streamSAVE+ Dialogue Meeting #06

Streamlining Energy Savings Calculations

Energy savings from heat recovery in ventilation systems

MINUTES OF THE MEETING

Date: 09 October 2025 **Duration:** 11.00-12.00 CEST
Online

Short summary:

This sixth dialogue meeting of streamSAVE+ discussed the assessment of energy savings from ventilation systems, focusing on the new streamSAVE+ methodology about this Priority Action (see chapter 5 in the D2.2 report of streamSAVE+):

- The streamSAVE+ methodology is focused on energy savings from heat recovery in ventilation systems, taking into account the space heating energy demand reduction due to the ventilation heat recovery
- The relative amount of energy savings is determined by the thermal efficiency of the heat exchanger. The methodology accounts for gains on space heating only (it does not cover possible gains on space cooling). Changes in the use of auxiliary energy (for example, fans, controllers, and defrosting) are not taken into account.
- In case other actions are implemented simultaneously with the installation of the new ventilation system, overlap between these individual actions should be considered to avoid double counting of energy savings.
- The methodology is applicable to all EU Member States and all types of buildings including retrofitted & non-retrofitted. The methodology differentiates between residential and non-residential buildings and considers three main climatic zones.
- Key data sources include the Ecodesign Regulation (EU) 1253/2014, the Ecodesign preparatory studies for ventilation units, the Ecodesign Impact Accounting reports, JRC IDEES database and Eurostat.
- The methodology provides EU-wide indicative values. However, it is recommended to use the methodology with national data whenever possible.
- Member States' reports on cost-optimal levels of energy performance can be a relevant source of national data in case heat recovery in ventilation systems is addressed in them. The definition and specifications of the input parameters of the streamSAVE+ methodology need to be respected.

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Agenda

11:00 – 11:05	Quick updates about streamSAVE+ | **Jiří Karásek** (SEVEn)
11:05 – 11:35	The new streamSAVE Plus methodology to calculate energy savings from heat recovery in ventilation systems | **Jan Verheyen** (VITO)
11:35 – 11:50	Q&A
11:50 – 12:00	Open discussion, and what's next

Part 1 - Quick updates about streamSAVE+

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

Jiří pointed out that the report detailing the development of the calculation methodologies for the new PAs, as well as all materials from the Dialogue meetings, are publicly available on the project website: https://streamsaveplus.eu/article/11-results

He also invited all participants to the following Dialogue meetings:

Thursday 20 November 2025 on public traffic management: registration link

Thursday 4 December 2025 on deep renovation in buildings: registration link

Jiří then summarised recent developments to the StreamSAVE+ platform. The calculations for all PAs will shortly be available online. Finally, he encouraged everyone to subscribe to the project newsletter, the first of which had been released (subscription link).

Part 2 - The new streamSAVE Plus methodology to calculate energy savings from heat recovery in ventilation systems

(see also presentation file available on the streamSAVE+ website and the online platform https://streamsaveplus.eu/priority-actions#priority-13).

At the beginning of his presentation, Jan reminded that the presentation focuses on the objective and context of the StreamSAVE+ Priority Action on Heat Recovery in Ventilation Systems. The purpose is to develop a bottom-up, harmonized methodology for calculating the energy savings achieved through heat recovery in ventilation units, to support EU Member States in implementing Articles 4 and 8 of the Energy Efficiency Directive. The methodology provides a consistent framework for estimating final and primary energy savings and GHG reductions, in line with the **requirements according to the Energy Efficiency Directive**.

Jan then introduced the technical background of the ventilation systems. Jan reminded that the main purpose of ventilation systems is to ensure **indoor air quality** (IAQ). To accomplish this, the system makes use of **auxiliary energy** (for example, fans, controllers, ...). Ventilation systems can consist of natural ventilation, mechanical ventilation, or hybrid systems.

When considering their energy performance, one of the major features is when a heat exchanger is included to transfer heat from the exhaust air to the external air used as supply air. When adding the **heat recovery device**, it then reduces the space heating energy demand.

In practice, installing a heat recovery system may be combined with additional measures to improve the building's energy performance (e.g. insulation of the building envelope, actions improving air tightness or increasing fan efficiency, smart controls). This may need to be examined to avoid double-counting of energy savings (between individual actions that may overlap).

In the second part of his presentation, Jan highlighted the assumptions made when establishing the approach for calculating energy savings from heat recovery in ventilation systems. The starting point for the methodology includes the documents related to the Ecodesign regulation on ventilation systems (notably regulation (EU) 1253/2014).

The **main types of heat recovery systems** considered are:

- Plate or cross-flow heat exchangers: simple, compact, only sensible heat recovery.
- Counter-flow (or tube) heat exchangers: higher efficiency, compact design.
- Rotary (enthalpy) wheels: regenerative devices that can recover latent (moisture) energy in addition to sensible heat.
- Run-around coil systems: involve a liquid loop between two heat exchangers (supply and exhaust sides), allowing flexible installation when ducts are not adjacent.
- Thermal bypass facility: enables bypassing the heat exchanger during summer (mandatory in Ecodesign regulation since 2016).

The methodology follows the **scope of the Ecodesign Regulation** and applies to bi-directional ventilation units (BVUs) equipped with a heat recovery component. It includes both local units (LBVUs) and central units (CBVUs/CHRVs) used in **residential and non-residential buildings**.

Excluded from the scope are:

- Ventilation units without heat recovery,
- Units with integrated heat pumps (e.g. ventilation heat pumps using exhaust air as the source for domestic hot water or space heating),
- Units for special conditions (hazardous environments, kitchen hoods, extreme temperatures).

The exclusion of heat pump systems avoids double counting savings that can be already covered under other energy efficiency actions (typically the installation of an air-to-air heat pump).

The methodology is applicable to all EU Member States and all types of buildings including retrofitted & non-retrofitted. The methodology differentiates between residential and non-residential buildings and considers **three main climatic zones**.

The methodology also covers the cases of either **replacement or new installation** of a ventilation unit. For replacement, the specific case of early replacement (prior the end of lifetime of the previous system) can be considered.

A **review and comparison of existing methodologies** were carried out to support the development of the StreamSAVE+ approach. The comparison included EU-level methods, research projects, and national schemes. Based on this review, preferred methodological choices were identified and adopted for the new harmonized methodology, as shown in the development table (with selected approaches highlighted). The literature review identified several existing methodologies and data sources, including:

- **EU-level sources**: methodology of the Ecodesign requirements, CEN standards (EN 16798 series), EPBD-related methods.
- **EU projects**: e.g., multEE.
- **National methodologies**: identified in Czech Republic, France, Hungary, Latvia, Lithuania, Luxemburg and Slovenia.

The relative amount of energy savings is determined by the **thermal efficiency of the heat exchanger**. The methodology only takes into account the gains on **space heating** energy use and it does not cover the possible gains in summer on space cooling.

In the final part, Jan explained the deemed savings methodology. The calculation comprises determining the final energy savings, which are the difference in conventional final energy consumption before and after the action is implemented, as well as applying a factor for behavioural effects.

The baseline (condition before to adoption of the measure) for the initial state represents the EU's average building stock. Furthermore, additional auxiliary energy used by fans, defrosting energy, and energy-saving measures like air tightness, building envelope enhancement, or smart controls are not taken into consideration by the suggested methodology. The method is primarily concerned with the savings obtained by heat recovery from ventilation.

Then conversion factors are used to calculate primary energy consumption. And the same for the reductions in GHG emissions.

The methodology also includes EU-wide indicative value that a user can use if no national data are known.

Details about the data sources and assumptions can be found in chapter 5 of D2.2 report.

Main sources used for the proposed indicative values include:

- Ecodesign Regulation (EU) 1253/2014 – definitions and minimum requirements.
- Ecodesign preparatory studies for ventilation, Ecodesign Impact Accounting – ventilation parameters.
- JRC IDEES databases – energy use data, conversion factors, and GHG coefficients.
- Scientific publications - indicative values.

Jan concluded by pointing out that Member States can use the methodology for calculating energy savings through heat recovery in ventilation systems to help them implement Articles 4 and 8 of the EED (EU/2023/1791) as this methodology is:

- Broadly applicable; scope aligned with Ecodesign requirements for VUs (EU 1253/2014).
- Accounts for space heating energy savings from heat transfer between exhaust and supply air.
- Inputs: national and case-specific data preferred, but default values provided.
- Outputs: TFES (final energy savings), EPEC (primary energy savings), GHGSAV (GHG reductions), and overview of costs.
- Full description in the report publicly available on the project website (D2.2.)
- A calculation tool is available on the StreamSAVE+ platform.

Q&A

- *Could you say a bit more about parameters to be the technology compliant with Ecodesign requirements? Any minimum efficiency requirement?*

According to the Ecodesign regulation, a heat recovery system is part of a bi-directional ventilation system equipped with a heat exchanger. There are different types of heat exchangers possible and within scope of the Ecodesign regulation as explained in the presentation. Excluded from the scope are technologies exclusively for operation in specific conditions such as range hoods as well as technologies that incorporate both a heat exchanger and heat pump technology, except when the heat pump serves for defrosting.

The Ecodesign regulation contains requirements specifically for residential (RVUs) and for non-residential ventilation units (NRVUs) including minimum energy performance requirements. For the RVUs the minimum energy performance is expressed via the specific energy consumption parameter SEC. For example, at time of publication of the regulation, the maximum SEC value starting from 2018 is set at -20kWh/(m^2.year). This negative value represents the total primary energy savings of the VU with heat recovery compared to a natural ventilation system (as the baseline). For NRVUs the minimum requirements are expressed in terms of the thermal efficiency of the heat recovery system and the specific fan power of the fans. Both depend on the type of technology used.

Some additional specifications are provided on technology such as motor drive types and the incorporation of a bypass in all bidirectional VUs.

This is not all. For more specific and additional information on this, consult the Ecodesign regulation. Review of the regulation is ongoing.

- *Could you please describe what is and is not included in the developed approach regarding energy consumption?*

The streamSAVE+ methodology includes only the contribution of the heat exchanger to the energy performance improvements of the building. The energy demand reduction achieved via the heat exchanger of the ventilation unit is reflected in the final energy use for space heating. The magnitude of the energy savings is relative to the thermal efficiency of the heat exchanger or the improvement of it. This depends on the type of heat exchanger technology used. In general, runaround systems have lower efficiency. The methodology only considers the winter operational mode, i.e. the space heating, not the cooling in summer mode. The indicated values for the initial state include the baseline, which represents the average building stock in the EU. The streamSAVE+methodology does not account for additional auxiliary energy use by fans, defrosting energy, or additional energy performance improvements such as air tightness, thermal building envelope improvement or smart controls. The method is primarily concerned with the savings achieved by heat recovery.

Open discussion

- *Is it possible to use the streamSAVE+ methodology in any Member State, and what adjustments must be made?*

The calculation can be used as-is. There is the option of using indictive values to the calculation referring to the EU level, as well as a combination of national and indicative values. However, it has to conform to the definition and specification of the input parameters, and the user has to ensure correct interpretation to use it.

More specifically, the methodology takes into account regional differentiation via three climatic zones. It is adviced to use national or regional values for those input parameters that are climate dependent, such as the average temperature difference between indoor and outdoor environment during the heating season and the length of the heating season.

Apart from the fixed physical parameters of the ventilation air - density and specific heat - all input parameters representing the baseline situation of the building stock that is considered are best context specific values. These are the building geometrical parameters, thermal efficiency of the space heating system, air change rates, the final energy consumption and the factor to calculate behavioural aspects. As it will not be easy to identify local representative values for all of these, the indicative values can be used to substitute local values in case of absence.

For the thermal efficiency of the heat exchanger of the implemented action, product specific information can be used, depending on the type of technology used. For a more general estimation, the indicative values are good for adoption in any specific Member State.

- *Some Member States are using Energy Performance Certificates (EPCs) to monitor energy savings from energy efficiency improvements in buildings. What would be the pros and cons of using a methodology like the one developed in streamSAVE+ vs. using EPCs?*

It depends on the methods/models used for the EPCs and how the energy performance is estimated. If it is based on metered data, then the comparison of the EPCs before and after implementation of the intervention should capture the energy savings. However, it will not distinguish the share of savings coming from the efficient ventilation system, if the intervention combines several actions (e.g. the improvement of building envelope, etc.).

In other cases, the energy savings in EPC is based on simplified models starting from energy balance equations, which may not accurately reflect changes in ventilation systems, for instance the use of technology for heat exchange in ventilation units.

More generally, the use of EPC to assess energy savings may include the EPC after intervention only and take average values from the national EPC database to define the baseline situation. This may create bias, because the buildings where interventions are done might not match well with the typology used in the EPC database, and because the buildings registered in the national EPC database may not provide a sample representative of the whole building stock: EPCs are primarily issued for buildings in case of sale or renting.

On the pros and cons;

For the majority of the building types, EPCs are already available, and do not require a separate calculation framework. Note that it is known that there is an energy performance gap which - on average – leads to an overestimation of the calculated energy savings. Furthermore, available EPCs may not be representative for the entire stock for a given building type.

The streamSAVE+ priority action on heat recovery in ventilation units provides a comprehensive method dedicated to solely heat recovery in ventilation units requiring only a minimum amount of inputs that are reasonably easy to estimate and with a corresponding link to ventilation product performance specifications. Energy use data is based on national energy balances representing actual consumption levels. Furthermore, for the majority of the inputs, careful estimates of default values are available.

- *Can the cost-optimal studies prepared by Member States for the EPBD be a useful source of national data to implement this methodology?*

In my opinion, generally speaking, yes. In the cost optimal studies, building stock modelling is executed with representation of the building stock per building typology to derive the cost optimal levels of energy performance, from which then the minimum energy performance levels are defined. In such modelling exercise also assumptions have to be made in relation to the building geometrical and building physical characteristics as well as assumptions on HVAC systems characteristics together with assumptions on the use of the buildings for an accurate representation of the building stock and the determination of the energy performance of it.

In a specific Member State, it is not sure that heat recovery in ventilation as one of the technological measures in the renovation packages is part of the analysis.

In Flanders, one of the three regions in Belgium, for instance ventilation system variants including several types with heat recovery are included in the measures for the analysis of new and existing buildings in the cost-optimal studies for residential and non-residential buildings.

Furthermore, heat recovery in ventilation systems might not be well addressed in the studies, especially about what is considered to define the baseline / stock average.

But also for the other parameters in the equation, the data can definitely serve to specify inputs for this streamSAVE+ PA on HR in VU.

The definition and specifications of the input parameters of the methodology need to be respected.

List of participants:

28 participants

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