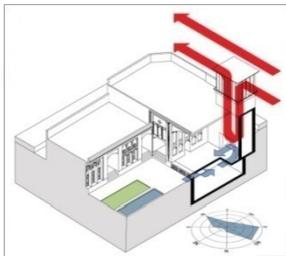


Ventilation, an essential requirement

Ventilation is a **basic need** to ensure a proper Indoor Air Quality (IAQ) and improve **quality of life & comfort** for people. A continuous **air renewal** is necessary for **health** by the **elimination of pollutants** (CO₂, Volatil Organic Components or VOCs), as well as **smells, spores** or **germs**. It also **reduces the humidity rate**, and thus the development of **moulds and acaroids**.

Some **natural ventilation solutions** such as **windtower** or "**barajeel**" systems ensured a basic comfort for the people through a natural cooling air renewal inside local dwellings till the 19th century (ex: Yazd, Bastakya district in Dubai). The need for ventilation is **old, basic and vital**.



Air conditioning and split-unit technologies have then been introduced in the buildings **to fight high temperatures**, but their noise and low thermal comfort are two main reasons to the change to central AHUs and FCUs nowadays. These systems ensure generally a really high level of cooling due to high cooling loads and a real lack of proper insulation. This leads obviously to **high energy consumption levels and lacks of thermal comfort**.

The first step in the sustainability pace is thus to work on the **envelope of the building** to ensure an efficient building **insulation, air tightness** and **shade**. This will lead to great **energy savings** by reducing the cooling load (low heat transfer and low air leakage), but it will also increase the need for an efficient ventilation system bringing outdoor air to **cure and improve the IAQ**. Indeed, all pollutants and VOCs trapped inside buildings will have to be removed effectively through a **continuous ventilation system**.



Absence of such adequate ventilation system with correct air flow rates will generate more and more **health issues** in particular for the most fragile (children, seniors). Some disorders from **building-related illnesses** to **sick building syndromes** lead also to increased employee sick days and **reduced work efficiency and productivity**.

In parallel, the evolution of construction and furnishing materials has generated diverse VOCs which are harmful to our health.



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The right to inhale an air that does not harm health is an inalienable right, as the right to drink a drinkable water. In the last decade, a substantial effort on the outdoor **air quality monitoring and supervision** has been made in major cities worldwide where the conjunction of strong heat and automobile pollution takes place (in Dubai: <https://portal.dm.gov.ae/AirQuality/airqualitymonitoring.htm>). Populations have started to integrate this aspect into "the collective unconscious".

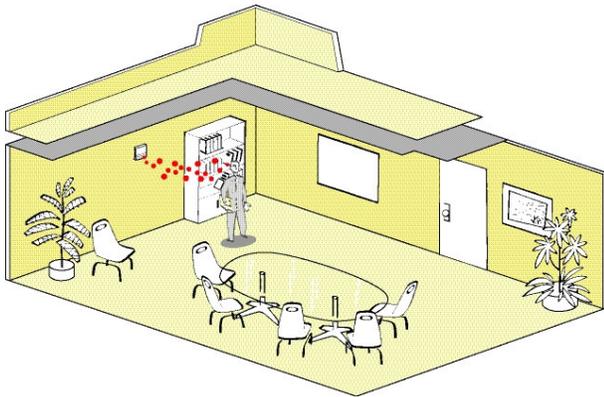
Why not making efforts for the buildings inside which we are spending **90 % of our time** and where the indoor air is usually **2 to 5 times more polluted** than outdoor air with formaldehyde, benzene, toluene (<http://www.epa.gov/iaq/voc.html>) Regarding these health risks, the population is still not really aware of them because of a lack of communication.

Numerous countries in the world have chosen carbon dioxide CO₂ as an IAQ indicator allowing to reveal the **pollution level** mainly **from human activities and materials**. High CO₂ concentrations are associated with occupant health, comfort and performance degradation.

The CO₂ threshold value from European standard EN 13779 for non-residential premises is fixed at **800 ppm** (parts per million) above the **outdoor level in between 350 and 400 ppm** according to the location and the season... To ensure a correct IAQ, any countries, authorities and designers should **enforce this common threshold**.

A daily average **air change rate of 0.5-0.6 ach** (*air change per hour: Vol/hour*) for housing is thus considered sufficient to achieve the CO₂ concentration limit of 800ppm above outdoor level and relative humidity of 60% at 18-20°C during occupancy.

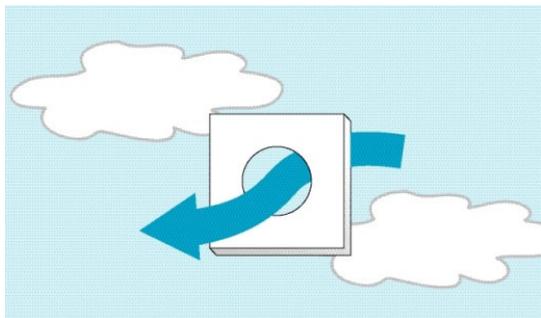
Many demand-control ventilation systems have been developed to **modulate** airflow rates according to the real occupancy inside a building, working hours... These systems can be timer-controlled, and they modulate generally airflows according to **optical detection, CO₂ or humidity level** preferably with a minimum airflow for dwellings. Indeed, the humidity is also a tracer for the ventilation, as in every breath cycle, people consume some oxygen O₂ and thus reject CO₂ and H₂O in identical quantity.



Other efficient ventilation systems are combining this approach of **IAQ and demand-control ventilation** with **energy recovery** ventilation for further **energy consumption control**.

These systems transfer the heat directly to the outdoor air for a free pre-cooling to limit the cooling from the central AHU or decentralized HRV units which are used more and more in new designs for schools for example.

The recovery efficiency overtakes now the 90%. So the cooling system has to compensate only 10% of the necessary air renewal cooling load (which means 0.05 ach).



For a good building preservation in temperate climate, for a good public and individual health, for the right of people to breathe healthy air, and also for the psychic and physical comfort of the inhabitants, **good ventilation is a MUST**. Efficient ventilation systems can also provide great **energy savings** when installed in **airtight and well-insulated buildings**.

Beyond the sanitary aspect, people expect to live with comfort by breathing **high IAQ** with low pollutant concentrations, but also by getting **thermal comfort** during both winter and summer. A secondary benefit of ventilation is that air can be an efficient carrier of calories or frigories, naturally present into the outdoor air, which may be warmed by the sun (recovery in the back of a solar cell), or cooled down in the ground (through geothermal ducts), or both through a heat pump (cf Aldes "Temperation systems" designed for the European market). Association with **renewable energies** can be numerous and they are not in opposition but totally complementary.



As regard to Middle East countries without any specific **ventilation regulations**, it is vital for the public interest to consider the following requirement defining and specifying the **need of ventilation**:

For healthy IAQ and hygiene purpose, dwellings have to benefit from an air renewal and pollutant extraction from any technical rooms (bathroom, kitchen, toilets...) to avoid any health hazards due to high indoor air pollution rates, and any condensation.

As a first step, we recommend that CO₂ concentrations calculated over one year shall not exceed 1200 ppm for more than 2 % of the year for conventional dwelling occupancy.

**Think ventilation
Think Aldes!**