



**THIRD SCIENTIFIC MEETING**  
**Working Groups and Management Committee**  
**New Sensing Technologies for Indoor Air Pollution Monitoring**

**Istanbul (Turkey), 3 - 5 December 2014**

Bahcesehir University - Ciragan Caddesi Osmanpasa School Sokak, No. 4 - 6,  
34353 Besiktas Campus, Istanbul, Turkey

## Highlights from Belgian and EU projects on IAQ and Health: future needs for sensor technologies

E. Goelen, M. Stranger, J. Theunis

Environmental Risk and Health Unit, Air Quality Measurements

# Non-ideal IAQ

» Accounts for 2 million DALY's/year within a population of 480 million (asthma, cardiovascular diseases, COPD, lung cancer, SBS, respiratory infectious diseases and acute CO intoxication) (*ENVIE project final activity report*)

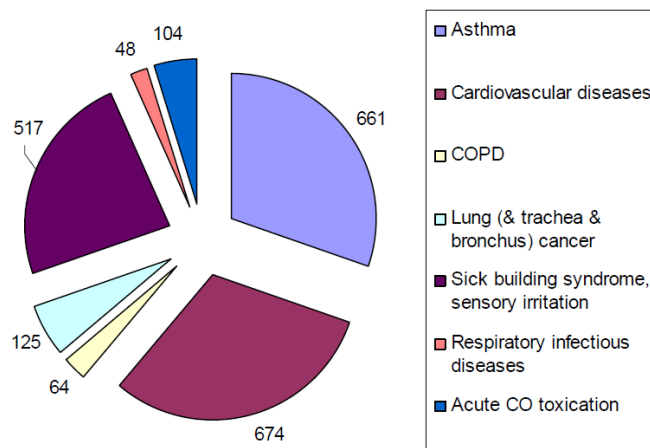


Figure 4. Contribution of non-ideal IAQ to symptom and disease burden in Europe, DALYs per year (thousands). ETS is not included.

→ *Initiation of various research projects to further assess IAQ and sources*

# Non-ideal IAQ

- » EU projects on IAQ and source identification/quantification:
  - » EPHECT (emissions of consumer products)
  - » Officair (modern office material emissions)
  - » Sinphonie (indoor air quality @ school)
  
- » National projects on IAQ and source identification/quantification:
  - » Surveillance of health-complaint free houses
  - » BiBa (IAQ @school)
  - » Clean Air Low Energy (IAQ @ sustainable buildings)
  - » Renovair (IAQ @ renovated buildings)
  - » Health Complaint houses (IAQ @ health complaints)

# Non-ideal IAQ

- » Impact of **outdoor** environmental conditions on the indoor environment : **NO<sub>2</sub>, BTEX, and PM<sub>x</sub>**
- » Impact of **indoor** sources : **ventilation, building materials, furniture, decoration, cleaning products** : indoor aldehydes and VOCs
- » *passive samplers for **aldehydes** (Umex 100, SCK) and **VOC** (Radiello) measurements; complementary active sampling on Tenax.*
- » ***PM** studied gravimetrically (PM<sub>2.5</sub>, Harvard type MS&T area samplers), further characterisation steps (XRF, electron microscopy, EC/OC analysis, ...).*
- » **CO<sub>2</sub>, temperature and relative humidity**

# e.g. Indoor Air Quality studies in Belgium

- » Evaluation of IAQ in 450 houses in Flanders (2008 – 2012; 2012-...)
  - » environment, geographical position, building age, building type, ...
  - » typical “health **complaint-free house**”
- » Evaluation of the IAQ in 90 classrooms in Flanders (2010)
  - » environment, geographical position, building age, building type, ...
  - » typical “health **complaint-free classroom**”
- » Evaluation of the IAQ in 50 indoor sites in energy-efficient buildings (2012)
  - » Air tightness, ventilation rate, IAQ
  - » typical “health **complaint-free sustainable building**”
- » Evaluation of IAQ in  $\pm$  70 “health **complaint houses**” (2008-2012; 2012-...)
  - » cause, building age, building type, ...

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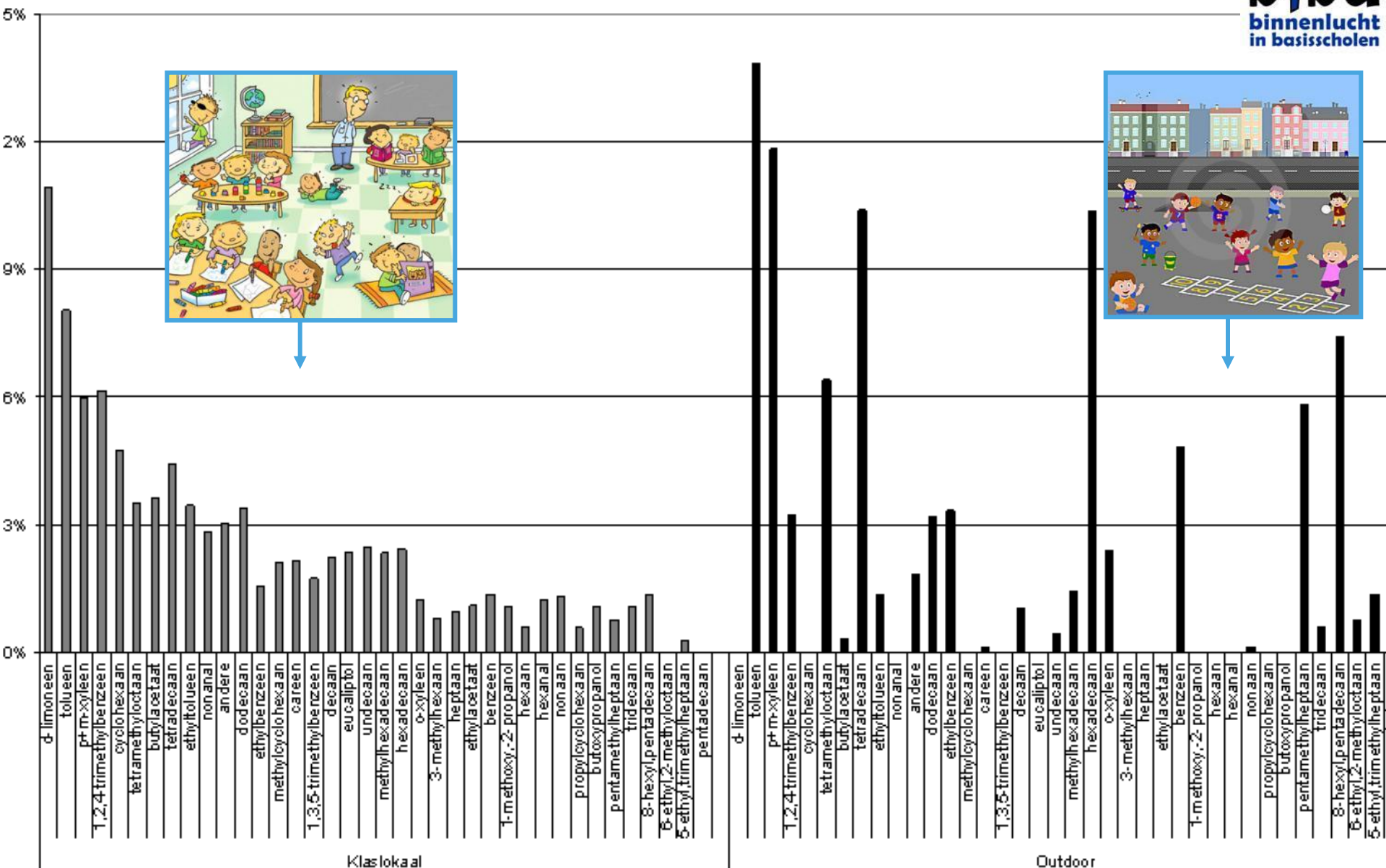
- » Evaluation of IAQ in ± 70 “health complaint houses” (2008-2012)
  - » cause, building age, building type, ...



# Indoor air quality at school

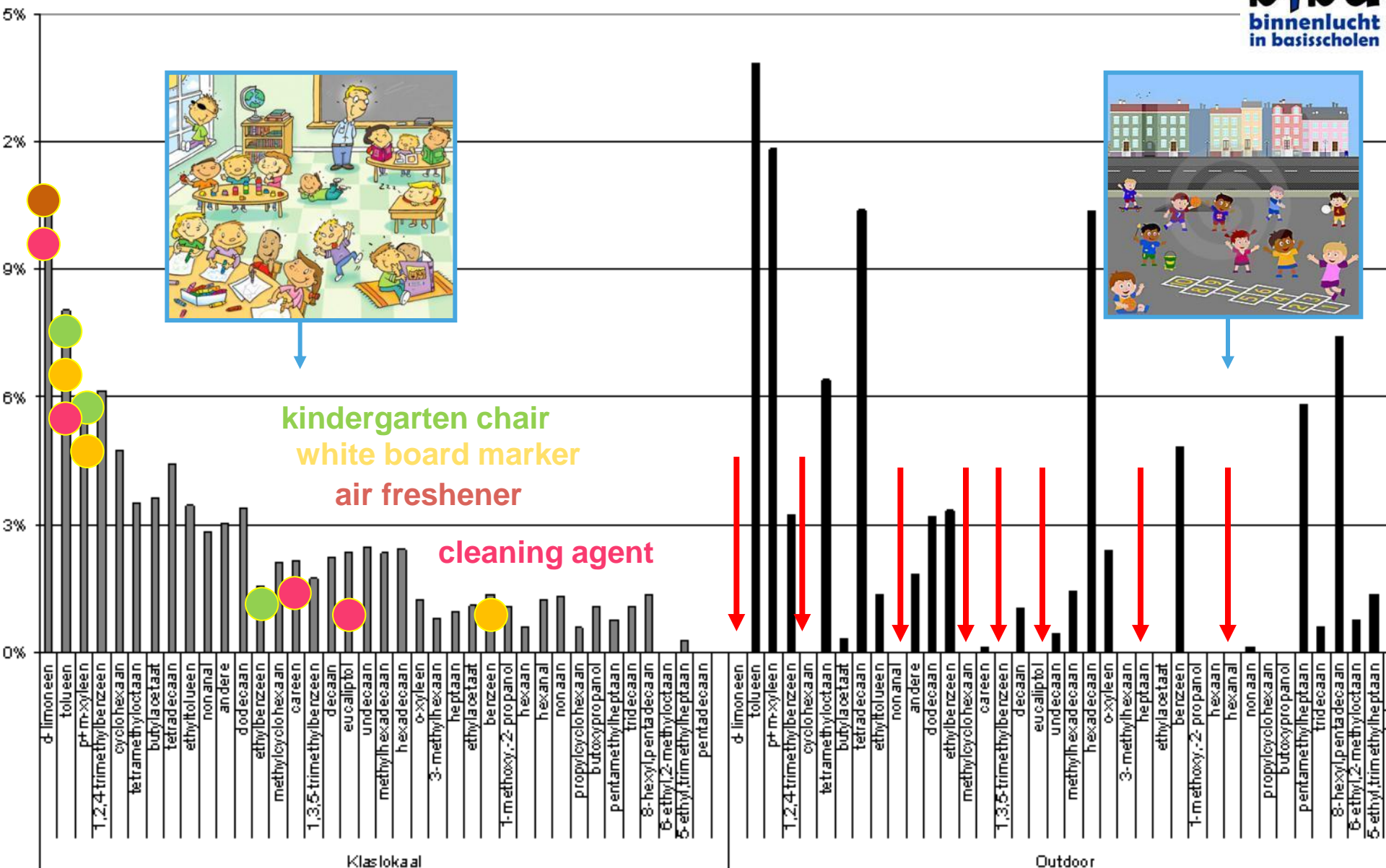


# biba indoor and outdoor VOCs





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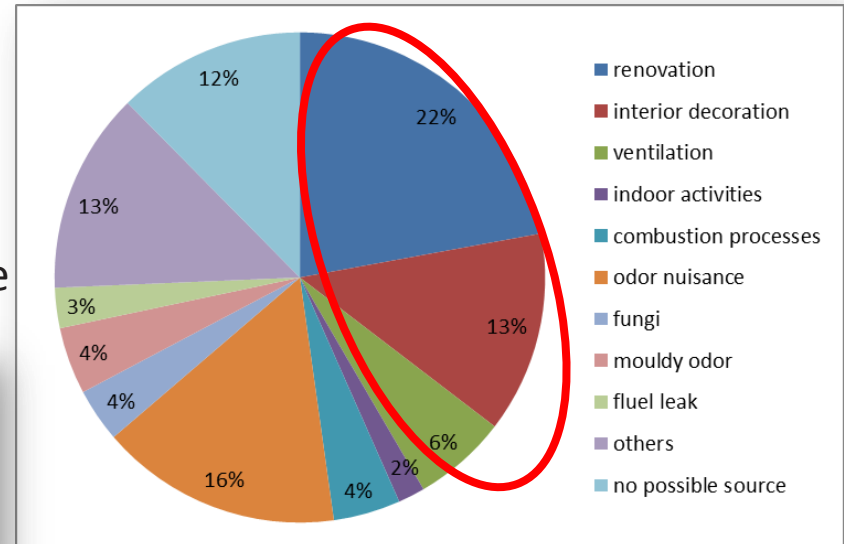
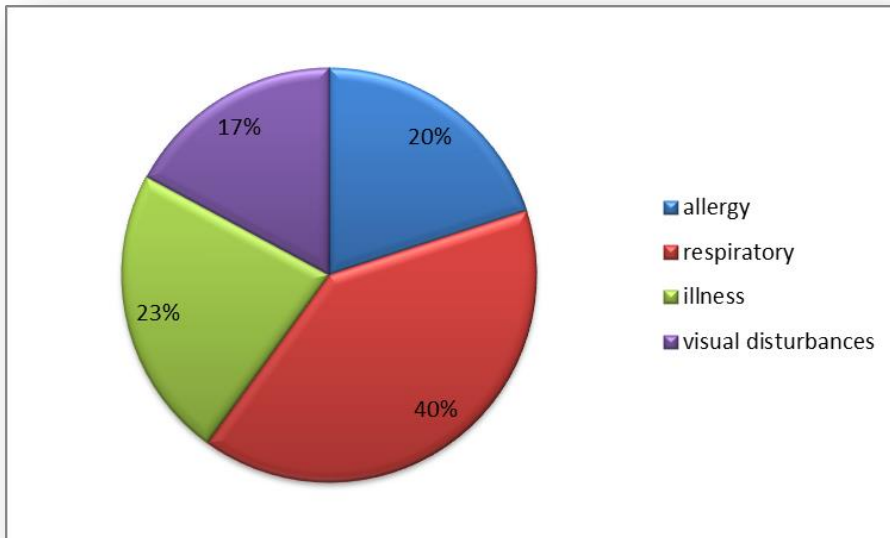
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# Health Complaints in houses and public buildings

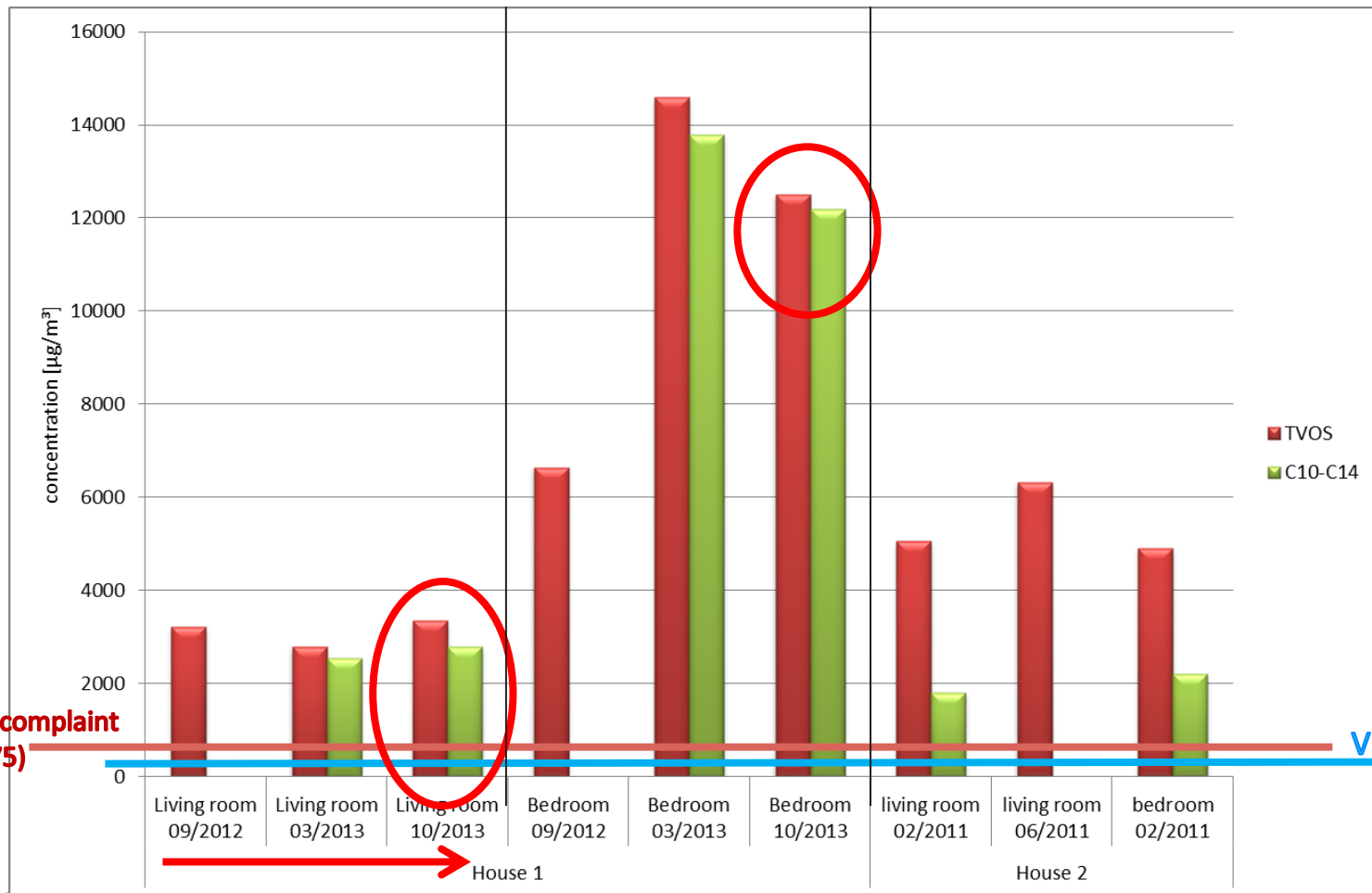
- » ± 70 “health complaint cases” (2008-...) → stepwise approach
  - » Description of the health complaint
  - » Questionnaire
  - » Walk-through inspection
  - » Database IAQ complaints
  - » Unique measuring plan for each case



Factors indicated to cause a health complaint – Status 2008-2014

Source: Vlaams Agentschap Zorg en Gezondheid

# Health Complaint houses – wall injections

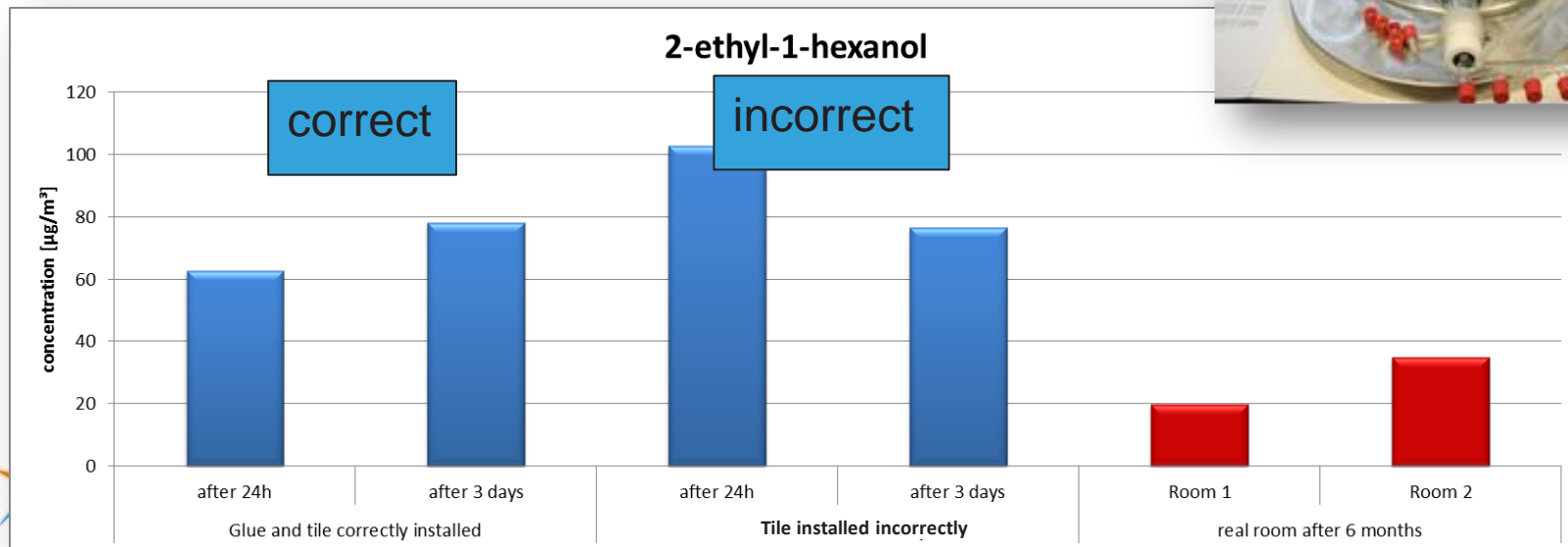


Surveillance of complaint free houses (P75)

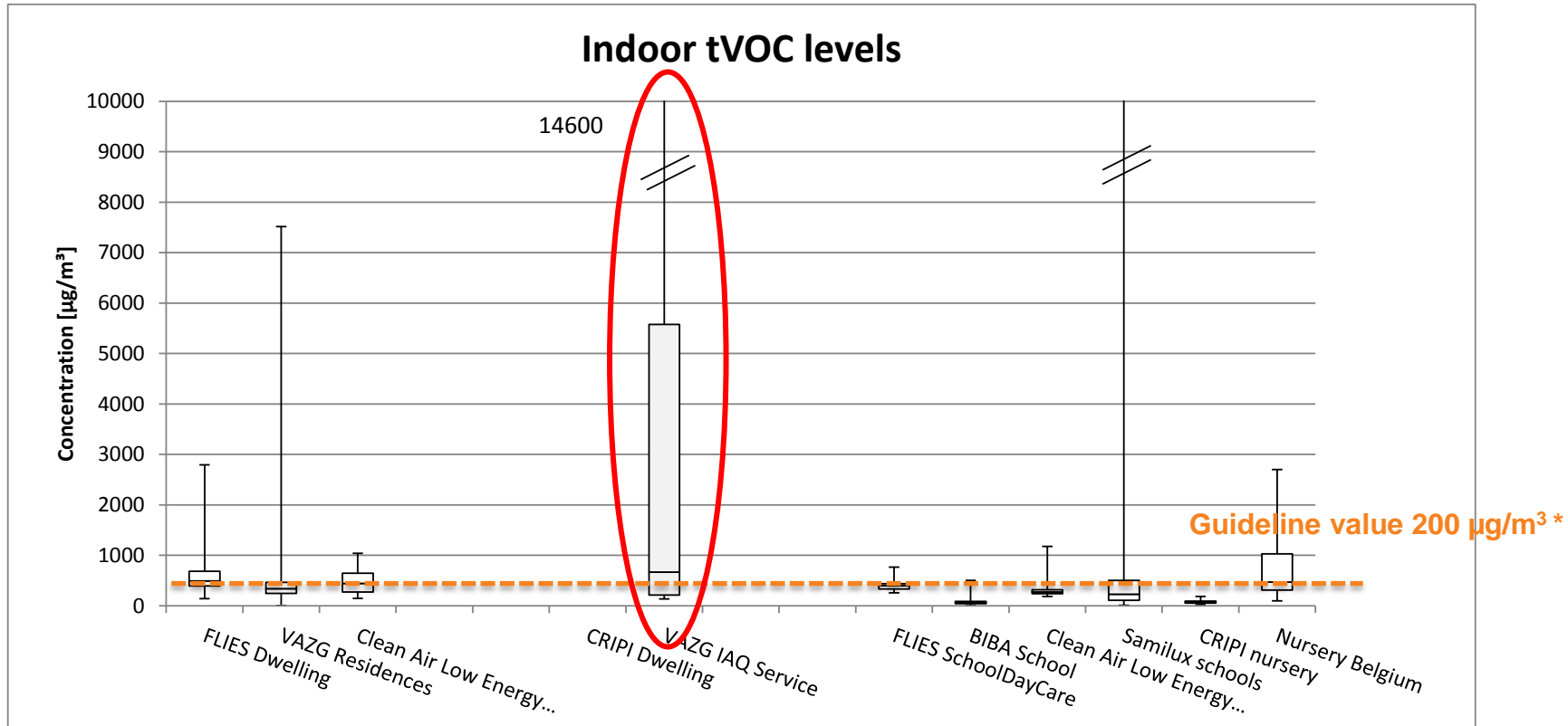
Vlaams BiMi

# Health Complaint houses – phthalate degradation

- » PVC tiles and low emission glue (M1 labelled)
- » Odour nuisance – health and comfort complaints
- » Moisture induced chemical degradation of vinyl flooring
- » → odorous alcohols (C10 – C12)
  
- » 2 test chambers of 0.062 m<sup>3</sup>, 1/h, 21 ± 4 °C
- » 2-ethyl-1-hexanol

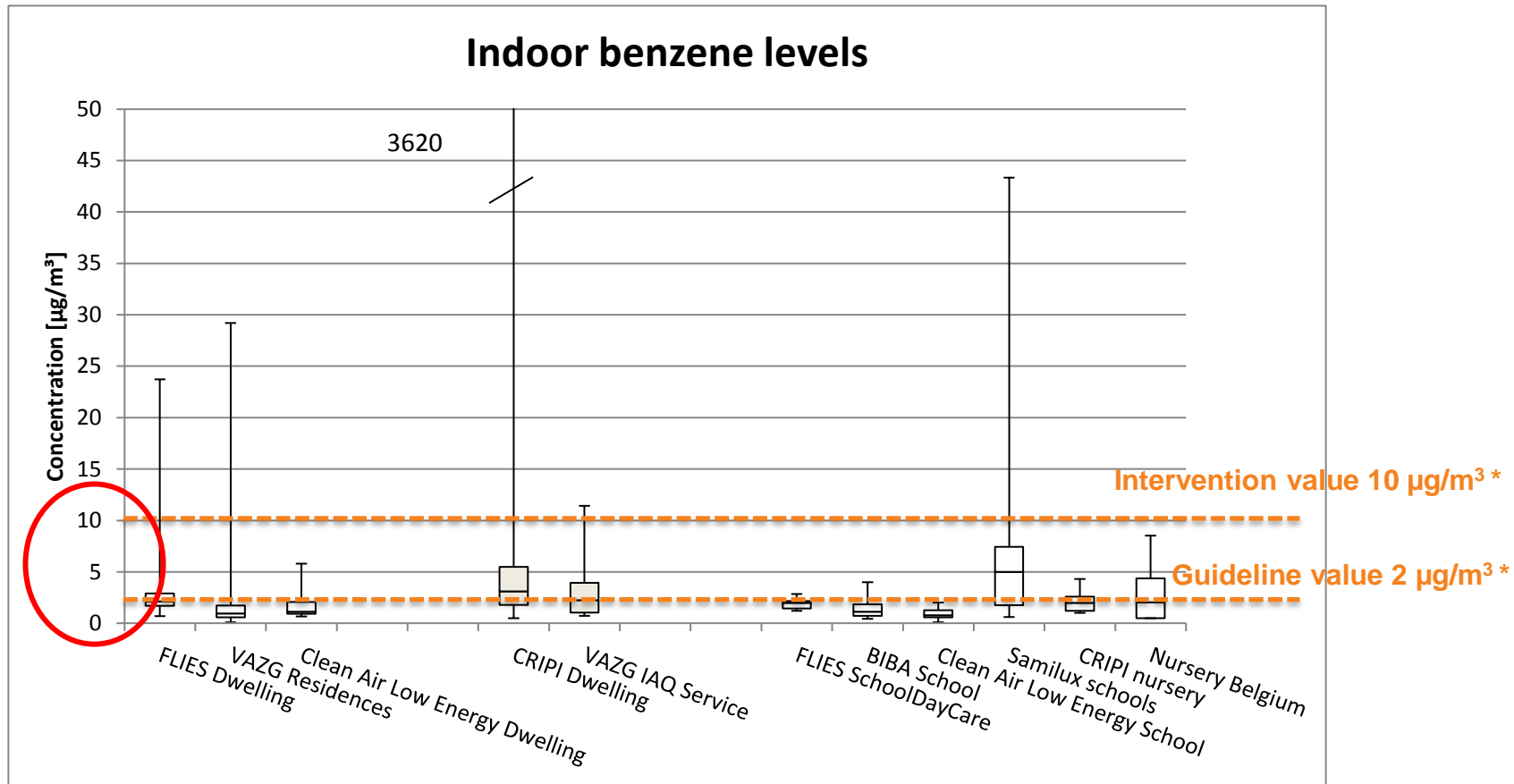


# Indoor Air Quality in Belgium



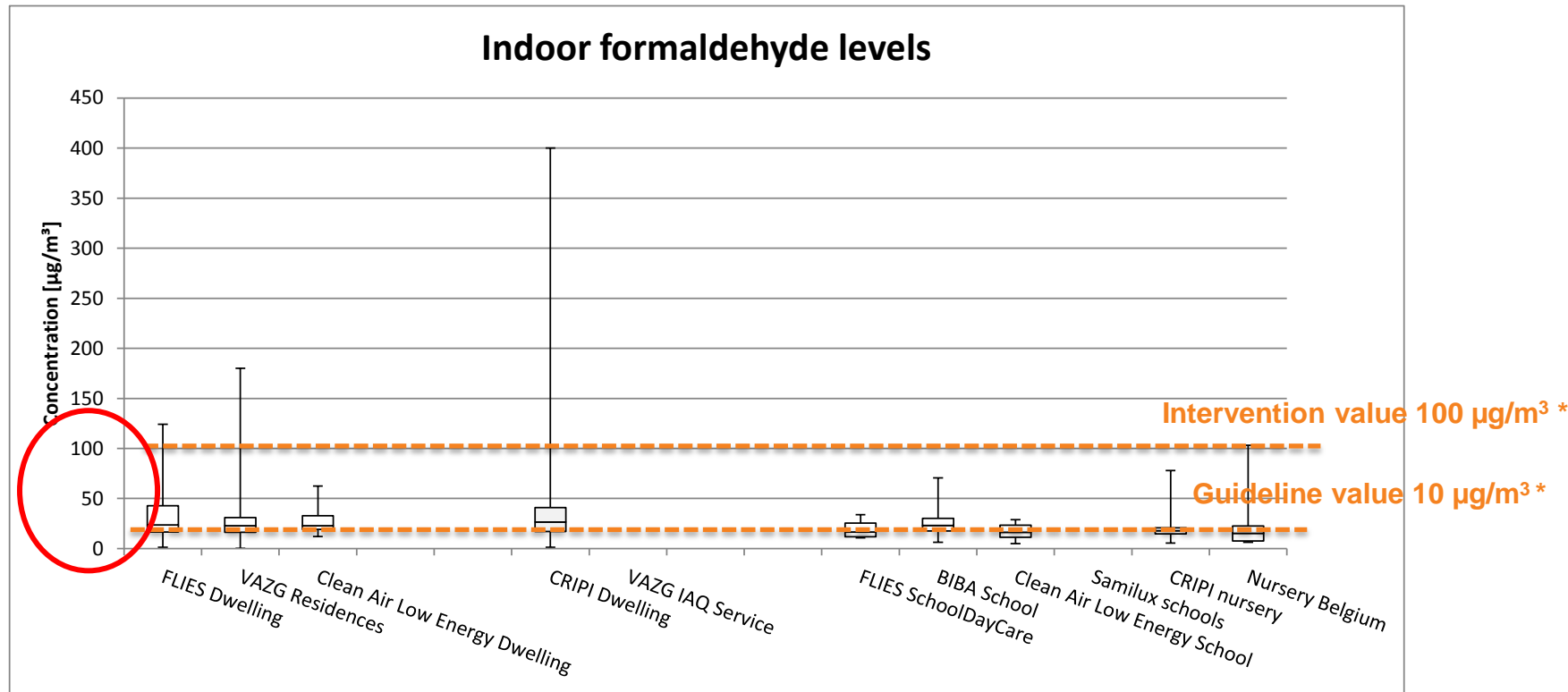
*IAQ sensor (TVOC) as a valuable tool for predicting (avoiding) indoor related health complaints*

# Indoor Air Quality in Belgium



*Indoor benzene level and guideline and intervention values in Flanders*

# Indoor Air Quality in Belgium



*Indoor formaldehyde levels and guideline and intervention values in Flanders*



# More information?

[www.vito.be/indoor\\_air](http://www.vito.be/indoor_air)