

# IEA-EBC ANNEX 86: A PERFORMANCE BASED ASSESSMENT METHOD OR A RATING ECOLOGY?

*AIVC workshop Stuttgart*

## **IEA-EBC Annex 86**

### **Energy Efficient IAQ Management in residential buildings**

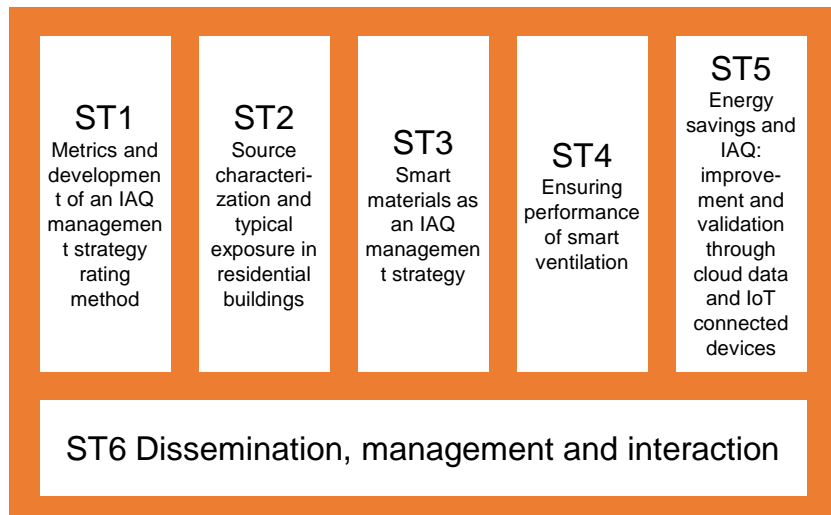
## Scope and Goals

Provide a framework to improve energy efficiency of IAQ management for

### Residential buildings

both new construction and refurbishment

To select metrics to assess energy performance and indoor environmental quality of an IAQ management strategy and study their aggregation  
To improve the acceptability, control, installation quality and long-term reliability of IAQ management strategies by proposing specific metrics for these quality issues  
To set up a coherent rating method for IAQ management strategy that takes into account the selected metrics  
To identify or further develop the tools that will be needed to assist designers and managers of buildings in assessing the performance of an IAQ management strategy using the rating method  
To gather existing or provide new standardized input data for the rating method  
To study the potential use of smart materials as (an integral part of) an IAQ management strategy  
To develop specific IAQ management solutions for retrofitting existing buildings  
To benefit from recent advances in sensor technology and cloud-based data storage to systematically improve the quality of the implemented IAQ management strategies, ensure their operation and improve the quality of the rating method as well as the input data  
To improve the availability of these data sources by exploring use cases for their providers  
To disseminate about each of the above findings.



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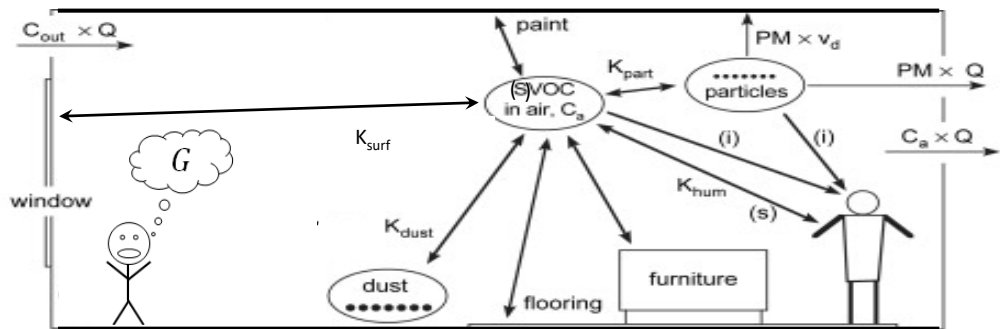
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## A bit of history about this annex

- Annex 68: Indoor Air Quality Design and Control in Low Energy Residential Buildings



Mash-up of Weschler et al. & Dols, 2020, <https://doi.org/10.6028/NIST.TN.2095>

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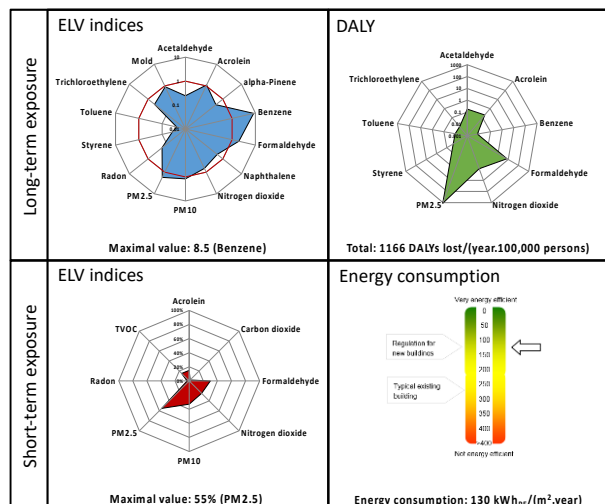
## Rating?

A set of performance indicators

Comparing cases

Ranking options / engineering case

Across buildings / generic options



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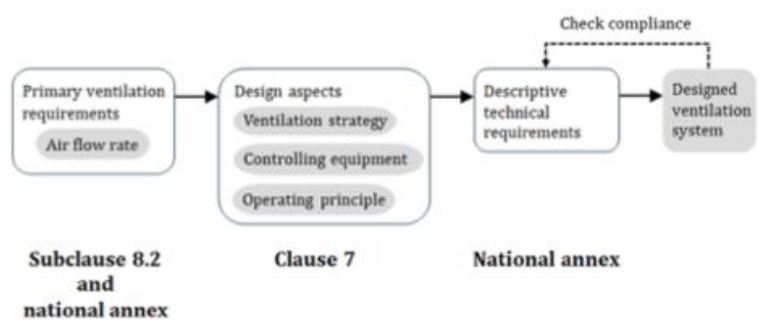


Figure 9 — Overview of the prescriptive approach

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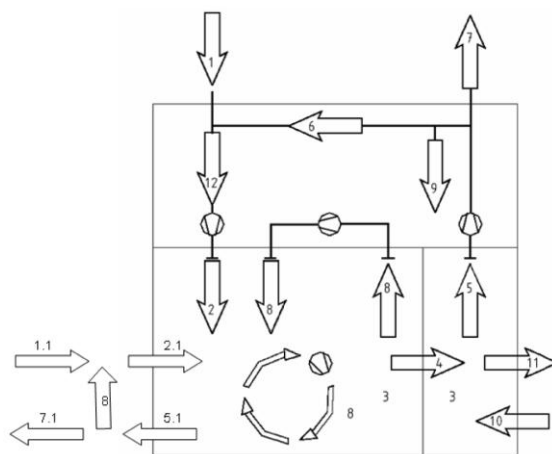


Figure 2 — Illustration of types of air using numbers given in Table 7

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## A bit of history about this annex

- Annex 68: Indoor Air Quality Design and Control in Low Energy Residential Buildings
- Remaining questions:
  - How to assess the performance trade-off between solutions for maximizing energy savings while guaranteeing a high level of maintaining indoor air quality in residential buildings?
  - How to identify optimal solutions?
  - How to include operational constraints and durability?



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“Turn left at the next traffic lights, then take the fourth street to the right, go right ahead at the first roundabout, turn to the right at the second roundabout and keep the left lane, then turn  
.....”



Spekkink, D. 2005. Key note presentation on PeBBu, CIB Conference, Helsinki, 2005

“To the airport!”



Spekkink, D. 2005. Key note presentation on PeBBu, CIB Conference, Helsinki, 2005

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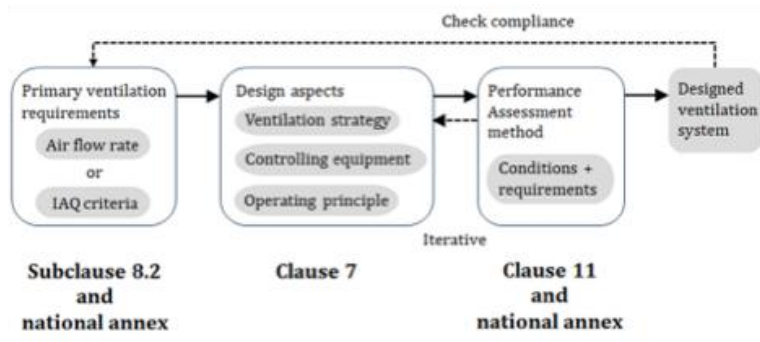
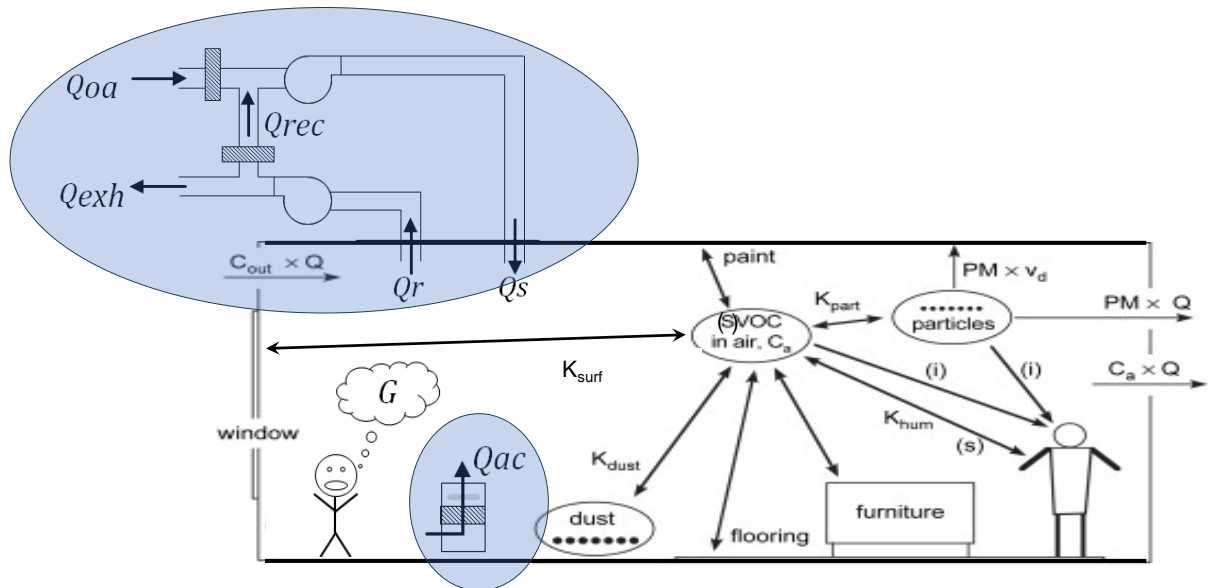


Figure 8 — Overview of the performance-based approach

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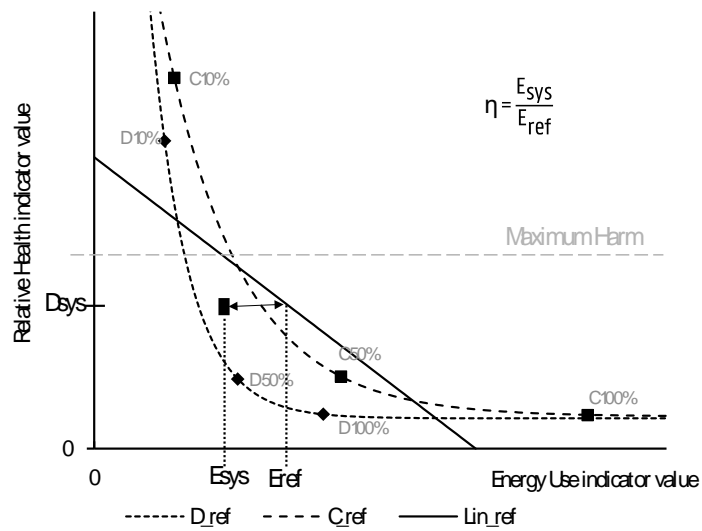
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Mash-up of Weschler et al. & Dols, 2020, <https://doi.org/10.6028/NIST.TN.2095>

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De Jonge, 2024

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## IT'S A METHOD, NOT AN ALGORITHM



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## AN IAQ RATING 'METHOD'

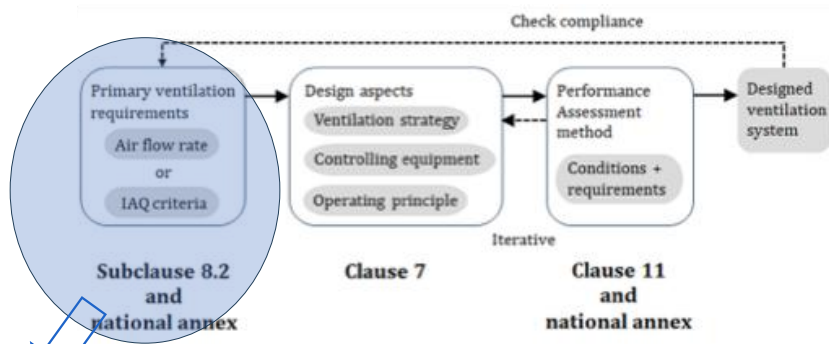


Figure 8 — Overview of the performance-based approach

ST 1: health, resilience

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## AN IAQ RATING 'METHOD'

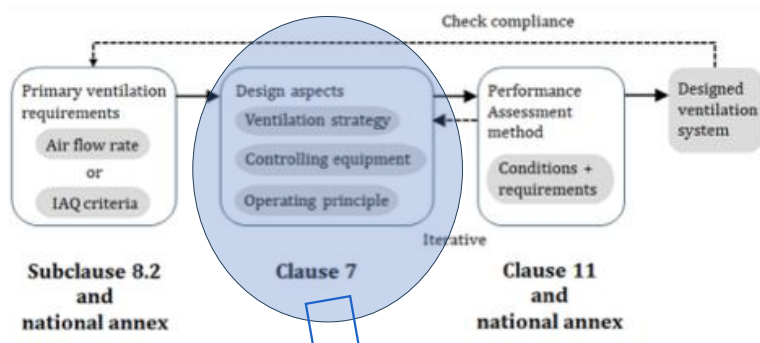
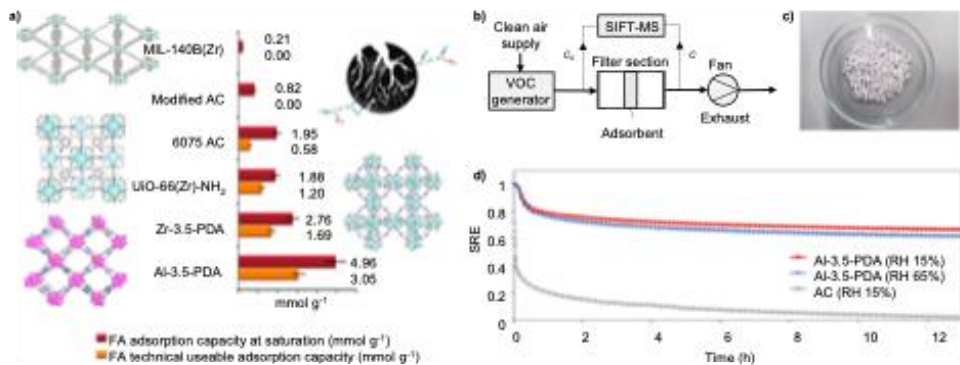


Figure 8 — Overview of the performance-based approach

ST 3: smart materials  
ST 4: smart controls  
ST 5: IoT

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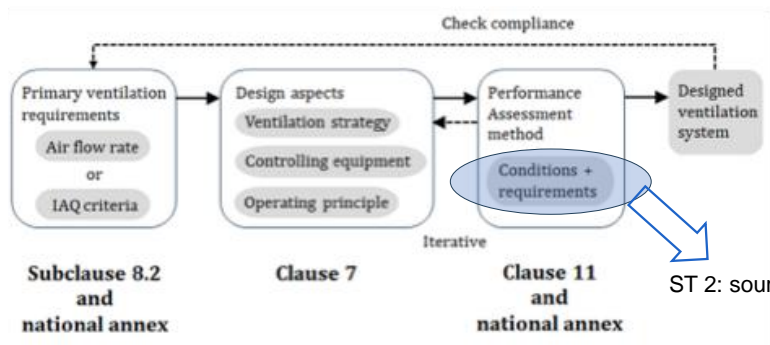
**Fig. 2 | Formaldehyde adsorption performances of investigated adsorbents.** **a** FA adsorption capacities of the investigated materials at saturation (red bars) and technical useable adsorption capacities (orange bars), measurement error bars  $\pm$  5% in black lines. In the structural schemes, Zr clusters are represented in light blue, whereas Al clusters are in pink; **(b)** Experimental setup for the single-pass

removal test; **(c)** Al-3.5-PDA extrudates; **(d)** FA single-pass removal efficiency (SRE) of shaped Al-3.5-PDA and activated carbon under different relative humidity levels. (test conditions: temperature: 23 °C, flow rate: 74 mL s<sup>-1</sup>, face velocity: 0.15 m s<sup>-1</sup>, the mass of adsorbent: 8 g, inlet FA concentration ( $C_0$ ): 0.2 mg m<sup>-3</sup> (0.163 ppm)).

<https://doi.org/10.1038/s41467-024-53572-z>

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## AN IAQ RATING 'METHOD'

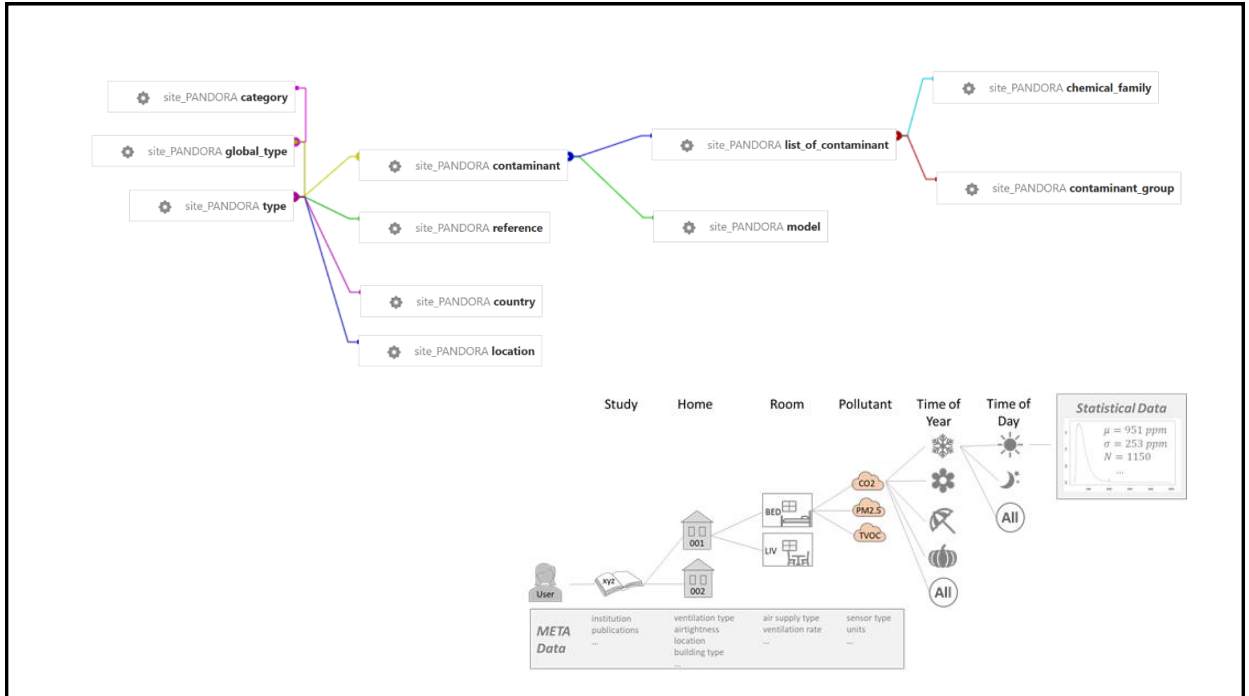


**Figure 8 — Overview of the performance-based approach**

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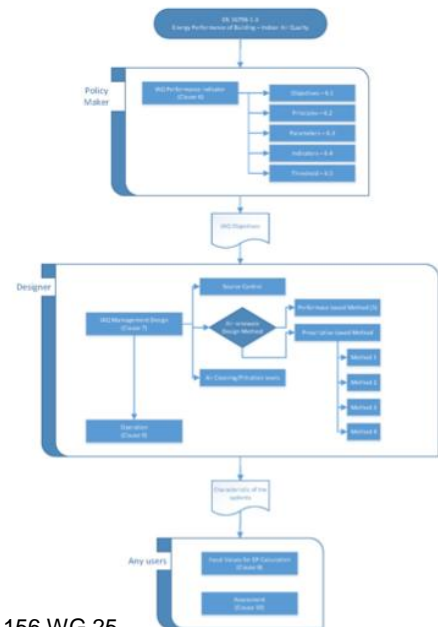
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## A RATING ECOLOGY

A definition: the totality or pattern of relations between organisms and their environment.  
(Merriam-Webster dictionary)



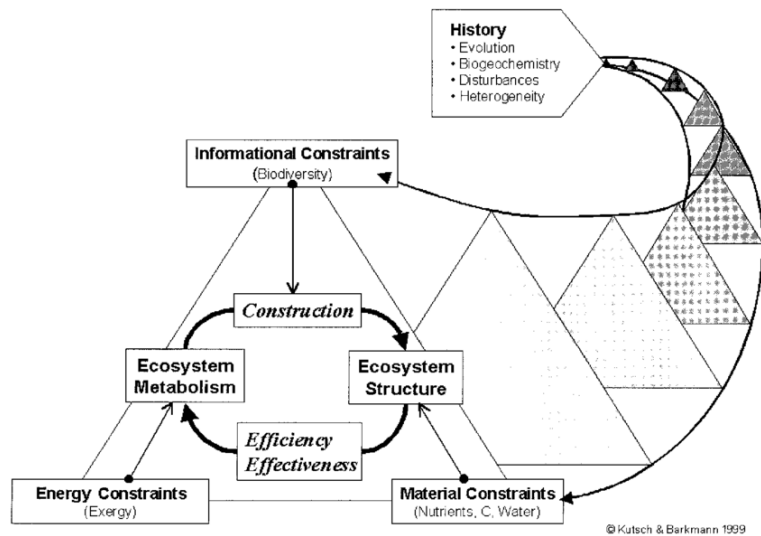
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