

# Rationale: A need for inclusion of IEQ in the scope of deep energy renovation

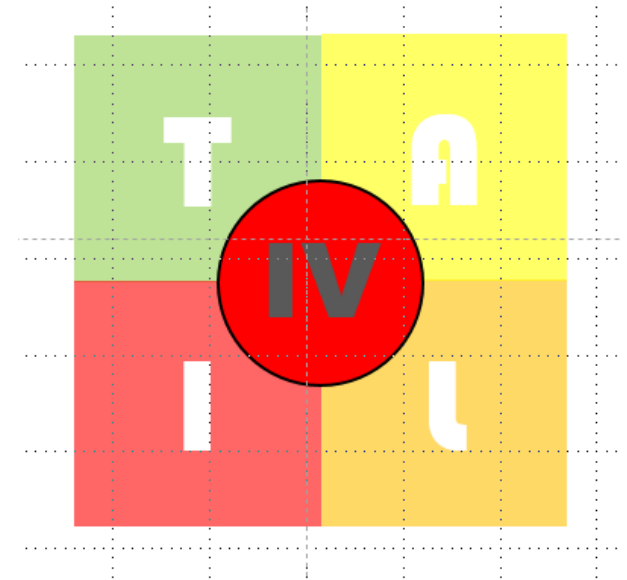
- 1) To guarantee that IEQ is not degraded during renovation.
- 2) To document any improvements in IEQ after renovation.
- 3) To estimate potential additional benefits from renovation including benefits for health and well-being, as well as the financial benefits from improved productivity and increased value of a building on a market.
- 4) To satisfy EPBD mandate.



# A new method for IEQ rating - the TAIL index

Four components:

- **T**hermal environment
- **A**coustic environment
- **I**ndoor air quality
- **L**ight – Luminous (visual) environment



Overall IEQ:

- I II III IV

*Wargocki et al. (2019) ASHRAE Journal*



# Parameters selected to define TAIL components

	IEQ parameter	Measured	Modelled	Visual inspection
<u>T</u>	Indoor temperature (°C)	x	(x)	
<u>A</u>	Noise level (dB(A))	x		
<u>I</u>	CO <sub>2</sub> (ppm)	x	(x)	
	Ventilation rate (L/s)	x	(x)	
	Formaldehyde (µg/m <sup>3</sup> )	x		
	Benzene (µg/m <sup>3</sup> )	x		
	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	x		
	Radon (Bq/m <sup>3</sup> )	x		
	Indoor air relative humidity (%)	x	(x)	
	Visible mold (cm <sup>2</sup> )			x
<u>L</u>	Daylight factor (%)		x	
	Illuminance (lux)	x		



# Summary of IEQ rating developed by ALDREN

- TAIL is the **framework** for rating of IEQ and its components. It can be used to develop other metrics compatible with TAIL.
- TAIL is an integrated comparative index describing IEQ level in offices & hotels that undergo deep energy renovation – it is used for rating of IEQ level **before and after** renovation.
- TAIL integrates all IEQ components and is based on **actual IEQ conditions** and measuring results. No arbitrary credits are given.
- TAIL treats all IEQ components equally. **No weightings** are used.
- TAIL complements the existing approaches for IEQ ratings and addresses EPBD mandate.
- TAIL is **compliant with major certification schemes**, EN16798-1 and Level(s).
- TAIL needs validation.
- TAIL may be extended (used) to schools and homes; must be verified.
- Even though TAIL may be perceived as fairly crude, it is expected to increase the interest of **investors** in IEQ and the rate of renovations.

