streamSAVE+ Dialogue Meeting #08

Streamlining Energy Savings Calculations

Energy savings from deep renovation of buildings

MINUTES OF THE MEETING

Date: Thursday 4 December 2025 **Duration:** 11.00 – 12.15 CET

Online

Short summary:

The 8th dialogue meeting focused on deep renovation of buildings and its role in achieving EU energy and climate targets. The introductory presentation covered the developments brought by the recast of the EPBD (Energy Performance of Buildings Directive), highlighting instruments such as Energy Performance Certificates (EPC), renovation passports, the Smart Readiness Indicator, and National Building Renovation Plans, with a strong emphasis on data collection, interoperability, and reporting to the EU Building Stock Observatory.

Then, the streamSAVE+ methodology for calculating energy savings was presented, applicable to both residential and non-residential buildings, including guidance on system efficiencies, behavioural factors, cumulative savings, and costs. A practical demonstration of the Excel-based tool illustrated both simplified and full calculation options, with the possibility to use EU-average or national values.

Important points of future developments on the topic of energy savings from deep renovation:

- Expected improved data availability, notably from the development of national EPC (Energy Performance Certificates) databases, and the possible linkage between EPC and renovation passports
- Better integration in the implementation of both, EPBD and EED (Energy Efficiency Directive)
- Need for further investigations about performance gaps between calculated and actual energy savings, considering the influence of user behaviour on actual energy use, as well as other sources of performance gaps (e.g. installation quality and construction defaults; overestimations in manufacturers' data).

Next steps in the streamSAVE+ project include a calculation integration to the online platform, national workshops and case studies, providing opportunities for further in-depth discussions.

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11:00 – 11:05	Quick updates about streamSAVE+ | **Jiří Karásek** (SEVEn)
11:05 – 11:25	Role of deep renovation of buildings in meeting the EU energy and climate targets – EPBD perspective | **Dr Susanne Geissler** (SERA Institute CA EPBD, leader of Central Team 3 - CT3 on Deep renovation and renovation passports)
11:25 – 11:30	Q&A
11:30 – 11:45	The new streamSAVE+ methodology to calculate energy savings from deep renovation in buildings | **Vesna Bukarica** (EIHP)
11:45 – 11:55	Demonstration of the calculation tool | **Hana Gerbelová** (SEVEn)
11:55 – 12:00	Q&A
12:00 – 12:15	Open discussion, and what's next

Project Update

Quick updates about streamSAVE+, by Jiří Karásek (SEVEn)

The meeting began with an update on the current status of the streamSAVE+ project. The platform is approaching completion, and once finalized it will include all 15 calculation methodologies corresponding to the project's Priority Actions (PAs). This will significantly expand the platform's functionality and make it a central tool for calculating and comparing energy savings across Europe.

Over the next six months, the consortium will focus on developing national case studies, with an expected total of 27 cases. These will be prepared in national languages and are intended to support national stakeholders by offering context-specific examples of methodologies, outcomes, and practical applications.

In addition, the project will organize nine national dissemination workshops in partners' Member States at the beginning of 2026. National partner organizations will coordinate these events, focusing on country-specific challenges and stakeholder needs. Participants are encouraged to contact their national partners and take part in these upcoming workshops. These are SEVEn for Czechia, CRES for Greece, VITO for Belgium, ISR for Portugal, EIHP for Croatia, AEA for Austria, EnEffect for Bulgaria, JSI for Slovenia, LEA for Lithuania.

Participants were also reminded that the next Dialogue meeting (Thursday 22 January 2026) is open for registration. It will address energy savings in data centers, a topic recognized as increasingly important due to the growing digital infrastructure in Europe. It will complement the dialogue meeting done in June 2025 on this topic, by presenting the new streamSAVE+ methodologies for calculating energy savings in data centres. In addition, findings from the latest assessment of the energy performance and sustainability of data centres in the EU will put the topic into perspective, both in terms of data issues and trends.

Lastly, it was noted that the project newsletter now has around 100 subscribers, reflecting growing interest in the project's outputs and progress. Participants are invited to use the subscription link to receive the next newsletters, and be informed about the next dialogue meetings.

Part 1 – Deep Renovation of Buildings (EPBD Perspective)

Role of deep renovation of buildings in meeting the EU energy and climate targets – EPBD perspective, by Dr Susanne Geissler (SERA Institute, and leader of Central Team 3 of the Concerted Action EPBD)

Susanne provided a comprehensive overview on the role of deep renovation within the framework of the recast of the Energy Performance of Buildings Directive (EPBD) (EU)2024/1275. She reminded that one of the main objectives of the EPBD is to support the transformation of the European building stock towards zero emission buildings, in line with the EU's 2050 climate and energy objectives. The EPBD has strong focus on data, planning instruments, and implementation support across Member States.

The long-term goal of zero emission building stock requires substantial improvements in energy efficiency and reductions in greenhouse gas emissions, with a shift from fossil fuels to renewable energy sources. Deep renovation is a central mechanism for achieving these goals, particularly because around 75% of today's EU building stock remains energy-inefficient, while renovation rates are still too low to meet long-term targets.

Key EPBD Instruments Supporting Deep Renovation

The directive includes several tools and regulatory mechanisms designed to accelerate and structure renovation efforts:

- **Energy Performance Certificates (EPCs):** EPCs provide calculated energy performance based on standardized use profiles and serve as a reference for comparing buildings on the market.
- **Renovation Passports:** These offer a building-specific renovation roadmap based on *actual* (metered) energy consumption and estimated energy savings. Passports complement EPCs by guiding building owners' step by step towards zero-emission performance.
- **Smart Readiness Indicator (SRI):** This indicator assesses the smart-technology capability of buildings, including building automation and control systems (BACS)[1] that optimize energy use and enable interaction with the energy grid.
- **National Building Renovation Plans (NBRPs):** With an expanded and detailed annex in the 2024 EPBD recast, NBRPs act as the central planning and reporting instruments for Member States.

These instruments generate important datasets used both for policymaking and for tracking progress towards energy and climate objectives.

Deep Renovation in the EPBD

The EPBD defines deep renovation as a process that transforms a building into a zero-emission building, or—where this is the first step—into a nearly zero-energy building (NZEB**)**. The process must reflect the principle of Energy Efficiency First, meaning that efficiency improvements (insulation, improved windows, reduced transmission losses) should be considered before the deployment of renewable energy technologies, and prioritized whenever cost-effective.

[1] About BACS, see chapter 3 of the report D2.2 of the previous streamSAVE project, including a methodology to calculate energy savings from BACS.

Deep renovation is also considered an opportunity to improve additional aspects such as indoor environmental quality and climate resilience.

Data as a Cornerstone of EPBD Implementation

A major highlight of the presentation was the essential role of data quality, consistency, and availability. The 2024 EPBD recast introduces new requirements:

- Mandatory **national EPC databases**, where EPCs, renovation passports, SRI assessments, inspection results, and metered energy consumption must be uploaded.
- Obligatory publication and **regular updating** of datasets.
- Full **interoperability** between the EPC database and other national administrative databases (e.g., land registries, building logbooks).
- Standardized reporting to the **EU Building Stock Observatory**, starting with the first mandatory data transfer due by March 2027 and then annually.

These measures create the foundation for tracking renovation progress and designing effective policy instruments.

Challenges and Implementation Issues

Despite the robust framework, several challenges were highlighted:

- Low EPC coverage in many Member States—often around or below 30% of the building stock.
- Voluntary uptake of renovation passports in some countries, meaning that coverage will depend heavily on national support schemes and financing options.
- Complexity of administrative coordination, particularly between authorities responsible for EPBD implementation and those handling the Energy Efficiency Directive (EED).
- Growing need for streamlined, user-friendly procedures, as current EPCs and renovation passports are often too technical and not easily understood by building owners.

The presentation emphasized that simplification and harmonization will be essential for widespread adoption.

Support through EU-funded projects and the Concerted Action EPBD

Multiple LIFE and Horizon projects provide technical guidance for implementing new EPBD elements, such as renovation passports, NZEB/ZEB standards, and the SRI.

The Concerted Action EPBD (CA EPBD) plays a central role in supporting national authorities. It brings together nine central teams focused on different EPBD articles. Central Team 3 (CT3) is dedicated to deep renovation and renovation passports, addressing critical topics such as:

- Implementation of the National Building Renovation Plans;
- Detailed requirements for renovation passports (Article 12 and Annex VIII);
- Linkages between EPCs and renovation passports;
- Harmonization of data flows between national frameworks and EU reporting obligations.

The Concerted Action creates a confidential space for Member States to exchange practical experience, and publishes topic reports and country profiles to support broader dissemination: https://www.ca-epbd.eu/

Q&A

- *Is there a risk of confusion for the general public between the Energy Performance Certificate (EPC) and the Renovation Passport, since they provide different information (calculated vs. actual consumption)?*

Yes, the risk of confusion is real and fully acknowledged.

The EPBD allows EPCs and Renovation Passports to be issued jointly, and EPC recommendations to be replaced by a Renovation Passport.

The challenge increases because there are different target groups:

- building owners;
- financial institutions;
- investors (green finance requirements)

This topic is actively discussed within the Concerted Action, including:

- comparison of EPC and Renovation Passport layouts across countries;
- dedicated sessions (e.g., upcoming meeting in Dublin).

No final conclusions yet, but it is recognized as a key issue.

- *What is the progress of EU Member States regarding the development of national EPC/databases (Article 22 of EPBD)?*

The development of national databases is technically and institutionally challenging.

There will be topic reports on databases within the Concerted Action. These reports will be anonymized (no country naming), in line with the Concerted Action's confidentiality rules.

Databases are considered one of the key implementation topics. More clarity is expected as:

- the EPBD transposition deadline (April next year) approaches;
- additional activities (BuildUp portal, workshops, European projects such as OBSERVE) take place.

Part 2 – Methodology for Calculating Energy Savings from Deep Renovation

The new streamSAVE+ methodology to calculate energy savings from deep renovation in buildings, by Vesna Bukarica (EIHP)

(See also presentation file available on the streamSAVE+ website)

Vesna Bukarica presented the streamSAVE+ methodology for calculating energy savings achieved through deep renovation of buildings. The methodology is designed to be applicable to both residential and non-residential buildings and is fully aligned with the requirements of the Energy Efficiency Directive (EED), in particular Article 8 and its annexes.

Definition and scope of deep renovation

Within the methodology, deep renovation is understood as a bundle of measures addressing both the building envelope and technical building systems, aiming to transform buildings towards zero-emission buildings (ZEB), or as an intermediate step towards nearly zero-energy buildings (NZEB). While specific performance thresholds depend on national cost-optimal calculations, the methodological framework itself is designed to be universally applicable across Member States.

Core calculation approach

The core calculation of energy savings is based on the difference between:

- final energy consumption before renovation, and
- final energy consumption after renovation,

adjusted by a behavioural correction factor to account for the influence of occupant behaviour and the so-called energy performance gap. This factor is particularly relevant for residential buildings, where user behaviour has a stronger impact on actual energy consumption. The performance gap may also be due to defaults in the installation / implementation of the actions (e.g. thermal bridges due to bad insulation works), or due to manufacturers' data overestimating the performance of the equipment or materials.

Calculation of final energy consumption

The methodology provides a detailed approach to calculating final energy consumption before and after renovation for all relevant energy uses, including:

- space heating;
- domestic hot water;
- cooling;
- ventilation;
- lighting (especially for non-residential buildings).

Calculations are based on following parameters:

- specific energy demand for heating and hot water;
- efficiencies of all components of technical systems (generation, distribution, emission and control);
- climate correction factor;

- and conditioned floor area accounting for possible changes in building floor area resulting from renovation.

Special attention is given to buildings using multiple energy sources, through the use of weighting factors reflecting the share of each energy carrier in total energy supply.

Data sources and indicative values

To support practical application, the methodology provides indicative EU-average values for key input parameters. These values are primarily derived from the JRC IDEES database and other EU-level sources. They serve as reference values in cases where detailed national or building-specific data are not available. At the same time, the methodology clearly recommends replacing these indicative values with national data whenever possible.

Cumulative energy savings

In line with EED requirements, the methodology enables the calculation of cumulative energy savings over the lifetime of renovation measures. Different lifetimes are considered for:

- building envelope measures (longer lifetimes);
- technical system upgrades (shorter lifetimes).

A two-step calculation approach is applied to reflect these differences and to ensure realistic long-term savings estimates.

Conversion to primary energy and emission reductions

The methodology also covers:

- conversion of final energy savings into primary energy savings using primary energy factors, and
- calculation of greenhouse gas emission reductions based on emission factors for different energy carriers.

National primary energy and emission factors are recommended whenever available, to reflect national energy mixes.

Cost assessment

In addition to energy savings, the methodology includes an overview of investment (CAPEX) and operational (OPEX) costs associated with deep renovation. Cost estimates are based on:

- the PRIMES reference scenario (2020) updated for the price levels (2024) using Eurostat HICP;
- data from real renovation projects in several EU countries.

Costs include not only renovation measures themselves but also engineering services such as design, supervision and project management.

Q&A

- *Do the indicative values for residential buildings represent an EU-27 average?*

Yes, most indicative values are EU-average values.

They are based on EU-wide databases (e.g., JRC IDEES database) and extensive literature reviews.

Some values come from studies rather than strict averages.

In any case, it is recommended that national values should be used whenever available, as they better reflect national conditions.

National databases (as required by EPBD) should improve the availability of national data.

– *Did the methodology consider performance gaps caused by poor installation quality (not only user behaviour)?*

The literature review focused exclusively on behavioural performance gaps. Installation quality and construction defects were not explicitly addressed. Deep renovations are complex projects that require proper supervision. This is recognized as both an important topic and an area for further investigation in future work.

Part 3 – Demonstration of the Calculation Tool (Excel)

Demonstration of the calculation, by Hana Gerbelová (SEVEn)

(See also presentation file available on the streamSAVE+ website)

The final part of the meeting was dedicated to a practical demonstration of how the methodology for calculating energy savings from deep renovation of buildings can be applied in practice. The demonstration showed how users can work with the calculation once it is implemented on the streamSAVE+ platform.

As the methodology is not yet fully integrated into the online platform, the demonstration used an Excel-based tool that will be included as an annex in the platform. This Excel mirrors the structure and logic that later will be transformed into a more user-friendly interface in the online platform.

The calculation is organized into several key components:

1. **Annual Savings Calculation**
   Users enter the required input data into an upper section divided into four parts:
   - general information about the building and systems;
   - data on energy carriers;
   - input parameters for the formulas.
     The results and related cost calculations then appear in the lower part of the sheet.
2. **Cumulative Savings Calculation**
   Since deep renovation consists of bundles of measures with different lifetimes, a separate sheet account for this. Measures such as insulation typically last longer, while technical systems have shorter lifetimes. The calculation therefore evaluates envelope measures first, and then includes the shorter-lived system replacements.
3. **Indicative Input Values (EU averages)**
   A dedicated tab contains indicative values (efficiencies, energy demands, etc.), derived from

the literature review and EU-wide databases mentioned in the previous presentation. These values automatically populate the calculation when the user selects the option to use indicative values.

4. **National Values Input**
   Another tab allows users to enter their own national data for all parameters. The demonstration emphasized that users should insert national values here—rather than overwriting formulas—so the tool remains functional and consistent.

The tool supports two calculation pathways, reflecting the methodological structure:

- **Simplified Procedure**
  When selected, the tool disables many detailed input cells. The user only enters basic values such as final energy consumption before and after renovation, useful floor area, and climate correction. This produces a simplified estimate of annual savings.
- **Full Procedure**
  This version applies the full methodology, requiring detailed inputs such as:
  - specific energy demand for heating and hot water;
  - system efficiencies;
  - contribution of primary and secondary heating sources;
  - and optional inclusion of systems like ventilation, cooling and lighting if they were part of the renovation.
    The tool combines all these parameters according to the formulas presented earlier in the methodology.

The demonstration showed that the tool contains helpful notes in the right-hand column to explain each required input, making the workflow intuitive despite the complexity of the calculations. As stated, once integrated into the streamSAVE+ platform, the interface will be more visually accessible and easier to navigate.

Hana concluded by noting that the Excel file will be made available together with the methodology guidelines document on the platform. In this way, it will allow users to test the calculations themselves and have a deeper look at all the data and their relations in the calculations.

Open discussion

The final discussion was a joint exchange focused on the practical application of the deep renovation methodology presented during the dialogue meeting. The discussion primarily addressed performance gaps between calculated energy savings and actual energy consumption after renovation. Participants discussed the influence of user behaviour on real energy use and emphasized that the current methodology explicitly accounts for behavioural effects. The discussion also outlined further possible refinement of the methodology as well as a discussion on future improved data availability through national EPC databases in line with EPBD requirements.

Looking ahead, future activities of the project will include the national workshops, capacity support activities and further dialogue meetings and dialogue workshops are planned in the coming months, for example on the data-related topic. All information will be available on the project website: https://streamsaveplus.eu/

Participants are also invited to look at the proceedings of the first dialogue meeting of streamSAVE+, including examples about deep renovation programmes and related savings calculations from Croatia, Czech Republic and Ireland: https://streamsaveplus.eu/article/29-dialogue-meeting-1-assessing-energy-savings-deep-retrofit-programmes

List of participants:

52 participants

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