

Additional information on EPD



For ventilation units

DUPLEX 650 / 1100 / 1700 / 2300 / 3500 / 4500 / 6000 Flexi 3

Atrepa®

Leader in ventilation and heat recovery

Heat recovery ventilation – environmental benefits for the entire building

CO₂e emissions associated with the manufacture of the ventilation unit are included in the Environmental Product Declaration (EPD). However, its operation with heat recovery significantly reduces energy consumption in the building in the long term and, under conditions in the Czech Republic, generally outweighs the negative impacts of manufacturing and the electricity consumed by the fans.

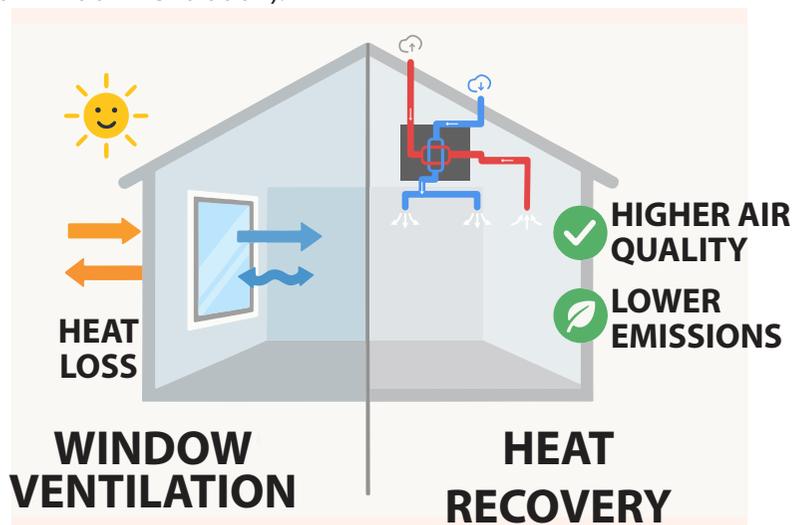
Context and compliance with the EPBD

The European Energy Performance of Buildings Directive (EPBD) sets requirements for indoor environmental quality and energy efficiency. Mechanical ventilation with a heat recovery unit ensures better distribution of fresh air in terms of both time and space than ventilation through windows, and with minimal heat loss – which reduces the energy required for heating and supports the fulfilment of EPBD targets and the strategy for reducing CO₂e emissions.

Comparison with window ventilation (for the same airflow)

Window ventilation: To achieve the same fresh-air rate, outdoor air must be heated to indoor temperature, which requires significant energy.

Heat recovery ventilation: Due to high HRV efficiency, the required heating energy for ventilation is much lower (often only around 15% of the energy needed for window ventilation).



The only disadvantage is electricity consumption for running the fans—however, this is small compared to the heat savings.

Practical example – comparison of mechanical heat recovery ventilation with natural ventilation through windows

- **Calculation conditions:** We assume the same fresh air supply for mechanical (recuperative) and natural (window) ventilation. The heat recovery efficiency (HRE) for DUPLEX Flexi series units is typically 85% or higher. We model three typical heat sources: First, electric resistance heater pump with an average seasonal heating factor of COP=2.5; and third, a natural gas boiler. Electricity emission factors follow the Czech Republic's energy mix. We consider the operation of ventilation in an office building for 25 people. The climatic location is Prague.

- **We use values for the DUPLEX Flexi 650 unit:** the values are taken from the manufacturer's design software and the EPD document.
- **Operating consumption:** modern fans with EC motors have low power consumption when transporting air. Typically, the SFP ranges between 0.15 and 0.3 W/(m³/h). When the ventilation unit is partially loaded (night operation), the SFP is even lower.
- **25-year service life:** the manufacturer-verified average service life complies with European standards for EPD creation.
- **Conclusion:** In the Czech climate, long-term heat energy savings in all three applications exceed emissions from unit production and emissions from electricity consumed during fan operation. In addition, continuously controlled ventilation (based on CO₂, TVOC and time schedules) maintains better indoor air quality without excessive losses caused by intermittent ventilation through windows.

Example of Life-Cycle CO₂e Balance (Czech Republic, 25 years)

Results for for the example of an office for 25 people:

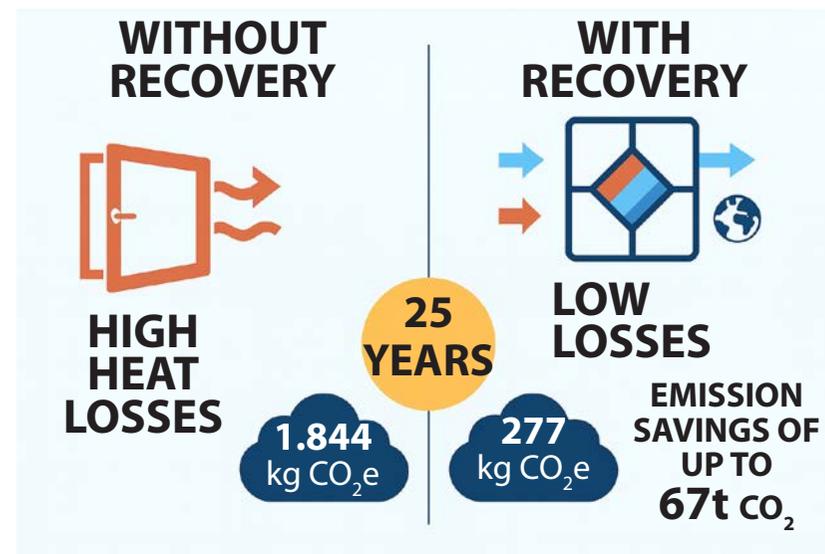
Annual Heat Loss from Ventilation

Without heat recovery	32,90	GJ*
With heat recovery	4,90	GJ*
Savings from recovery	27,90	GJ*

* gigajoule

Annual CO₂e Emission Balance

	Heating system type			
	Electric Direct Heating	Heat Pump	Gas Boiler	
Natural ventilation without heat recovery	6 500	2 600	1 809	in kg CO ₂ e
Mechanical ventilation with heat recovery	975	390	271	in kg CO ₂ e
Emissions from fan operation	743	743	743	in kg CO ₂ e
Emissions from preheater operation	23	23	23	in kg CO ₂ e
Emission savings	4 759	1 444	772	in kg CO ₂ e



CO₂e emissions balance over a 25-year life cycle

	Building heating method			
	Electric direct heating	Heat pump	Gas boiler	
Climate change – total (GWP-total) – sum of values from EPD	648	648	648	kg CO ₂ e
Emissions savings through operation	-118 974	-36 102	-19 305	kg CO ₂ e
Total balance (savings)	-118 326	-35 454	-18 657	kg CO ₂ e

After 25 years of operation in the Czech climate zone, the overall environmental balance is positive. During its entire service life, the ventilation unit with heat recovery saves up to 118 tonnes of CO₂emissions.

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