stream SAVE

Streamlining energy savings calculations

Outcomes and lessons learned

Coordination and Support Action H2020-LC-SC3-EE-2019

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About the project
streamSAVE is a Horizon2020 that aims to streamline energy savings calculation methodologies under Article 3 and 7 of the Energy Efficiency Directive. The project brings together public authorities, technology experts and market actors to foster transnational knowledge exchange on technical priority actions across Europe

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Based on deliverables produced within streamSAVE project by all partners

Learn more
https://streamsave.eu/

Introduction

About streamSAVE

Energy efficiency is one of the five key dimensions of the Energy Union, and consequently of the Member States' National Energy and Climate Plans. The Energy Efficiency Directive (EED) sets the 2020 and 2030 energy efficiency targets and a series of measures that contributes to their achievement within the Union. The streamSAVE project streamlines energy savings calculations and provides the support needed to increase Member States' chances of successfully and consistently meeting their energy efficiency targets. The streamSAVE project specifically focuses on Article 3 and 7 of the EED - becoming Article 4 and 8 under the EED recast - which are devoted to energy efficiency targets and national energy savings obligations, respectively.

Given the importance of deemed savings approaches in Member States' EED reporting, streamSAVE focuses on streamlining bottom-up calculations methodologies of standardized technical actions. These methodologies are meant to make it easier for Member States to integrate these actions into policy measures. streamSAVE offers these savings methodologies in a transparent and streamlined way, not only to improve the comparability of savings and related costs between Member States (MS), but also between both EED articles. The savings actions are targeted to those measures with high energy saving potential and considered as priority issues by Member States, the so-called Priority Actions.

More broadly, the project aims at fostering transnational knowledge and dialogue between public authorities, technology experts, and market actors. The key stakeholders will improve their energy savings calculation skills and ensure thus the sustainability and replicability of the streamSAVE results towards all European Member States.

Now: Article 3 and 7 under EED 2018/2002/EU - New: Article 4 and 8 under the EED recast

The EU energy efficiency directive (EED) was originally adopted in 2012 to help the EU and its Member States make energy efficiency improvements of at least 20 % by 2020. The EED places an upper limit on total EU energy consumption and includes a series of provisions to help Member States collectively meet this goal. The EED was revised in 2018 to deliver on the EU objective of at least 32.5 % energy efficiency improvements by 2030 compared with levels projected in the European Commission's 2007 baseline scenario[1]. Under Article 3 of the EED, EU countries set their own national non-binding contributions for energy efficiency for 2030. These targets can be

1 https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energy- efficiency-directive_en

based on primary or final energy consumption, on primary or final energy savings, or on energy intensity. The EED requires, however, that when doing so, Member States also express those targets in terms of absolute levels of primary and final energy consumption.

To support the achievement of these targets, Article 7 of the EED requires Member States to achieve cumulative energy savings over 10-year periods. For the period 2021-2030, this target was set as yearly, new energy savings of 0.8 % of Member States' final energy consumption averaged over 2016-2018. Member States can meet their target through an energy efficiency obligation scheme (EEOS) (Article 7a) and/or alternative measures (Article 7b). Under an EEOS, obligated parties must undertake measures to improve energy efficiency for final consumers. Member States may also implement alternative policy measures which reduce final energy consumption, for example fiscal measures; financial incentives; regulations or voluntary agreements; national energy efficiency funds; and information measures. Annex V of the EED provides methodological options for calculating energy savings under Article 7, including the use of "deemed savings, i.e., by reference to the results of previous independently monitored energy improvements in similar installations". Deemed savings account for a significant portion of reported savings under Article 7 and offer a practical approach to minimize administrative burden, provide prompt feedback, and ensure stakeholder visibility, particularly for efficiency measures with straightforward impacts.

By the Fit-for-55 Package, the EU Green Deal incentivises more efforts on energy efficiency, so the updated 2030 emissions reduction target of net 55 % compared to 1990 levels – previously 40% - can be reached. In the REPowerEU plan, presented in May 2022, the Commission proposed to raise the ambition further to reduce the EU's reliance on fossil fuel imports from Russia.The EED recast 2023/955 has been adopted in July 2023, which sets an 11.7 % reduction in EU energy consumption in 2030 compared to the 2020 reference scenario projections. To reach the EU target, countries can establish indicative national contributions, as stipulated in Article 4 of the EED recast[2] following the calculation principles set in Annex I of the EED recast. According to Article 8, Member States shall achieve increased, annual energy savings of 1.5 % on average until 2030, starting with 1.3 % until 2025 and progressively increasing to 1.9 % by the end of 2030[3] [4].

2 *In this report, the numbering of the EED 2018/2002/EU Articles is kept as it was until June 2023, as streamSAVE was running under this EED version. The corresponding articles: Article 3 in 2018/2002/EU becomes Article 4 under the EED recast, Article 7 becomes Article 8 ; Article 7a will be Article 9 and Article 7b will be Article 10.*

3 *https://www.consilium.europa.eu/en/press/press-releases/2023/07/25/council-adopts-energy- efficiency-directive/*

4 *https://data.consilium.europa.eu/doc/document/PE-15-2023-INIT/en/pdf*

streamSAVE's impact in numbers

Each streamSAVE' activity – Knowledge Facility, dialogues, Capacity Support Facility - resulted in impactful progress in Member States' capacity to report and implement energy efficiency policies in frame of the Energy Efficiency Directive.

200 stakeholders involved in the streamSAVE community, which are mainly public authorities

350 unique participants took part in the 20 dialogue web-meetings & workshops to improve their knowledge on deemed savings methodologies of all 10 Priority Actions

40 public officers participated into capacity support activities in 10 consortium Member States and 3 replication countries

30 energy efficiency policies are (likely) improved across the 10 partner countries and 3 replication countries

700 downloads and online completions of the streamSAVE calculation templates on the Training Module of the streamSAVE platform

How to learn more on savings calculations for the 10 Priority Actions?

What is the status of deemed savings methodologies in Europe?

Mapping and describing the existing deemed savings methodologies as applied by Member States in terms of end use and sectoral coverage helps to understand the gaps that still remain. An extensive collection of existing bottom-up methodologies can be consulted.

- Status of energy savings calculations for priority actions in European countries, **Deliverable D2.1**

How to estimate deemed savings & cost effectiveness? Which indicative values to use?

Sixteen new bottom-up saving methodologies featuring indicative calculation values, data on costs and estimations of GHG emission reduction are developed for the 10 Priority Actions. A clear guidance is included for each methodology which enables Member States to estimate the monitored or ex-ante final and primary energy savings. This guidance offers the flexibility to utilize EU-wide averages or adapt values to their national context.

- Practical guidance on additional calculation methodologies, complemented with indicative values, **Deliverable D2.2**
- streamSAVE platform: Discover and practice the streamSAVE methodologies, **https://streamsave.flexx.camp/training** (after registration)

What can be learned from knowledge exchange on existing practices?

Dialogue groups of experts and policy officers from EU Member States have been formed to share experiences and discuss savings calculations for each Priority Action. streamSAVE facilitates these exchanges through dialogue meetings, an online forum, and summarizing key lessons learned from the discussions.

- Overall synthesis of peer-to-peer dialogue activities, **Deliverable D3.4**
- streamSAVE Forum: sharing experiences & dialogue proceedings, **https://streamsave.flexx.camp/forum**

What are the improvements & challenges when implementing deemed savings methods in EU countries? How to maximize streamSAVE's support in EU countries?

streamSAVE provided one-to-one technical support to Member States, assisting them in energy savings calculations for the various Priority Actions. This support involves applying and validating the streamlined bottom-up calculation methodologies and associated indicative values in real-case policies. By improving stakeholders' energy savings calculation skills, streamSAVE aimed to ensure the sustainability and replicability of its results across all European Member States.

- Outcomes and Impact of the Capacity Support Facility, **Deliverable D4.3**
- How to apply streamSAVE's outcomes in your country: Training material and replication guidance, **Deliverable D4.5** and **Deliverable 4.6**

Building Automation and Control Systems (BACS)

What is BACS?

Building Automation Control Systems (BACS) and Building Energy Management Systems (BEMS) — made up of hardware and software — enable automatic controls, monitoring, optimisation, and management to achieve the energy-efficient operation of technical equipment, such as heating, cooling, ventilation, hot water, lighting and electricity production within buildings.

What is the status of deemed savings methodologies in Europe?

Despite the significant interest in deemed savings methodologies for BEMS/BACS, the availability of such methodologies in Europe is relatively limited. Furthermore, there is ambiguity in the use of the terms BEMS and BACS, as there are multiple definitions and approaches applied for BACS. In the case of streamSAVE, EN ISO 16484 was chosen as the reference standard, and a review identified six savings methodologies currently in use across EU countries for the installation of the following BEMS/BACS related technologies.

- Automation and heating control systems in residential buildings
- Energy-efficient management system at a distribution station
- Heating system regulation equipment
- Automatic regulation of lighting systems
- Equipment for automatic regulation of electricity consumption
- Automation and heating control systems & hot sanitary water in residential buildings

How to estimate deemed savings & cost effectiveness? Which indicative values to use?

The streamSAVE methodology can be used to evaluate savings generated by the installation or upgrade of BACS in residential and non-residential buildings. It encompasses a range of end-uses including heating, cooling, domestic hot water, ventilation and lighting. The calculation relies on the utilization of BACS factors defined in EN 15232, ensuring a standardized and reliable calculation of energy savings.

To calculate the energy savings, the total floor area of the building and the original final energy consumption of the respective end-use have to be provided, next to the efficiency class of the BAC system before and after implementation. To account for climate differences, a correction factor for three European regions (North, West, South) is prepared. Additionally, the calculation formula offers the possibility to account for behavioural effects. Indicative values are prepared for the specific final energy consumption, as well as the BACS factor per end-use before implementation (based on the IDEES database and the Ecodesign preparatory study for BACS), the factor for climate correction (based on the Ecodesign preparatory study for BACS) and – for some end-use areas – the factor on behavioural effects (based on various studies). The total floor areas of the buildings equipped or upgraded have to be entered depending on the action implemented. Information on the cost effectiveness relies mostly on cost data of the main components (hardware & software) of a BAC system, as well as installation cost. streamSAVE provides cost data per m^2 of total floor area, to allow for scaling the costs to the actions implemented easily. The indicative values cover class C and class A BACS for the multiple building types (based on the Ecodesign preparatory study for BACS).

What can be learned from knowledge exchange on existing practices?

BACS system can offer significant and cost-effective energy savings, which is why the amending EPBD 2018/844 includes new provisions on BACS. Improving the control and maintenance related energy use in buildings could represent energy savings potentials up to 30%, according to eu.bac. However, there is no comprehensive data source available to determine the existing proportion of BACS classes in each Member State's building stock. Nevertheless, streamSAVE provides indicative values for three EU regions: North, West, and South. National surveys might be required to establish a more accurate baseline, as applied in France for example. The EPBD provisions impact the minimum baseline to be used for Article 7 savings from 2025, as explained in the streamSAVE methodology.

Due to the diversity of the non-residential sector, deemed unitary savings for BACS should be differentiated according to sub-sectors, which can be challenging. While deemed savings can be helpful for monitoring energy savings from BACS in large policy initiatives like EEOS, it is advisable to utilize measured data at the project level. This ensures better accuracy and effectiveness.

What are the improvements & challenges when implementing deemed savings methods in EU countries?

The streamSAVE methodology brought about a significant improvement in estimating deemed savings by focusing on ensuring compliance with Article 7 of EED (or Article 8 of EED recast) and the availability of indicative values. This, in turn, highlighted the added value of the BACS methodology, which provided insights into the BAC system both before and after implementation, applicable to both new installations and upgrades. Compliance with the provisions of the EPBD was also taken into consideration, further enhancing its effectiveness.

However, adapting the BACS methodology to national circumstances for non-residential buildings proved challenging due to the lack of standardized calculation values for total floor area and final energy demand in the tertiary sector. Despite the increasing digitalization of buildings, the collection and assessment of monitored data remained significant bottlenecks to calculate savings. The scarcity of quality data further compounded the challenge, making it imperative to improve accessibility to existing data sources that are currently not easily obtainable. Enhancing the implementation and effectiveness of the BACS methodology necessitates the development of specialized data collection procedures, allowing for the acquisition of national reference values. To further advance, it is crucial to address additional technical issues, including the calculation of lifetime and cumulative energy savings. Additionally, implementing appropriate documentation to verify achieved energy savings while avoiding double counting becomes paramount in ensuring accurate and reliable results. By tackling these challenges, the BACS methodology can continue to progress and contribute to more effective energy savings estimations.

Heat recovery (district heating and excess heat from industry)

What is heat recovery?

Heat recovery is the process of using waste heat from industrial processes that would otherwise have been lost. Recovered heat is used to increase the temperature of water – conventionally heated by a fuel-powered boiler or furnace – before it is fed into an industrial process or district heating grid.

What is the status of deemed savings methodologies in Europe?

Member States apply various bottom-up methodologies for estimating savings from heat recovery in varied segments of an industrial process. This includes methods for compressed air systems (Bulgaria, Luxembourg), furnaces and (condensing) economizers (Bulgaria, Luxembourg, France), and cooling units and towers (Bulgaria, France). Additionally, other methodologies, such as those from Cyprus and Slovenia, provide general calculations for heat recovery system installations. The calculation formulas either compare the final energy consumption before versus after the installation of heat recovery; or they incorporate a savings factor or percentage of heat recovered by applying it to the installed power and operating time (final energy consumption).

How to estimate deemed savings & cost effectiveness? Which indicative values to use?

There is a wide spectrum of heat consuming applications in industry that are suitable for heat recovery actions. streamSAVE prepared the following three methodologies:

- Heat recovery for on-site use in industry - feedback of excess heat into a process (reducing the overall final energy input needed for the process)
- Heat recovery for on-site use in industry - use of excess heat for on-site applications (e.g., the heating system of office buildings or other industrial processes on-site)
- Heat recovery for feeding into a district heating grid (reducing the final energy consumption of buildings connected to the grid by using more efficient heating)

Calculation requirements vary depending on the methodology, such as providing final energy consumption of the process before and after implementation, or the amount of excess heat recovered. Normalizing energy consumption requires the production output when feeding back into the same process. When used for on-site applications or district heating grids, information on the efficiency of pre-existing heating systems is necessary. For district heating, additional information should be included, like heat losses in the grid, factors related to external incentives and changes in user behaviour.

Since industrial processes with a potential for excess heat recovery are heterogeneous, no standardized, indicative calculation values are provided. Instead, guidelines for the acquisition of appropriate data are provided. However, for district heating, indicative values are prepared for the heat losses of the heating grid, the efficiencies of different heating systems and the effects of behavioural changes. Those values are based on Eurostat data as well as the IDEES database, next to other studies.

The costs of implementing an action in the area of heat recovery may vary significantly. However, the methodologies list the most important components usually needed and rather broad ranges of total investment costs per kWh of recovered heat (taken from an Austrian benchmarking programme for industry sectors). For district heating, the costs for final customers (replacement and operational cost of the heating system) are provided as well, which are based on the Austrian annual study comparing costs of heating systems ("Heizkostenvergleich").

What can be learned from knowledge exchange on existing practices?

Heat recovery in industry represents significant potentials of final energy savings. Amending the EED 02018/2002/EU has made that only small final energy savings from district heating can be reported to Article 7. But heat recovery for district heating still provides large primary energy savings for Article 3, next to reductions in GHG emissions.

As covered by the three streamSAVE methodologies, it's essential to precisely define the scope for the savings calculations which depends on the case of application. The scope influences, for example, the way ancillary electricity consumption (e.g., circulation pumps) is taken into account. Projects in industry are sometimes complex and require specific data to calculate savings. Meters or other measurement devices might already be in place for other purposes (e.g., safety, optimisation), thereby providing data at no additional cost, as demonstrated by the Austrian example.

What are the improvements & challenges when implementing in EU countries the streamSAVE guidelines to estimate savings?

The streamSAVE guidelines for the metering of appropriate data is perceived as a viable approach. However, there's a strong preference for deemed saving methods to reduce administrative load and simplify energy savings calculations. Policy officers acknowledge that their implementation poses a challenge due to the difficulty in setting indicative values given the high diversity in industrial processes. Additionally, a scaled method that uses engineering estimates to calculate energy savings could be a potential alternative.

Regardless, the streamSAVE bottom-up calculation methodology offers valuable insights on different technical aspects, such as calculating final energy consumption before and after an intervention. During streamSAVE's support, there was increased interest in understanding the required control and verification procedures, especially those related to metering systems specifications to estimate final energy consumption before and after the installation of heat recovery technologies.

Commercial and Industrial refrigeration

What is commercial and industrial refrigeration?

Commercial and industrial refrigeration systems involve process cooling, performed by a chiller, in which the temperature of a space, product or process is mechanically reduced. Process chillers within a refrigeration process or appliance are primarily intended to cool down and continuously maintain the temperature of a liquid using a vapour compression cycle, rejecting the heat into the air (air-chiller) or ambient water (water-chiller).

What is the status of deemed savings methodologies in Europe?

Commercial and industrial refrigeration systems are not well covered by existing bottom- up methodologies. The Austrian and MultEE methodologies are the only methodologies covering the streamSAVE scope of centralized commercial and industrial refrigeration systems, and having indicative values available. In these methodologies, the annual cooling requirements, based on the European Seasonal Energy Efficiency Ratio (ESEER), are crucial to determine energy savings.

How to estimate deemed savings & cost effectiveness? Which indicative values to use?

The methodology prepared by streamSAVE focusses on the energy savings of newly installed and electrically operated industrial air- and water-chillers. Systems for air conditioning are not covered. It complies with the minimum standards as defined in the EU's Ecodesign Directive. Savings are calculated based on the installed cooling power of the system, the full-load hours and the difference in the Seasonal Energy Performance Ratio (SEPR) of the system before and after implementation. Additionally, it is possible to account for changes in user behaviour or other rebound effects.

Indicative values are provided for the SEPR values of air- and water chilled refrigeration units and are based on minimum standards defined in the Ecodesign Directive (baseline situation) and market averages of the units currently available (after implementation). Data on the installed cooling power and full load hours has to be provided depending on the action implemented. No specific user behavioural change has been observed in commercial and industrial applications; therefore, no indicative value is provided.

Data on cost effectiveness consists of investment costs, variable operating costs and repair and maintenance costs. The indicative cost values are based on the Ecodesign Directive preparatory studies.

What can be learned from knowledge exchange on existing practices?

In both the industrial and service sectors, refrigeration systems hold significant potentials of final energy savings, as demonstrated by the outcomes of the French white certificates scheme. Using a set of deemed savings offers a standardized approach to monitor energy these savings, while accommodating variations based on key parameters that stakeholders can readily report. The indicator to assess the efficiency of these cooling systems is either SEER (Seasonal Energy Efficiency Ratio) or SEPR (Seasonal Energy Performance Ratio), which should be aligned with the type of system and the stipulations of the Ecodesign regulation (EU) 2016/2281. It's imperative for Member States to ensure their methodologies are up-to-date in this regard.

To provide context on potential investment, indicative cost values can be presented in absolute terms, offering a broad project cost estimate, or in relative metrics, such as cost per kW of capacity, as the capacity and size have a strong impact on investment cost. Nevertheless, while these cost values serve as a general guideline, they shouldn't be used for specific cases.

Electric vehicles (private & public)

What are electric vehicles?

Electric vehicles (EV) — such as two-wheel vehicles, cars, trucks, buses, trains, ships and airplanes — use electricity to power their motors. While hybrid models only partially depend on electricity, electric vehicles are fully dependent. Charging infrastructure consists of public and private systems of stations established to recharge these vehicles.

What is the status of deemed savings methodologies in Europe?

Several Member States, like Austria, Croatia, Cyprus, Greece, Luxembourg and Slovenia, have developed methodologies to calculate savings from purchasing alternative vehicle technologies. The method typically considers factors such as the number of vehicles, the energy consumption difference between the reference and efficient vehicles, and yearly mileage. Adjustments for behavioral effects and the lifetime of savings are also factored in.

How to estimate deemed savings & cost effectiveness? Which indicative values to use?

The methodology focuses on fuel switching between conventional and electric (hybrid) vehicles, covering cars, vans, buses, and trucks. The conventional options include vehicles using diesel, petrol and LNG, as well as hybrid options. It calculates the energy consumption difference between a reference vehicle and a more efficient one, using specific energy consumption values (kWh/100 km) multiplied by the average, yearly distance travelled. This approach accommodates hybrid options and different vehicle types. The methodology also considers behavioural factors like rebound and spill-over effects.

The indicative values for the specific energy consumption of the reference vehicles were derived from European CO_2 emission performance standards 2020-2030 for cars and vans. Efficient vehicle energy consumption values were based on typical electricity usage of battery electric vehicles from sources like JEC Tank-To-Wheels and EV-database (2021). In addition, the indicative distance travelled was assessed using EU-27 road traffic statistics by vehicle type (in million vehicle-kilometres; based on Eurostat) and vehicle numbers by type (based on ACEA).

Transitioning to electric vehicles entails costs beyond the initial vehicle investment, including operating (fuel consumption) and maintenance expenses. Indicative average values for these costs were obtained from various online vehicle databases that compare different conventional and EV options.

What can be learned from knowledge exchange on existing practices?

Using indicative values as baselines would streamline calculations, as the European CO_2 emission standards provide a common basis. It would also ensure compliance with the additionality requirement for Article 7 of the EED. The use of national data, especially parameters like distances travelled or emission factors, is preferred for its accuracy. Moreover, the choice of how the electricity mix is approached, such as using average or marginal emission factors, significantly influences CO_2 savings estimates. However, beyond the scope of the EED, it's essential to use a spectrum of indicators when evaluating transport technologies since one parameter cannot capture all relevant impacts. It is also important to specify the cycle considered, i.e., whole lifecycle, well-to-wheel or tank-to- wheel. The charging losses should, for example, not be neglected.

There's potential for evaluating indicative values concerning behavioural impacts, like if the usage of electric vehicles correlates with shorter distances travelled. The savings associated with charging infrastructures aren't included in the streamSAVE methodology due to the impending Alternative Fuels Infrastructure Directive that could affect the Article 7 EED compliance (additionality).

In case of schemes promoting early replacement (scrappage schemes), it is possible to use a staircase approach considering two different periods, i.e., before and after the early replacement, reflecting each a different energy consumption for the reference vehicle, the replaced vehicle and the average from the market, respectively. Lastly, the costs when comparing vehicles should be based on the TCO (Total Cost of Ownership), factoring in taxes, insurance, and fuel costs among others. However, determining European average values is challenging given the strong country-to-country differences.

What are the improvements & challenges when implementing deemed savings methods in EU countries?

There is a strong need for a standardized data collection procedures for estimating energy savings achieved through the promotion of electric vehicles. Current data sources lack robustness and accessibility, and hence, the development of a precise and independent monitoring and verification structure should be encouraged using the streamSAVE calculation methodology. Additionally, a comparative study will be helpful to understand the differences and similarities in practices across Member States.

Comparing the savings derived from the streamSAVE method with national methods offers insights into their reliability and accuracy. Any significant differences require further investigation to identify the contributing parameters and to select the most effective approach.

In addition, more focus should be placed on adhering to the additionality criterion to the Clean Vehicle Directive and evaluation of savings from soft modes of transport. Discrepancies between the actual and theoretical lifetimes (as specified in the respective legislative framework) of vehicles needs further examination. Finally, the inclusion of CO_2 emission reductions in the streamSAVE methodology offers a new perspective on policy effectiveness, aiding the transport sector's transition towards carbon neutrality.

Lighting systems and public lighting

What is public lighting?

Lighting systems use both artificial light sources like lamps, luminaires and light fixtures, as well as natural illumination by capturing daylight, using windows, skylights or light shelves to achieve practical or aesthetic effects. Proper lighting can enhance task performance, improve the appearance of an area and increase security. Public lighting refers to lighting systems that light up outdoor environments.

What is the status of deemed savings methodologies in Europe?

Lighting is one of the actions where most European countries have developed several methodologies. These bottom-up methodologies encompass nearly all sectors, such as street lighting, traffic lighting, industrial lighting, building lighting and residential lighting. The calculation formulas are based on the quantity of lighting points or lamps, the power difference between inefficient and efficient technologies, and the total annual operating hours. The baseline consumption is estimated by using the power of the installed lighting points/lamps and the annual operating hours. This necessitates access to the specific characteristics of the installed technologies.

How to estimate deemed savings & cost effectiveness? Which indicative values to use?

The streamSAVE methodology focuses on achieving energy savings through the replacement of existing road lighting systems with more energy-efficient technologies. This includes the substitution of old light sources with new, efficient LED light sources, as well as the integration of lighting control technologies.

Two different formulas can be used, depending on the availability of data. The “project- based approach” is more detailed, but more data has to be provided specific to the project implemented to calculate the resulting savings. The “simplified approach” can be used in the case of lower data availability and when an equivalence between the power of the existing and the new light points needs to be assumed. Both formulas calculate the savings based on the number of light points in the system, the difference in energy consumption or installed power per light point, the annual operating time and factors to account for the installation of lighting control systems. Indicative values for the simplified approach are available for the different lighting technologies and installed powers of new and old lamps. Factors to account for the effect of light control systems and full load hours are available for both approaches. Minimum standards for lamp efficiencies are defined in accordance with the Ecodesign Directive. Standards for light control systems were taken from multiple existing bottom-up methodologies in EU Member States as well as taking into account the indication on the EU GPP technical specification core criteria TS3 for minimum dimming performance. The total annual operating hours are based on the globally accepted value of 11 hours per day.

Data on cost effectiveness consists of investment costs, variable operating costs and repair and maintenance cost. The indicative cost values are based on the European project Streetlight-EPC.

What can be learned from knowledge exchange on existing practices?

Offering the choice between deemed savings and scaled savings allows project holders a flexible, cost-effective manner for data monitoring & reporting. Given the challenges of gathering detailed, local data on a national scale, the aim is to present methodologies that rely on readily accessible and easily collected data. In this framework, the provision of indicative values becomes valuable, notably regarding energy savings for different lighting sources and their dimming effects. Using conservative, deemed savings values can motivate the use of standard methods when specific project-related data can be easily collected, as seen in practices like those in **Slovenia**. For unique cases like new lighting installations in newly developed areas (e.g., new roads or districts), specific calculation formulas or guidelines might be essential. It's also worth noting that uncertainties in factors like electricity pricing for road lighting can significantly impact the economic viability of energy efficiency projects.

The methods for calculations can build on the expertise of energy efficiency specialists, such as energy managers or auditors. Their knowledge and skills are pivotal not only in achieving the energy efficiency improvements as expected, but also in developing these calculation methods.

Accelerated motor replacement

What is accelerated motor replacement?

Electric motors are big consumers of electricity as they are used to convert electrical power into mechanical power for many applications (e.g., pumps, fans, compressors, material movement and processing). This means that even a small improvement in efficiency translates into very large absolute savings. As the replacement rate for old, inefficient motors is much longer than their expected lifetime, encouraging their renovation through policy incentives is highly desirable.

What is the status of deemed savings methodologies in Europe?

Recognizing the significance of energy consumption in motor systems has promoted the implementation of various measures targeting electric motors. Consequently, numerous Member States now have methodologies for calculating energy savings derived from the replacement of electric motors. This holds true for Austria, Bulgaria, Croatia, Hungary, Ireland, Italy, Luxembourg, Portugal, and Slovenia. The calculation considers factors such as the power of the installed motor, its annual operating hours, the average load factor, and the efficiency differences between the old and new motors.

How to estimate deemed savings & cost effectiveness? Which indicative values to use?

The methodology developed deals with the replacement of existing motors (having an International Efficiency IE2 standard or below) to more energy efficient technologies (IE3 or above) before the end of their lifetime. It provides formulas for the calculation of energy savings of the implemented measures that account not only for the replacement of existing motors in fixed speed applications, but also for the installation of Variable Speed Drives (VSDs) in applications where the motor speed and torque need to be adjusted based on the demand.

The calculation of energy savings is based on the power of the replaced motor, the annual operating hours, the load factor and the comparison of the efficiency of the motor before and after replacement. Additionally, a factor for the installation or a variable speed control (VSD) can be applied. Indicative calculation values are available for the load factor (based on a study which collected data on the EU-15 motor stock and the U.S. Industrial and Commercial Motor System Market Assessment Report), the efficiency of different International Efficiency classes of motors (based on the IEC 60034-30-1 standard and Annex I of the Ecodesign Regulation), annual operating hours for different shift models in industry (based on own calculations) and the factor for installation of a VSD (based on a Ecodesign preparatory study and reports prepared for the European Commission) are provided. The power of the replaced motor has to be defined depending on the action implemented.

Data on cost effectiveness consists of investment costs, variable operating costs and fixed operating costs. The indicative cost values are based on the Ecodesign preparatory study Lot30: Motors and Drives.

What can be learned from knowledge exchange on existing practices?

Motor systems account for 53% of the world's electricity consumption across all end-use sectors, and 74% in the industrial sector. A savings' potential of 20-30% can be achieved with solutions available today, when considering all the elements of the motor system. However, a thorough optimization, such as adjusting installed power, calls for a holistic system approach, which isn't always feasible in current practices.

Assessing how many years before the end of lifetime the motor is replaced is challenging. Acquiring harmonized data on the running hours and load factors is no easy task. One possible alternative to indicative values involves using monitored data from the actions reported or from a sample of actions. Yet, in cases where specifics about replaced motors have become unavailable, default assumptions might be essential, especially concerning their efficiency.

For more accurate evaluations of primary energy and CO_2 savings, it's advisable to rely on national values for the primary energy factor and the emission factor. This is due to the significant variances in the electricity mix among countries. Additionally, the investment costs vary strongly according to the size of the motor, which makes it difficult to define indicative cost values per power range.

What are the improvements & challenges when implementing deemed savings methods in EU countries?

The streamSAVE calculation methodology suggests that there remains room for subtle enhancements to the calculation formula and its indicative values within existing national methodologies. These improved, indicative values can also optimize return on investment calculations for anticipated motor replacements, surpassing conventional methods like payback period calculations. It is recommended to extend the scope of the interventions beyond the replacement of the motor, and include careful consideration and analysis of other parts of the drivetrain.

Comparative analysis with existing national methodologies shows similar results, with any deviations typically explained by inherent differences between national conditions and European averages. Allowing users to customize the streamSAVE baseline with national parameters has proven effective. In short, the application of streamSAVE allows to validate the current national methodology for assessing efficiency benefits of anticipated motor replacements, suggesting scope for further refinement to better fit specific national contexts.

Providing feedback and tailored advice towards households: behavioural changes

What are behavioural changes?

Research indicates that human behaviour plays a crucial role in shaping energy consumption, often equal or even more significant than the physical attributes of a building. Behavioural changes - or the ways in which end-users alter the way they use energy, energy consuming products or systems - can be achieved through measures such as energy advice, targeted information campaigns, real-time energy-consumption displays, training and feedback from audits or reports.

What is the status of deemed savings methodologies in Europe?

Several Member States have drafted methodologies for assessing savings related to measures that encourage behavioural changes, including energy advice, awareness campaigns, smart meters, informative energy billing, displays, workshops, and courses. The focus is mostly on household electricity consumption, with some methodologies also targeting heating and other end uses. The calculation formula multiplies the number of targeted users by their average unit energy consumption and the potential energy savings factor of a specific measure.

How to estimate deemed savings & cost effectiveness? Which indicative values to use?

The methodology focuses on behaviour-based measures in the residential sector aimed at promoting energy savings. It specifically addresses measures related to feedback, including direct (real-time) and indirect feedback with tailored advice. The methodology reflects the impact of these measures on final energy savings by means of the Energy Saving Factor (S), which is multiplied by the Unitary, yearly final energy consumption per household (electricity or gas). When implementing the same measure repeatedly targeting the same group without direct monitoring, a Double-counting factor can be applied to account for the overlap in effects among participants.

The methodology aligns with the Commission Recommendation 2019/1658 on transposing energy savings obligations under the EED. To estimate energy savings under Article 7, specific evaluation approaches are recommended, such as the use of randomized controlled trials (RCT) to collect data on metered or monitored energy consumption before and after the action. The indicative values provided by streamSAVE serve as EU-wide benchmarks, but should be adjusted based on the specific behavioral measures and target population. Indicative values are provided for the unitary final energy consumption (based on Eurostat and JRC IDEES database). The Energy Savings factor (S) values were derived from a selection of quality feedback studies (median values). No indicative value is provided for the double-counting factor as it varies between the implemented measures.

Costs associated with behavioral measures depend on the specific feedback measure and its characteristics (e.g., type of resources and number of participants). Categorizing costs is challenging due to the lack of reliable data sources. However, potential cost categories include equipment purchase and installation of monitoring, infrastructure and data communication, data analytics or processing, technical experts for audits and reports, dissemination of the measure, and surveys.

What can be learned from knowledge exchange on existing practices?

Requiring evidence-based research, such as empirical studies, enhances the credibility of energy savings attributed to behavioural interventions, especially when the studies include pilot trials and a well-documented methodology. Using Randomised Control Trials (RCT) to assess behavioural savings is valuable, as RCT effectively differentiate between external influences and intentional behavioural measures — critical in context like fluctuating energy prices. In the US, RCT and similar methodologies have been consistently used for generating reliable energy savings, becoming pivotal for the residential sector.

Lastly, literature reviews indicate that the lifetime of behaviour-driven energy savings often aligns with the duration of the intervention promoting such changes.

What are the improvements & challenges when implementing deemed savings methods in EU countries?

The streamSAVE calculation methodology provides a valuable tool for comparing the results obtained from existing methodologies, given that various Member States have already developed bottom-up methods for evaluating energy savings from behavioural measures. streamSAVE's indicative values proposed for the Energy Savings Factor can serve as an EU-wide benchmark, since they're based on 40 different studies. It was however acknowledged that RCT results in a more reliable assessment of savings for specific, behavioural measures, but requiring high budget and time.

It's challenging to compare methodologies due to their focus on different behavioural measures, thus highlighting the need of categorizing measures. Therefore, it is important to categorize in detail per type of the educational and counselling measure to allow for benchmarking of parameters for calculating delivered energy savings. Differences were also found in the assumed lifetimes of the measures, further emphasizing the need to establish common values across all Member States.

Energy efficiency actions alleviating energy poverty

What are energy efficiency actions to alleviate energy poverty?

Energy poverty is the incapacity of a household to maintain reasonable conditions of indoor comfort. Actions to alleviate energy poverty include the initiatives, measures and policies put in place to mitigate increases in energy prices or to facilitate access to energy efficiency improvements, such as building renovation, installation of renewable heating systems next to behavioural changes.

What is the status of deemed savings methodologies in Europe?

Currently, there is no established calculation methodology for estimating savings realized by measures addressing energy poverty. Nevertheless, uplift factors are applied in countries like Croatia and Austria: these factors multiply the savings of actions implemented in energy-poor households, primarily focusing on building renovations, heating system replacements, energy advice, and household equipment upgrades (e.g., lamps, white goods). However, these factors are not indicative of actual higher savings achieved; rather, they serve as an incentive to implement actions in energy-poor households.

How to estimate deemed savings & cost effectiveness? Which indicative values to use?

Energy-poor households living in less efficient buildings tend to have lower overall energy consumption, known as the prebound effect. This effect reduces energy savings and monetary benefits from energy retrofits, and therefore a prebound correction factor is suggested in the methodology. Three types of measures are covered by the guidance, namely thermal improvement of the building envelope, installation of renewable heating systems, and behavioral changes resulting from feedback or tailored advice.

For thermal improvement, the methodology compares the final energy consumption of a building before and after improvement. The building's useful floor area, the final energy demand for space heating and hot water, and the conversion efficiency of the heating system are used in the calculation. A correction factor based on the prebound effect is applied to account for differences in consumption levels for energy-poor households compared to average households. Annex V(1)(d) of the recent adopted EED recast, however, stipulates that Member States may estimate the savings for energy-poor households on "... the basis of engineering estimates using standardized occupancy and thermal comfort conditions or parameters ..."

Indicative values for space heating and hot water demand, next to the heating system conversion efficiency are derived from the JRC IDEES database. To determine the correction factor for prebound, peer-reviewed articles and official studies addressing mismatches between theoretical and real heating consumption were considered.

Concerning the conversion efficiency of heating systems, literature agrees on energy-poor households using less efficient systems. Indicative conversion efficiencies are derived from various data sources. Similar correction factors for prebound are suggested for behavioral change measures and installation of renewable heating systems. Costs associated with actions targeting energy- poor households are generally similar to those for average households, incl. investment, maintenance, and operational costs. Indicative cost values are provided for each type of measure.

What can be learned from knowledge exchange on existing practices?

While current practices seldom adjust energy savings calculations based on household type, literature indicates significant variances in energy consumption and thereby in energy savings. However, there's low data availability to specify potential variations in the effects of energy efficiency interventions, particularly behavioural measures. Establishing control groups to assess the impact of these interventions is difficult, often necessitating a comparative approach between pre and post-intervention states.

Engineering estimates based on building models tend to overestimate energy savings, especially for less energy-efficient dwellings. Such discrepancies may arise from behavioural assumptions or performance gaps, such as defaults in installation. Instead of relying solely on correction factors per household type, a complementary approach could entail using indicative values for key parameters, like space heating demand or system efficiency, that could vary based on the energy profile of dwellings and/ or household types.

Addressing deep renovations for energy-poor households is a challenging yet crucial task to alleviate energy poverty. Studies indicate that mitigating energy poverty offers multiple benefits, potentially outweighing intervention costs. However, renovations might inadvertently burden tenants with increased rents. Combining quantitative and qualitative methods therefore provides complementary evidence to better understand the effects of energy efficiency interventions, especially about multiple impacts or benefits.

What are the improvements & challenges when implementing deemed savings methods in EU countries?

The streamSAVE calculation methodology offers valuable perspectives on the use of indicative values and specific factors for energy-poor households. Given the lack of existing practices, it was not feasible to compare streamSAVE methodology with national methodologies.

The methodology still requires the collection of data, which are not easily accessible and available for the case of energy-poor households, highlighting the need to establish effective data collection procedures. Particular difficulties arise when gathering specific data on the improved building component area, space heating and hot water demand, conversion efficiency of the existing heating systems, and the insulation degree of building components. Lastly, it is crucial to monitor the number of energy-poor households targeted by planned policies and measures. Ideally, detailed income categories should be identified in the Member States, or additional parameters should be considered to better classify households as energy-poor.

Modal shift in freight transport (from road to rail)

What is modal shift in freight transport?

Modal shift refers to the transition from one transportation system to another, aiming to enhance the energy and environmental efficiency of freight transport. By applying more effective modal alternatives, this shift contributes significantly to the attainment of ambitious energy and climate targets set for 2050. The streamSAVE project focuses on road to rail shifts.

What is the status of deemed savings methodologies in Europe?

Only three methodologies concerning modal shift could be identified, all incorporated within the French catalogue. Two primarily concentrate on the shift from road to rail transport and from road to river transport. Both provide indicative calculation values, requiring reporting parties to simply supply the number of shifted trips. The third methodology centers on rail highway wagons, so a shift from road to rail between two transshipment terminals. This method incorporates the final energy consumption of road and rail transport within its calculation formula. This necessitates details on the average distance travelled per transportation mode, the number of trips per line, and the total number of lines used.

How to estimate deemed savings & cost effectiveness? Which indicative values to use?

streamSAVE performed a stakeholder consultation revealing that many stakeholders have obvious lack of knowledge about modal shift in freight transport. Moreover, they identified gaps in the availability and reliability of the statistical data. However, due to the high variety of possible actions and various factors that need to be taken into account depending on the initial situation, providing a universal calculation formula and indicative calculation values proved to be unreasonable. Therefore, the methodology prepared by streamSAVE in this area does not account for savings achieved by single actions implemented but assesses overall potentials per Member State. It can be used as a first estimation of savings that can be achieved in this area. Actual savings calculation for actions resulting in a modal shift from road to rail should be based on monitored data.

The methodology analyses the road freight transport volume per Member State, type of good and distance class and then reduces it by relevant factors, like the modal shift potential per type of good, per distance class and the rail network density of each Member State. To comply with the EED, another factor is introduced to only account for savings that occur on the Member State’s territory. The data for these values was mostly derived from EUROSTAT data, as well as studies on modal shift in freight transport. To transform the calculated shift potential to energy savings, the difference in energy consumption between road and rail transport is included in the calculation, using data of studies conducted by the JRC and IEA.

To estimate the cost effectiveness of actions in this area, detailed data on the fixed and variable operation costs, staff cost, mode-specific costs and general operating costs are available for different goods and vehicles in both transportation modes. This data was obtained from a study that collected information from transport operators in the Netherlands.

What can be learned from knowledge exchange on existing practices?

Scenarios expect a strong increase in freight transport in Europe. Most Member States have considerable savings potential, with the exception of small or insular countries. The rail network density can be a limiting factor, suggesting that, realistically, freight volume could at most double by 2030 across the EU. Given that no substantial railway expansions are anticipated over the next decade, improving capacity management will be essential to avoid congestion issues where the rail freight markets grow.

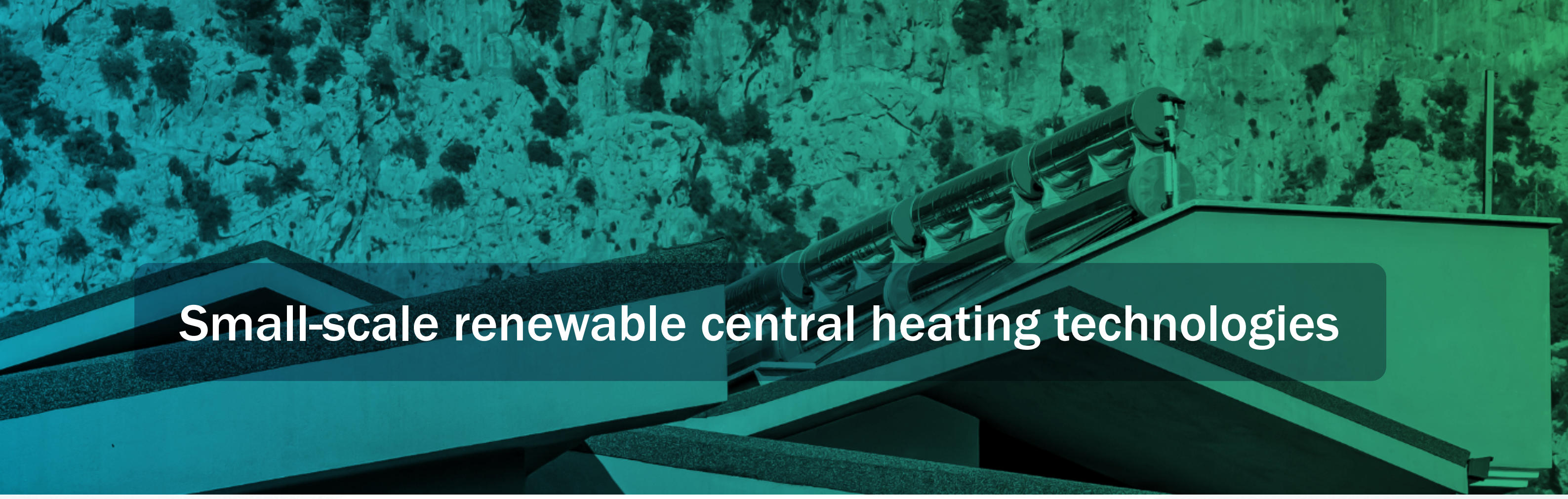
Except **France**, the countries reporting energy savings from freight transport to Article of the EED, do not use deemed savings but specific calculation methods, as observed in **Italy**, for instance. Market data from professional organisations can provide indicative values for typical consumption per km (per mode), distances travelled (domestically and abroad) and operational lifetime (i.e., proxy for savings lifetime). Specific energy consumption per mode can be the most challenging to estimate. Any comparison of energy consumption between road and rail modes must consider differences in distances and weights for each.

It's noteworthy that the savings lifetime assumed in the calculations is often shorter than the technical lifetime of the transport modes.

What are the improvements & challenges when implementing deemed savings methods in EU countries?

The development of a deemed methodology for modal shift in freight transport can reduce administrative costs and ease energy savings calculation. Although the streamSAVE methodology is more top-down, it can be a useful alternative for designing targeted measures. However, the lack of national data impedes its evaluation, stressing that data scarcity is a major obstacle to standardizing savings methodologies across Europe.

Further guidance is needed on the control and verification procedures, especially in determining and approving shifted tonne-kilometres. In general, it is recommended to define data collection procedures for assessing energy savings and to consider various parameters impacting the economic viability of modal shifting (e.g., the type and quantity of goods transported, route of rail network). Lastly, understanding the reasons behind logistics operators' preferences for trucks over other modes is key, as this can inform more effective modal shift strategies. Despite associated costs, the promotion of modal shift in freight transport presents however competitive energy saving potential and is worth further exploration.



Small-scale renewable central heating technologies

What are small-scale RES heating technologies?

Small-scale renewable central heating systems enable the production of heat for both space heating and domestic hot water, utilizing renewable energy sources. These systems employ small-scale energy generators, including heat pumps, biomass boilers, and other emerging technologies. They are applicable in various sectors, encompassing residential and non-residential buildings.

What is the status of deemed savings methodologies in Europe?

Various methodologies are used to calculate energy savings from small-scale RES for central space heating and hot water in buildings. These methods are covering a wide variety of renewable energy systems for heating and hot water, so a common energy savings calculation formula is necessary. Most of the parameters needed for the energy savings calculation when applying heat pumps or biomass boilers are standardized values, but finding harmonized data sources to estimate the heating and hot water demand is more difficult.

How to estimate deemed savings & cost effectiveness? Which indicative values to use?

The methodologies prepared for this Priority Action encompass energy savings generated by replacing heating systems of residential and non-residential buildings with heat pumps or biomass boilers.

For both methodologies, the useful floor area of the building (which should be defined specifically for action implemented), the space heating and hot water demand (based on the IDEES database) and the conversion efficiencies of the heating system before (calculated based on weighted averages from the IDEES database and the Ecodesign Directive) and after implementation (based on Commission Decision (EU) 2013/114/EU for heat pumps and Commission Recommendation (EU) 2019/1658 for biomass boilers) are needed to calculate the resulting energy savings. Additionally, the methodologies contain a factor to account for behavioural effects (indicative values based on various studies). A factor to account for different climate zones in Europe (North, South, West) is included as well.

Data on cost effectiveness consists of investment costs, variable operating costs and maintenance costs. The indicative cost values are based on the Austrian annual study comparing costs of heating systems (“Heizkostenvergleich”).

What can be learned from knowledge exchange on existing practices?

Under the provisions of Article 7 and Annex V of the EED, only final energy savings can be reported. However, small-scale RES technologies don't always yield these savings, making such actions ineligible for Article 7. When setting baselines, it might be needed to consider if the policy measure encourages fuel switching. If so, the baseline might be tailored based on the technology of the system being replaced.

The preferred indicator for domestic hot water's specific energy demand, whether per person or per m^2, depends on data availability. Moreover, the significant fluctuations in energy prices post-2021 profoundly affect the cost-effectiveness of various heating system options.

What are the improvements & challenges when implementing deemed savings methods in EU countries?

The streamSAVE methodology aids in estimating energy savings from small-scale RES installations, providing a solid basis for comparison with national methodologies. For more accurate, country-specific results, the use of national parameters is advised. This methodology also enables comparative analysis among small-scale RES technologies, indicating, for example, biomass boilers yield lower final energy savings, especially in non- residential buildings, than heat pumps due to efficiency differences.

While the current methodology doesn't account for space cooling due to low demand and data scarcity, it could be beneficial to include it by utilizing typical cooling demand values and efficiencies of cooling technologies.

Unlocking the power of energy savings

The streamSAVE & DEESME projects held their joint final event on 6th of June in Brussels, bringing together key stakeholders, policymakers, and innovators to celebrate the insights and experiences gained by different countries and companies in implementing energy efficiency policies.

Speakers covered a wide range of topics to support the implementation of Article 3, 7, and 8 of the EED, which require countries to set energy targets, conduct energy audits, and establish energy efficiency obligations for energy companies. Discussions focused on key aspects of the EED recast, such as accurate estimation of energy savings using deemed savings, improving energy audits in SMEs, and measuring and verifying energy savings resulting from energy efficiency actions. Additionally, prioritization of future actions was discussed, particularly on how to reach energy savings in the context of the new EED recast. The streamSAVE & DEESME project's final event in Brussels served as a platform to indicate the remarkable achievements in energy savings so far and underline the importance of collective action in achieving greater energy savings. Thanks to all our speakers, moderators and participants for joining us at this final event.

Agenda & presentations of the final event

Welcome and introduction

- streamSAVE & DEESME highlights – Nele Renders (VITO/EnergyVille, coordinator streamSAVE) & Ivana Rogulj (IEECP, coordinator DEESME)
- Turning policy into action – LIFE-CET outlook – Ulrike Nuscheler, Filippo Gasparin (CINEA)

Policy Panel: Improving energy efficiency policies by understanding savings: from deemed savings to measurement - Moderation: Václav Šebek (SEVEn)

- streamSAVE and its replication potential to support energy efficiency policies – example from Slovakia – Jan Maygar (SIEA)
- DEESME for policy implementers: Energy audits and management in the EED – Antoine Durand (Fraunhofer ISI)
- Country examples from Croatia: Role of deemed savings calculations and measurements in monitoring savings and identifying new savings potential – Vesna Bukarica (EIHP)
- Ireland's approach to the evaluation and monitoring of scaled and metered savings and the identification of new savings potential – Aidan Condell (SEAI)

Industry Panel: Achieving energy savings in industry - Moderation: Dusan Jakovlievic (EEIP)

- Heat recovery in industry: streamSAVE's practical guidance on standardised savings methodologies – Elisabeth Böck (AEA)
- Heat recovery in industry and supermarkets – view on quantification of energy savings – Torben Funder-Kristensen (Euroheat & Power)
- Audits for actions in SMEs: European Covenant of Companies for climate and energy – Karen Clements (Low Associates Brussels)
- Measuring energy savings in industry: the experience of the Italian white certificates scheme – Livio De Chicchis (FIRE)

Priorities' Panel: Future of energy savings and beyond in the context of the EED recast - Moderation: Jean-Sébastien Broc (IEECP)

- Priorities of the EED recast: Article 4, 8 and 11 – Heidelinde Adensam, European Commission (DG ENER)
- Auditing and managing: DEESME's tools, integration of multiple benefits – Laura Bano (SOGESCA)
- From voluntary agreements towards energy savings obligations – actions towards energy efficiency 2030 targets & beyond: The Netherlands – Jorieke Rienstra (RVO)
- Pay-for-Performance schemes and other ways to develop measured energy savings: concrete examples from the SENSEI and ENSMOV Plus projects – Marion Santini (RAP)
- Developing the ESCO market and the assessment of energy savings: the German experience – Rüdiger Lohse (EDL_HUB, DENEFF)

Closure and summary

Annex – Presentations by external speakers during dialogues

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 & 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)
	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)

Priority Action	External Presentation	Speaker
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
Modal shift for freight transport	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)

Moreover, the last dialogue meeting invited speakers to discuss further energy savings opportunities (all presentations and recordings available here):

About Buildings:

- 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 (Václav Šebek and Jiří Karásek, SEVEn)

About Industry:

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

About Transport:

- Assessing energy savings from policy measures promoting modal shift to e-bikes: the Austrian experience, by Gregor Thenius, AEA stream SAVE

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