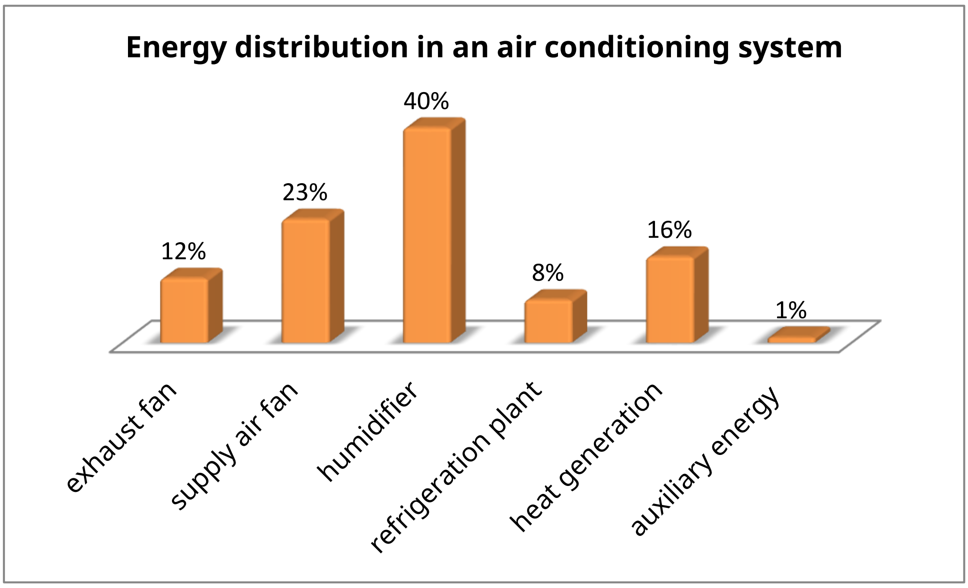
This project has received funding from the European Union's H2020 Coordination Support Action under Grant Agreement No. 894356.

Best Practice	REPLACEMENT OF FAN	HVAC-03
Application	Optimisation of HVAC systems	
SME sector	All	
SME Sub-sector	All	
Technical description	Volume flow of a ventilation system is the volume of transported air per unit of time. In many ventilation systems, the set flow is greater than necessary. Most of the time this comes from safety margins of 5-15% that are applied in the planning phase to guarantee the required values (MAK values, moisture load, air exchange rate, etc.). However, the more volume flow is delivered, the higher the energy used. In some cases, optimization of certain parts of the system is not sufficient enough. In this case, existing components can be exchanged for new, more efficient components. The following equipment parts can be affected: fan, coupling, motor.	
Recommendation for optimisation	When a fan does not operate at the nominal point, the efficiency quickly drops. This often linked to a bad appraisal of the network pressure drop or to recent changes in the network. A new fan design for the real operating point brings often high savings. To determine the operating point of a fan usually the flow rate and pressure is measured. With this information the operating point can be determined by using the manufacturers datasheet of the fan. If the actual operating point does not correlate to the nominal operation point corrective actions must be taken. In most cases these are safety margins of 5-15% that are applied at the design stage to ensure the required values (maximum values, humidity load, air exchange rate, etc.). However, the greater the volumetric flow rate delivered, the greater the energy used.	
Relevant technical considerations	Pressure reduction can be applied at any site of interest as long as the criteria for proper operation are met	

This project has received funding from the European Union's H2020 Coordination Support Action under Grant Agreement No. 894356.

Schemes and diagrams	
Economics	Fan replacement: approx. 1,500 EUR/kW
Energy savings	The energy saving, through the identification of operational needs and the installation of a new more efficient fan that operates at the point of maximum efficiency, is approx. 30%
Economic savings	Approx. 10-15%
Average Payback Time	3-6 years
Emissions	This measure does not involve further emissions.
Environmental benefits	Reduction in CO_2 emissions due to a reduction in electricity needs for cooling
Main NEBs (Multiple benefits)	☒ Environmental benefits ☐ Increased productivity ☐ Work environment/ Health/Safety ☐ Increased competitiveness ☐ Maintenance
Replicability	Medium
Related measures	• HVAC-01: Reduction of fan running time • HVAC-03: Replacement of fan • HVAC-04: Replacement of transmission system

This project has received funding from the European Union's H2020 Coordination Support Action under Grant Agreement No. 894356.

	• HVAC-05: Heat and moisture recovery • HVAC-06: Reduction of pressure loss • HVAC-07: Leakage reduction of pipes • HVAC-08: Replacement of motor
Case study	Installation of suction regulator and fan replacement (Austria, 2016) • Initial Situation: in 3 cases, the potential for optimisation has been identified for fans. First, at the stage of the "hot plasticization" process, plastic parts are connected with other parts by melting. The resulting air is extracted from a centrifugal fan (power: 5.5 kW). Secondly, in the boiler room due to the high heat generation, active ventilation by two fans on the roof (power 5 kW) was required. Thirdly, another fan on the roof was responsible for suction of paper dust. • Description of the optimisation: several measures have been implemented to achieve energy savings. First, the suction of the plasticizing units was adjusted, which reduced the necessary air flow. In addition, an on-demand controller was installed in the boiler room, which reduced the hours of operation. Thirdly, all old fans have been replaced by new and more efficient low-power EC fans (from 0.6 kW to 2 kW). Thanks to these measures, the total consumption of 98,800 kWh has been reduced by 75,800 kWh. • Implementation costs: 17,000 EUR • Payback Time: 3 years
References	Kulterer, K., Mair, O., Horvath, C.: Leitfaden für Energieaudits in Kältesystemen, klimaaktiv energieeffiziente betriebe, Vienna 2017

This Best Practice was developed by the Impawatt Project (GA No. 785041) and adapted for the GEAR@SME Project (GA No. 894356)