Improving IAQ in school and Non-residential buildings: case studies

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ABSTRACT

When energy savings are often opposed to the need to renew classroom air, Cerema and Ifpeb wanted to demonstrate by example that a balance was possible. The *Hub Air Energie* project brought together a community of public and private stake-holders willing to combine good indoor air quality (IAQ) with controlled energy consumption. For a period of 24 months, 10 schools and 5 commercial buildings have been supported and monitored. Each partner's individual learning experience was structured around 4 pillars: Understand, Analyze, Act and Exchange. Workshops were organized in each site to raise awareness among the occupants.
Here are some of the key messages coming out from this experiment:

- Characterizing the objectives of a good IAQ, easily measurable over time, around 3 compounds (carbon dioxide – CO_2, total volatile organic compounds – tVOC, and fine particles – $PM_{2.5}$), gives an initial indication of the overall state of IAQ at the site, easily understandable by stake-holders.
- IAQ was quite good on the panel of 15 *Hub Air Energie* buildings, but buildings with mechanical ventilation achieved better overall IAQ than buildings without ventilation system. Buildings using only airing through windows for air-renewal, but implementing a reinforced airing protocol, achieved IAQ levels, in some rooms, close to those of sites with defective mechanical ventilation systems (design, implementation, maintenance).
- A mechanical ventilation system has a significant effect on the reductions of CO_2 and $PM_{2.5}$ concentrations, but its impact on tVOCs concentration was not as significative on the panel studied (occupants have a key impact on these peaks, identifying sources of pollution remains essential).
- Energy efficiency must be a lever for progress in IAQ. It is economically more accessible to integrate IAQ criteria alongside energy criteria right from the design stage. In operations, the team found it easier to integrate IAQ reflexes alongside energy reflexes, rather than making them a separate subject. The same contact person should be able to handle both subjects in synergy.
- Setting up a commissioning for a new ventilation system, or re-commissioning of existing one, helps to ensure that fresh air is delivered to the right place at the right time.

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To complete this approach and to go further in the dissemination, this project continues with a dissemination task in the *CleanAirBouw* project, funded by Interreg France-Wallonie-Vlaanderen (project management: Université Littoral-Côte-d'Opale; dissemination management: Cerema). This task of the *CleanAirBouw* project focuses on 3 target audiences: schools (the target of interest in this topic), students and professionals. For schools, an IAQ challenge will be organized between September 2026 and June 2027, among 20 schools in the Hauts-de-France region and Belgium, with 2 classes per school. The objectives for the 40 participating classes is to achieve:

- the best possible IAQ over the duration of the challenge,
- the best progress,
- and the best communication with non-participating classes in their school.

Workshops will be held throughout the year to raise awareness on IAQ issues and on improving it in the classroom. If this new experimentation is successful, it should induce a wider offer to local authorities in the 2 countries.

KEYWORDS

IAQ, air renewal, energy consumption, school, dissemination