Assessing ventilative cooling potential in Energy Performance regulations

Webinar 2015/12/08

Ventilative cooling in the French Regulation.

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French regulations

RT2012 : French thermal regulation

Energy needs
Bbio < Bbio max

Energy used
On average, Cep < 50 kWh/m².year

Summer comfort
Tic < Tic Ref

French regulations / ventilation

Residential building : Decree of March 1982 : “Aeration of the housing must be general and permanent at least during the period when the outside temperature requires to keep the windows closed.”

Other buildings : minimum air flow rate depending on the type of buildings
Natural ventilation strategy

1- Empirical model for monozone is used at each time step (1 hour)

\[ Q_v = \left( C_0 \times A_{ouv} \times \sqrt{C_1 \times C_2 \times V^2 + C_3 \times h \times \Delta T} \right) \]

\[ C_0 = 1800; \ C_1 = 0.001; \ C_2 \geq 1; \ C_3 = 0.0035; \ h: \text{height of the opening} \]

2 - Aouv: depending on the external temperature, the internal external temperature difference and the type of windows.

3 - COMETh: COre for Modeling Energy and Thermal comfort

Example

House in the south of France, (150m²; 1 level)
Mechanical ventilation

The windows are open
The extra flow rate is on

<table>
<thead>
<tr>
<th>mode</th>
<th>consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without extra ventilation</td>
<td>8 kWhep/m².y</td>
</tr>
<tr>
<td>extra ventilation</td>
<td>10.7 kWhep/m².y</td>
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</tbody>
</table>
Conclusion

Ventilative cooling – i.e., the use of natural or mechanical ventilation strategies to cool indoor spaces – is already implemented in the French thermal regulation RT 2012, both for residential buildings and for commercial buildings. Opening windows and night mechanical ventilation allow to reduce indoor temperatures and to maintain a comfortable thermal environment. This allows to delay the startup of air-conditioning systems. On cases presented and with our hypotheses, opening windows seems more effective and it does not consume energy.
Bibliography

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