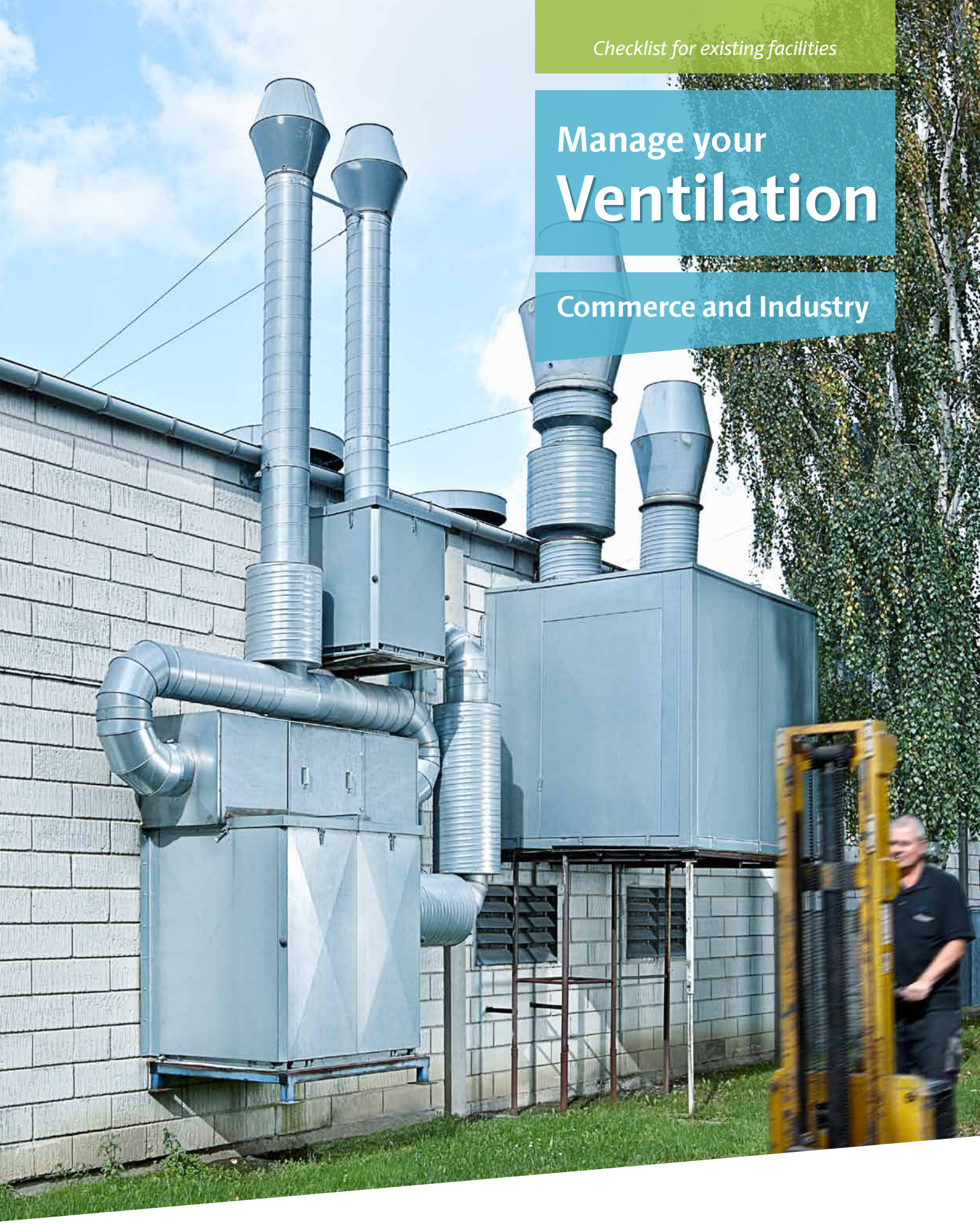
Checklist for existing facilities

Manage your Ventilation

Commerce and Industry



Use the Danish Energy Saving Trust's checklist
– and get a specialist to inspect your ventilation system

Go'Energi
Danish Energy Saving Trust

What to check	How to do it
Ventilation needs	
Check purpose of system	Ventilation needs are determined by your indoor climate requirements and by factors that impact on it.
	Check original and current indoor climate requirements. These are a mix of working environment requirements, and your requirements in relation to comfort, processes and machines.
	Check or map out original and current factors that impact on the indoor climate. Impacts are typically a mix of heat generated by human activity, IT equipment, lighting, machinery, etc. Finally, you should also take account of heat loss in the building envelope, solar energy ingress, as well as dust, gasses and odours from work processes and human activities.
	Check whether the requirements or the impacts have changed since the system was built, and whether you can retrofit the system and its control system so that it meets your actual needs.
Check if requirements vary	Check if requirements vary, and whether the control system manages the system in the most energy efficient way, 24-hours a day, all week, and all year. Evaluate the need for variable airflow, timer control and variable thresholds for temperature, moisture and air quality.
Settings	Check if airflow, room pressure, temperature and humidity are set with a suitable interval between high and low thresholds, and that it is possible to change these parameters to achieve even lower energy consumption.
Avoid wasting heating	It's better to heat with radiators than by using ventilation. Heating with ventilation may be a good idea if you use a lot of recirculation.
System efficiency	
SFP (Specific Fan Power)	Measure the total supply airflow and the total power of all motors. Calculate the specific consumption. The result should be less than 2.1 kW/(m³/sec) for the whole system.
Ventilator efficiency	Check if energy saving components are fitted such as energy efficient fans, motors, belts and fan housings. Consider replacing them with more efficient ones if not.
	Check that the size matches the requirements. Adjust the motor size and fit a variable speed drive for controlling the motors. Possibly change to a more efficient low resistance motor type (e.g. PM Motor).
Heat recovery	Check if you use heat recovery, and whether this is functioning optimally. Pressure loss should preferably be less than 150 Pa.
	If the efficiency is less than 60-70%, you should investigate the viability of replacing or optimising your heat recovery process.
Recirculation	Investigate whether you can increase the level of recirculation without compromising the indoor climate requirements.
	Check that the damper control system is configured so that it is always set to the lowest pressure loss.
	Check the pressure level in the mixing chamber when it is open for partial recirculation. Overpressure is a sign of too little fresh air – check the fresh air intake.
Filters	Measure the pressure loss across the filters in the ventilation system. The pressure should always be less than 200 Pa for a normal filter, and less than 80 Pa for a coarse filter. Make sure the filter is one of the recommended types, that it is clean, dry, has no holes, and that the edges are properly sealed.
	Check if the filters cover the complete unit cross-section, and consider the feasibility of having a larger filter area with lower pressure loss.
Cooling and heating coils	Measure the pressure loss across all heating and cooling coils. Clean as necessary and repair damaged fins. Pressure loss should be less than 25 Pa for heating coils and under 130 Pa for cooling coils.
	Check if the coils utilise the complete unit cross-section, and consider the feasibility of having larger coils with lower pressure loss.
Cooling coils	Pressure loss in the coolant circuit should not exceed 15 Pa in standard (not dehumidifying) cooling coils with a capacity under 30 kW/(m³/sec). Pressure loss should not exceed 25 Pa in coils with a capacity over 30 kW/(m³/sec) if these are also used as dehumidifiers.
	Cooling fluid temperature should preferably be 3-5 °C less than the required supply air temperature on the output side of the cooling coil. The cooling system is less efficient if you use unnecessarily cold fluid. This is because the compressor operates worse, and because the number of fresh air cooling hours will be less.
	Either you or the Building Monitoring System (BMS) should be able to vary the temperature of the water passing into the cooling coil between 6 and 13 °C.

What to check	How to do it
Heating coils	The pressure loss in the fluid circuit should not exceed 10 Pa.
	Hot water temperature must be as low as possible. Use a supply air temperature to the heating coil of 60 °C and an extract air temperature of 30 °C. Low temperatures increase the potential for heat recovery from process heat.
	Avoid using coils heated by electricity or steam.
Ducts	Ensure that you adjust the duct system as required to distribute the necessary airflow, e.g. every fifth year. Make sure that there is the least possible pressure loss across the dampers.
	Reduce the pressure loss by replacing long flexible hoses (> 20 cm) with fixed ducts, and install guide vanes in large bends. Replace any critical ducts with larger ducts. 'Best practice' pressure loss per metre is less than 1.0 Pa.
	Adjust duct pressure in the system by fitting self-regulating CAV control dampers so there is exactly the right pressure across the damper fitted furthest away in the system.
Automatic control	
BMS (Building Monitoring System)	Check that the system can control the fans as required. Use timer control and work with as big an interval as possible between the high and low thresholds for temperature and humidity values.
Measuring points	Check that all measurements and signals from the system are displayed correctly on the automatic control system (BMS). Typically, these include temperature, humidity, pressure, airflow, motor power, signals from HVAC switches, differential pressure switches, and other alarms.
Control signals	Check that signals for controlling fan motors, dampers, valves, pumps and rotary motors result in the correct response at the components.
Operation and maintenance	
Cleaning of ducts, etc.	Check that the ducts, dampers, cooling coils, heating coils, fans and motors are clean, dry and odour-free. Cleaning of the ducts often requires professionals, but you can clean everything else yourself. Make sure that the fresh air intake grilles are clean.
BMS (Building Monitoring System)	Ensure that the building monitoring system is regularly serviced. Remember to update and back-up the system, and make sure that the graphics and component numbers are up to date.
Insulation	Check that all ducts and pipework are properly insulated. You will often need to repair the insulation following work on or around the system.
Leaks	Check all duct connectors. Leaks often occur around inspection doors, diverters and components out in the duct system, including measurement points.
Filters	Replace the filters when pressure loss exceeds a fixed level.
Dampers	Check that all dampers can fully open and close without resistance. If the dampers are designed to be able to fully open and/or fully close, check that this actually happens.
Heat recovery	Check that the impeller in a rotary heat exchanger is clean and undamaged, and that it can rotate freely, and also that the unit does not leak between the cold and the hot sides. Verify that the belts and the motor are in good order, and that the speed chosen matches the one programmed by the control system.
Ventilators	Check that the right number of belts are fitted, that they are undamaged, and properly tensioned. Check that the pulley is not damaged. Check that all bearings spin freely, and that there are no vibrations. Check that the fan runs in the right direction.
Energy management	
	Larger ventilators (> 5 kW) should be fitted with an electricity meter. You should monitor the electricity consumption on an ongoing basis, and measure and calculate SFP values once a year.
Links to other resources	
	www.savingtrust.dk **www.spareventilator.dk (only in Danish)** **www.sparelisten.dk/doks/den_lille_blaa_om_spareventilatorer.pdf (only in Danish)** **www.vent.dk (only in Danish)** **www.byggeriogenergi.dk (only in Danish)**

To be completed by specialist

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Ventilation check carried out at:

Company: _____ Date: _____

Unit (unit no.) referred to: _____

Estimated energy consumption: Electricity: _____ Heating: _____

Observations:

SFP (Specific Fan Power) measurement if any: _____

Other: _____

_____

Recommended measures in order of priority are shown below:

Priority 1: Estimated payback period: 0-1 year
Priority 2: Estimated payback period: 1-5 years
Priority 3: Estimated payback period: over 5 years

Priority	Recommended measures

Conclusion/Next step:

_____

Carried out by Company/Name: _____

☐ Appendix enclosed. Attach the appendix separately if there is insufficient space on this page.

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Go'Energi
Danish Energy Saving Trust

Go' Energi is an independent public organisation creating energy efficiency in Denmark.