

French policies in energy and indoor air quality

Emmanuel Acchiardi

MTES/MCT

France

1 INTRODUCTION

Indoor air quality and comfort of occupants, in the context of international commitments, reduction of energy consumption and greenhouse gas emissions is an important subject. The Paris Agreement of 2015 on Climate set ambitious targets to limit global warming. The energy and environmental challenges that we collectively face are translated by France into a proactive policy of reducing energy consumption and carbon footprint, particularly in the building sector, responsible for nearly 45% of national energy consumption and more than 25% of greenhouse gas emissions.

The ventilation of buildings, in which we spend nearly 80% of our time, is an important theme of this sector, because of its essential contribution to the quality of indoor air. Thus, public policies in terms of energy and environmental performance of the building must imperatively integrate the indoor air quality of the premises

2 ENERGY

2.1 Energy New buildings

Since 40 years, France has been committed to a strong policy of reducing building energy consumption. The first thermal regulation of 1974 was regularly reinforced, and its scope extended to non-residential buildings.

The thermal regulation 2012, currently in force, is applicable to all new buildings since 5 years. The successive thermal regulations have allowed to divide by 6 to 7 between 1970 and 2012 the energy consumption of the heating and hot water.

The current thermal regulation, which naturally takes into account heat losses due to air renewal, requires compliance with a conventional maximum primary energy consumption of new buildings. The following uses are involved: heating, cooling, lighting, hot water, and auxiliaries (pumps, fans). The regulation has increased the maximum permeability requirements of the envelope, thus greatly limiting air infiltration.

This regulation also sets requirements for bioclimatic need and summer comfort.

2.2 Existing buildings

Thermal regulation have also been introduced in existing buildings (housing and tertiary) undergoing renovation works.

The thermal regulation of the global existing, applicable since 2008 to buildings built after 1948, with a renovated surface area of more than 1000 m² and whose cost of thermal renovation works exceeds a threshold updated annually, imposes a level of overall thermal performance of the building.

For the other renovation cases, the thermal regulation of existing elements, applicable since 2007 and reinforced in 2017, requires, for the elements undergoing work (replacement or installation), the respect of minimum thermal performance.

In particular, it lays down requirements for the energy performance of ventilation auxiliaries and, for non-residential buildings, sets a need-based regulation requirement for new ventilation systems.

The thermal regulation of existing buildings includes requirements for the maintenance of initial ventilation conditions in case of work.

3 VENTILATION

The regulation on the ventilation of buildings has evolved over time, passing, for housing, from an obligation by opening windows, to a requirement of general and permanent ventilation since 1969.

These regulatory requirements are intended to provide adequate ventilation and to avoid exposing occupants to pollutant concentrations of indoor air.

3.1 New housing

The main principle of regulation is: new housing must benefit from a renewal of the air and a evacuation of the emanations such as indoor air pollution levels are not a health hazard.

Condensations must be avoided

These requirements naturally come under normal conditions of occupancy.

The regulation is not intended to evacuate large quantities of pollutants produced during activities such as painting, cleaning, cooking, or pollutants related to the presence of certain materials.

The implementing decree of March 1982 imposes a general and permanent ventilation of the dwelling, and sets minimum flow rates of extracted air in service rooms (kitchen, bathrooms, toilets) according to the number of main rooms. The decree specifies that the extraction of air can be mechanical or by natural draft duct.

The amending decree of October 1983 opened the possibility of automatic modulation of the flow rates, the flow rates being reduced provided that the system benefits from an authorization.

The thermal regulations have favored a large use of this possibility, and today, new homes are equipped with systems, which automatically regulate flow rates according to the humidity rate, thus taking into account the actual occupancy of the dwelling (first steps towards "intelligent ventilation").

With regard to new non-residential buildings, the aeration requirements are set out in the labor code.

For rooms with specific pollution, the ventilation rate is determined according to the nature and quantity of pollutants emitted.

3.2 Existing buildings

Concerning existing buildings, the thermal regulation of the existing one imposes, in housing as tertiary, requirements aiming not to degrade the initial conditions of aeration.

The "global" regulation provides that the renovation works must maintain a general and permanent ventilation system if one already existed. In the opposite case, the renovation work must be accompanied by the maintenance or the installation of a system allowing to ensure a minimum renewal of air by room, either mechanically or by opening windows, or by a mechanical or natural system providing general and permanent ventilation.

The regulation "by element" provides that the new windows installed in the main rooms of housing and schools must be equipped with air intakes, except in rooms already equipped.

It also provides that the thermal insulation works of the walls must retain the existing high and low air intakes.

In addition, the “decent housing decree” of 2002, amended in 2017, sets specific requirements for rental housing: the opening devices and any ventilation devices in the dwellings must be in good condition and allow a renewal of the air and a moisture evacuation adapted to the needs of normal occupancy of the dwelling.

3.3 Conclusion

As you can see, France has a substantial regulatory arsenal on building ventilation, and the thermal regulation takes into account the minimum air renewal concerns. Changes in these regulations must be made by integrating indoor air quality concerns.

4 NON-REGULATORY ACTIONS

4.1 NATIONAL HEALTH ENVIRONMENT PLAN

The current National Health Environment Plan (2015-2019 period) has integrated the Action Plan on indoor air quality, including information, training, development of pollutant emission labeling, improvement of knowledge.

4.2 OBSERVATORY

The Observatory of Indoor Air Quality (OQAI), created by the public authorities in 2001, carries out national campaigns on different living spaces with measures of pollutants of indoor air in real conditions of occupation: housing, offices, schools, medico-social institutions. A second housing campaign is under study. The information collected provides to government information to guide public policy.

The data of the previous national housing campaign have thus made it possible, since 2012, to introduce the mandatory labelling of emissions of volatile pollutants from construction and decoration materials.

A program of the observatory, carried out on new or renovated housing, has shown that the pollutant concentrations of indoor air were generally lower than those observed on the housing stock existing.

Improving the energy performance of buildings, including their airtightness, is not likely to affect their indoor air quality.

The data provided by the observatory allows the public authorities to prepare the various phases of entry into force of the indoor air quality monitoring system in certain public establishments, particularly with regard to the choice of substances.

The law – the environmental code - requires periodic monitoring of indoor air quality in certain public buildings with an evaluation of the means of aeration and provisions relating to the quality of indoor air.

It came into force this January in institutions receiving children.

The evaluation of the aeration means consists of visual checks of the actual possibilities of aeration (doors opening on the outside, easy access to these openings, visual inspection of existing ventilation).

Other public buildings will be concerned by next 5 years (2023) and the preparation of future texts will be based on the results of observatory measurement campaigns.

4.3 VENTILATION CLUB

The right application of the decree of 1982 checked by the controls carried out by the State, show 50% of non-conformities, even in the most recent constructions, with a low air

permeability of the envelope. The significant reduction in air infiltration gives a major role to the proper functioning of the ventilation systems.

It's the reason why the DHUP (administration) created a Ventilation Club, 3 years ago, associating professionals from the sector, with the aim of pooling observations and reflections, and improving the quality of ventilation systems.

This Club has notably initiated work on the analysis of nonconformities and the means to avoid them.

The club has created a reference website, in order to make available to professionals the regulatory texts, reference documents, frequently asked questions, etc.

The Club also has a validation role, for example for the application of the control protocol upon receipt of mechanical ventilation systems.

It is a place of reflection for professionals on the measures that seemed the most effective to improve the quality of ventilation systems. Professionals drawn up a paper with the proposal for the introduction of a certificate to take into account the aeration regulation.

The exchanges between professionals within the Club have highlighted a problem of moisture at the end of the construction site.

The end of construction is indeed sensitive because the materials in the drying phase are in closed rooms to protect them from break-ins, while ventilation is not yet in operation.

Professionals are considering strategies to naturally ventilate or provide temporary site ventilation to address this.

5 PROSPECT: REWRITING THE CONSTRUCTION RULES

An innovative approach is underway as part of a new law passed last August.

This law empowers the Government to make "any measure aimed at facilitating the realization of construction projects and promoting innovation".

It is provided 2 texts:

- a first text authorizing building owners to derogate from certain construction rules provided that proof of the achievement of results equivalent to the rules is provided,
- a second text establishing a permanent right for building owners to meet their obligations: either by following objectives of regulatory means or by implementing other means to achieve equivalent results.

This will lead to re-writing the construction rules in performance-based form and no longer in the form of means requirements, which is an important change and will open up a wide range of possibilities for professionals.

This law is a real revolution thanks to the freedom offered to professionals and builders to design high-performance and quality buildings.

We are confident that new building design solutions for indoor air quality can be created.