



## Energy Efficiency Solutions

### Efficient ventilation systems

Air quality is an important part of a guest's stay in any type of hotel. Guests can immediately recognize a poor ventilation system by the stagnant, polluted smell of the air in their rooms and common hotel areas. You should design a hotel's ventilation system so that it maximizes air flow and circulates oxygen.

#### Why is it highly recommended for my hotel to have a controlled ventilation?

Air quality: the quantity of fresh air needed depends on room occupancy and on activities within the rooms (for instance, bathrooms require important air renewal); therefore air renewal should be adjusted accordingly.

Reduction of heat loss: excessive ventilation should be avoided in cold conditions because it will result in important heat loss (ventilation may be responsible for up to 15% of heat loss in winter).

Need for cooling in hot conditions: over-ventilation may be very useful at mid-season or at night during summer in order to keep the hotel cool and comfortable.

#### Related criteria of the EU Eco-label:

- Heat recovery systems are dealt with by criterion # 37 (optional).

#### Which areas of my hotel should I ventilate?

##### *Hotel Kitchen Ventilation*

Kitchen Ventilation is important to remove heat, smoke, grease, steam, and combustion products. It helps to keep fresh air in the kitchen. Your hotel has the following advantages with kitchen ventilation systems.

- Keep your kitchen clean and safe
- Keep your kitchen staff in better environment
- Prevent food contamination from air borne sources
- Improve indoor air quality in your kitchen
- Prevent corrosion of kitchen equipment
- Control heating and cooling costs

##### *Hotel indoor pool ventilation*

Water evaporates no matter what temperature or what condition it is in, it will evaporate if left exposed. You can reduce the amount of evaporation by covering the pool when not in use but you can not eliminate it. If left uncovered the evaporation would produce high humidity's in the pool hall and promote mould and corrosion of the hotel building structure.



## *Hotel bathrooms*

Hotel bathrooms are one of the dampest rooms in your hotel. Without proper ventilation, you put them at risk of developing mold and mildew which can then spread and enter your hotel's air supply. Ensure that the bathroom ventilation system is operational while the bathroom is in use and that it remains on only for a few minutes after the light has been switched off. A time-delay relay is used to prevent the extractor from switching off immediately and to ensure that it remains on during an adjustable time-delay period.

## **Which solutions exist for efficient ventilation?**

Various solutions exist for efficient ventilation; the most reliable ones (as of today) are demand-controlled mechanical systems (\*). But these systems are worth considering only if air infiltrations at doors and windows are controlled in the first place! (\*) Natural and hybrid ventilation (which is partly mechanical, partly natural) may also be considered but this generally does not offer the same control over ventilation.

## **What is mechanical ventilation?**

Mechanical Ventilation draws air from the exterior of the building through ducting and fans to the space, the 'old' air is extracted from another area within the space to be released to the atmosphere.

## **What are the main existing types of mechanical systems?**

Exhaust-only or supply-only ventilation systems: in this case, only the air exhaust (or supply) is operated mechanically. Airflow can either be constant (without any possibility of adjustment) or adjusted with the technical solutions cited below.

- In guest rooms, for instance, air can be extracted mechanically from the bathrooms and supplied by openings in the façade.

Supply and exhaust ventilation systems: in this case, two fans are used: one brings fresh air in and another sends the indoor air out. This system gives you better control over the ventilation rate as the air supply is controlled. In addition, this type of configuration allows pre-heating of the incoming fresh air in winter if a heat recovery unit is placed on the exhaust air network. This improves indoor comfort and contributes to the reduction of space heating needs.

- Although this system requires additional electricity consumption for the second fan, energy savings resulting from the heat recovery generally exceed the additional electricity consumption.
- This system allows you to over-ventilate at mid-season and at night during summer (if designed for high air flows), thus lowering the needs for active space cooling.

A thermodynamic machine (a small reversible heat pump) may be coupled with the ventilation system to provide enhanced air heating and cooling.

- This system is well suited to noisy environments (contrary to natural ventilation or exhaust-only or supply-only ventilation systems).

## **How much energy can my hotel save by installing a mechanical ventilation system?**

- Use of a heat exchanger can save up to 50% of heat loss resulting from ventilation.
- If ventilation is responsible for 15% of the building heat loss, this results in a 7% saving on space heating.
- A study by CETIAT (Centre Technique des Industries Aérauliques et Thermiques, France) has also shown that you could save 50% on space heating in meeting rooms that are occupied 10% of the time by adjusting the ventilation airflow to the occupancy.





### Advantages Mechanical Ventilation

- Fresh air can be supplied with ease deeper within the building.
- Not dependant on outdoor weather conditions
- Air flow rate is easily controllable
- Air can be directed to allow the output to be passed through a passive heat exchanger

### What are the solutions available to adjust airflows to actual needs?

- Humidity control: air inlets and air extract units can incorporate humidity sensitive technologies (humidity being an indicator of a room’s occupancy and pollution); when the air humidity of a room is high, the airflow is increased,
- Time programmers: they can be used to switch a ventilation system on and off according to room occupancy.
- Presence detectors: Presence detectors such as CO2 detectors or movement sensors.

### Which are general recommendations for the regulation of mechanical ventilation systems?

- Supply and exhaust ventilation systems provide better comfort and give better control over the ventilation rate, but they are also more expensive. The choice between the two types of systems must be made according to consideration of the specific needs of the hotel in terms of ventilation, acoustic comfort, etc. Also, it is recommended to take into account your cooling-ventilation-heating needs because the choices of ventilation/heating/cooling systems depend on one another.

- Independent ventilation systems should be used for zones with very different activities and sources of pollution.

Room type	Possible air flow controls
Guest rooms	<ul style="list-style-type: none"> <li>▪ A presence detector is particularly recommended: either an on-off presence detector or a CO2 based detector</li> <li>▪ A humidity control can also be used</li> </ul>
Large restaurants	<ul style="list-style-type: none"> <li>▪ A CO2 detector can be used</li> </ul>
Kitchen	<ul style="list-style-type: none"> <li>▪ A humidity or temperature control is particularly recommended</li> <li>▪ A presence detector can also be used</li> </ul>

Note that ventilation control can be done either with an independent regulation system in each room or with a central (computer) system. It can thus be integrated in the Building Energy Management System (BEMS) of the hotel, together with space heating and cooling control. In this case, it is recommended to adopt zone control.

### How should my hotel proceed to choose and install a new mechanical ventilation system?

The application of a particular type of ventilation system depends on a number of factors such as occupancy and activities of rooms, etc. Given the technical complexity of this solution, we advise you to consult a qualified HVAC design company or installer to choose the right equipment for the specific needs of your hotel.





If you want to upgrade your exhaust-only ventilation system to a supply and exhaust ventilation system, it may be possible to reuse the exhaust air network but a suspended ceiling needs to be added for the air supply network.

If you decide to install a new ventilator, make sure that its electricity consumption is as low as possible.

Depending on the system configuration, it may be necessary to thermally insulate the air ducts and the heat exchanger – in particular if located in a non-heated part of the hotel.

## How much maintenance will my hotel mechanical ventilation system need?

Maintenance and servicing of a mechanical ventilation system is essential to maintain good hygiene and the energy efficiency of the equipment over time.

When a new system is installed, particular attention should be paid to providing an easy access to the system to enable servicing.

Air quality is also affected by the age and cleanliness of the ventilation devices in a hotel room. Clean air vents and fans with a duster to avoid blowing dusty air in the room.

## What is natural ventilation?

- Natural ventilation uses passive processes and makes use of the local micro climate to facilitate the air movement within the building.

## Advantages Natural Ventilation

- No noise produced in the operation of the system
- Completely passive so no energy required
- Minimal maintenance required
- Decreased capital costs

## Link with other solutions in the database

- Installation of an efficient ventilation system (solution n°XX) should be considered when upgrading the thermal insulation of the building (solution n°VII) or the windows (solution n°VI).
- To take advantage of all the benefits of an efficient ventilation system, it is important to prevent air infiltration and unnecessary outdoor air supply (solution n°VIII) and to upgrade the thermal insulation of the building (solution n°VII).
- Because you may want to install a cooling system that ventilates (and/or heats space) in addition to space cooling, it is recommended to consider your cooling-ventilation-heating needs all together when you think about replacing your heating equipment (solution n°XVII), ventilation equipment (solution n°XX) or cooling equipment (solution n°XIX).
- Note that ventilation can be operated together with space heating and space cooling with “all-air” central air-conditioning systems (see solution n°XIX).

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