



Best Practice	HEAT AND MOISTURE RECOVERY	HVAC-05
Application	Optimisation of HVAC systems	
SME sector	All	
SME Sub-sector	All	
Recommendation for optimisation	<p>Basically, the classification of heat and moisture recovery is categorized in recuperative and regenerative systems. Recuperators are heat exchangers with separate chambers between the media that allow heat transfer. The air flows are always strictly separated in recuperators (eg. plate heat exchangers). Regenerators, on the other hand, function by exploiting an energy-storing mass through which exhaust air or fresh air flows alternately (for example, rotary heat exchangers). Both types are available with and without moisture recovery. The heat pump is an additional way of transferring the heat from the exhaust air to the supply air.</p> <p>Of the heat and moisture transfer plate heat exchangers and rotary heat exchangers are pretty much equal with the appropriate quality of execution.</p> <p>The technically simpler, more robust and less expensive solution is the plate heat exchanger. The low icing temperature of the rotary heat exchanger makes it particularly interesting for renovations where no geothermal heat exchanger can be implemented. Here, depending on the climate, you can completely spare the electric antifreeze register or set it to very low temperatures.</p>	
Technical considerations	<p>Disadvantages of plate heat exchangers are:</p> <ul style="list-style-type: none"> • no controllable heat or moisture transfer • relatively high icing temperature (approx. -2 to -4 ° C, with moisture recovery down to -10 ° C) • for summer use, a summer bypass is necessary to prevent unwanted heat recovery <p>Rotary heat exchangers use almost exclusively rotors with moisture recovery. Their basic advantages are:</p> <ul style="list-style-type: none"> • controllable moisture transfer or heat recovery (no bypass required) • deep icing temperature up to approx. -12 to -18 ° C <p>Disadvantages of rotary heat exchangers are:</p> <ul style="list-style-type: none"> • possible odor transmission - depending on type (with or without flushing) • additional power requirement for the rotor 	



	<ul style="list-style-type: none"> wear of the sliding seals - higher maintenance 	
Schemes and diagram	<p>ODA: Out Door Air SUP: Supply Air ETA: Extract Air EHA: Exhaust Air 1. Filter 2. Fan 3. Heat exchanger 4. Humidifier 5. Silencer 6. Engine flaps</p> <p>Sketch of a basic ventilation system</p>	
Economics	The cost of a plate heat exchanger varies from 600 to 1,800 EUR depending on the size (a 100kW plate heat exchanger for conventional systems costs approx. 1,000 EUR).	
Energy savings	Heat recovery saves an average of 30% of total energy consumption.	
Economic savings	Between 15% and 30% of the costs for the energy consumed.	
Average Payback Time	Less than 3 years	
Emissions	This measure does not involve further emissions.	
Environmental benefits	Heat recovery systems can greatly save fossil fuels. Reduction of CO ₂ emissions due to lower energy needs.	
Main NEBs (Multiple benefits)	<input checked="" type="checkbox"/> Environmental benefits <input type="checkbox"/> Increased productivity <input checked="" type="checkbox"/> Work environment/ Health/Safety <input type="checkbox"/> Increased competitiveness <input type="checkbox"/> Maintenance	The air quality (temperature and humidity) contributes significantly to human well-being and thus to optimal production conditions. Heat recovery systems can substantially save fossil fuels.
Replicability	Medium	
Related measures	<ul style="list-style-type: none"> HVAC-01: Reduction of fan running time HVAC-02: Flow rate reduction through variable speed variation (VSD) HVAC-03: Replacement of fan 	



	<ul style="list-style-type: none"> • HVAC-04: Replacement of transmission system • HVAC-06: Reduction of pressure loss • HVAC-07: Leakage reduction of pipes • HVAC-08: Replacement of motor
Case study	<p>Heat recovery system company "Collini Holding AG"(2018)</p> <ul style="list-style-type: none"> • Initial Situation: at the site, the buildings of the wastewater treatment plant are heated to at least 15°C by means of a heating register in the ventilation system. The need for space heating was 1,375 MWh for the year 2016. The heat resulting from the neutralization of the chemical substances is not recovered, because the containers are open at the top and gas out. Only the container for the pure hydrochloric acid is closed and provided with a suction device. • Description of the optimisation: in order to be able to use the waste heat from the exhaust air, the wastewater treatment plant is equipped with a heat recovery system. The heat recovery takes place via two identical heat exchangers (WT) with a rated output of 34 kW each. The use of energy from the WRG is mainly possible in the months of the heating season (15 October to 15 April). The design calculation of the manufacturer for these winter months has shown that the transmitted power of a WT averages 19.69 kW. The calculation also already takes into account a partial load of 75 percent of the nominal volume flow. In total, a heat potential from the exhaust air of 171,000 kWh/year is available with a running time of 4,344 operating hours per year. <p>The heat recovery system requires two exhaust fans. These are energy-efficient centrifugal fans of efficiency motor class IE4 with FU control. Compared to a model without FU control it results in a saving of electricity. The total running time of the plant is 7,500 operating hours per year.</p> <ul style="list-style-type: none"> • Implementation costs: 153,000 EUR • Payback Time: 9 years
References	<p>Gerstbauer, Ch., Kulterer, K., Gorbach,Ch., Brunner, W. : Leitfaden für Energieaudits von Lüftungsanlagen, klimaaktiv energieeffiziente betriebe, Wien 2013</p>

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