Wal, TNO (the Netherlands)
	The French framework on energy efficiency measures for energy poverty alleviation	Ute Dubois, ISG International Business School (France)
	Challenges in monitoring and assessing impacts of energy efficiency measures to alleviate energy poverty	Katarina Trstenjak, Jozef Stefan Institute (Slovenia)
	Assessing and comparing the impacts of measures to reduce energy poverty: results from the EmpowerMed project	Mariana Jiménez, Catalonia Energy Research Institute (Spain)
	Impacts from overcoming challenges in household energy data collection - insights from the EnergyMeasures project	Niall Dunphy, University College Cork (Ireland)
Modal shift for freight transport	Calculation methods about modal shift for freight transport – Examples from the French white certificates scheme	Caroline Meunier, Total Energies (France)
	Opportunities and impacts of developing modal shift for freight	Conor Feighan, European Rail Freight Association
	The example of the Ferrobonus and Marebonus programmes in Italy	Maria Lelli, ENEA – Italian Agency for New Technologies, Energy and Sustainable Economic Development
	Discussing options to reduce the energy consumption and GHG emissions from road freight	James Nix, Transport & Environment
Small-scale RES for heating	Insights from the 'REPLACE your Heating System Calculator'	Tadeja Janša and dr. Gašper Stegnar, Jožef Stefan Institute (Slovenia)
	Example of the calculation methods for heat pumps used in Greece	Christos Tourkolias, CRES (Greece)

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