5 December 2024, Webinar – Personalized Environmental Control System (PECS) in Action: Insights from Case Studies

Performance of Personalized Ventilation Installed in Open-Plan Offices

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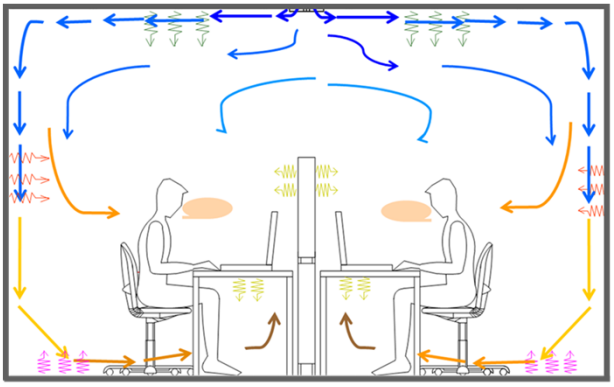
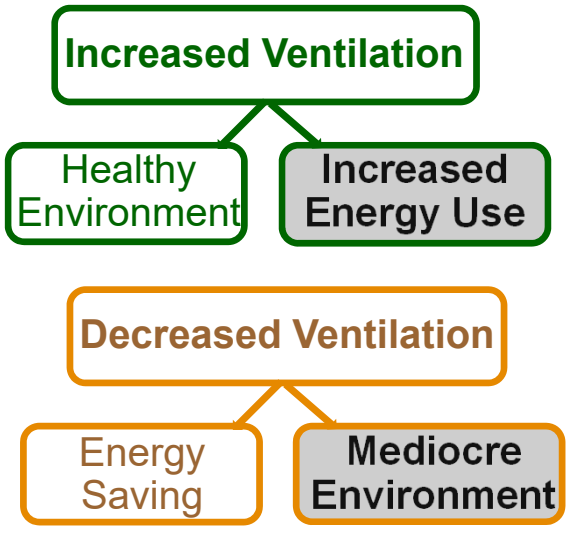
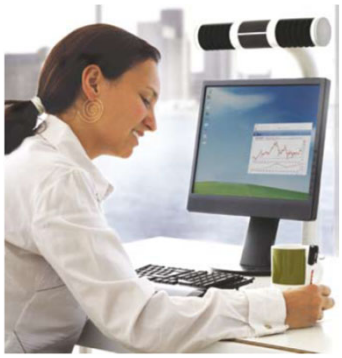
Present Ventilation Design

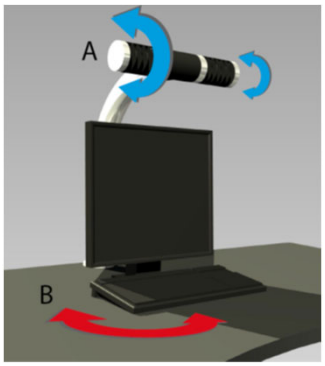


Limited improvement of IAQ and reduction of Energy!



Personalised Ventilation (PV)





Courtesy of Exhausto

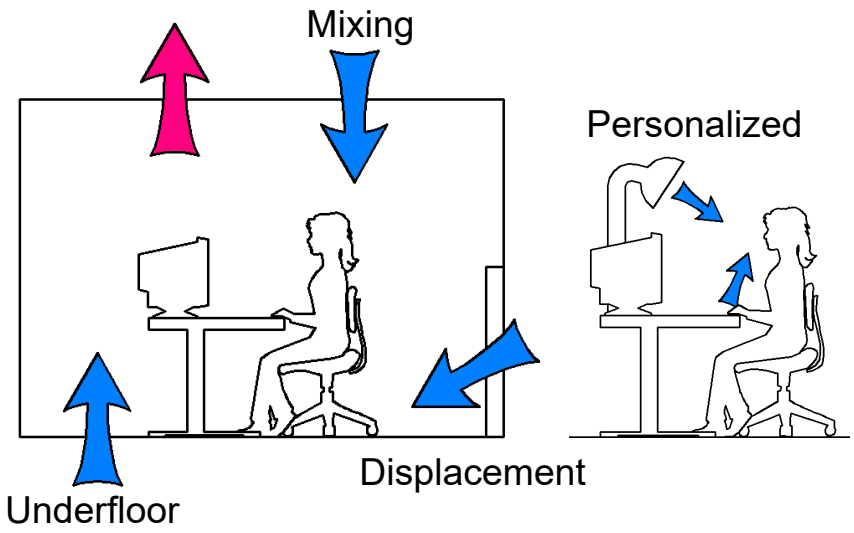
Personalised Ventilation: Performance

- Clean air to breathing zone
- Individual control

- Preferred thermal environment
- Better PAQ
- Improved health
- Increased productivity
- Energy saving

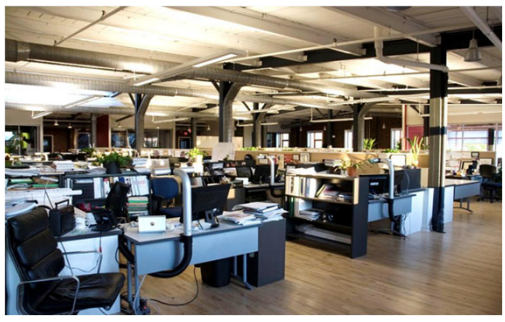
Melikov, Indoor Air J., 2004

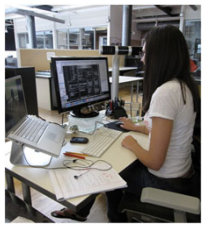
Personalised Ventilation: Practical Implementation

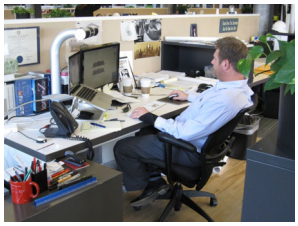


PV can be implemented alone or in conjunction with background ventilation.

Personalised Ventilation: King & King Building

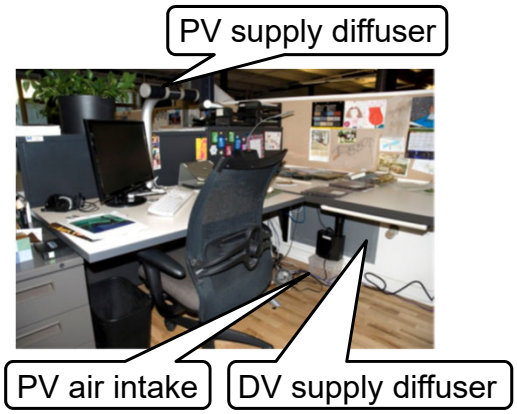






Dalewski et al. 2013, CLIMA 2013

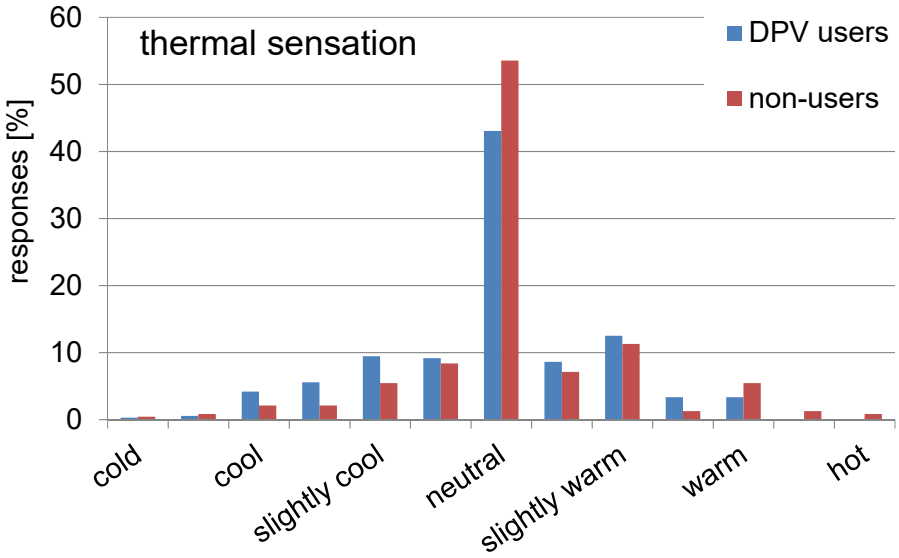
- LEED-Platinum office building (Syracuse, USA)
- 60 workstations
- 38 workstations with PV (53%)
- Average room temperature 23,5 ± 0.4°C



Performance of PV: Field Study

ASHRAE scale

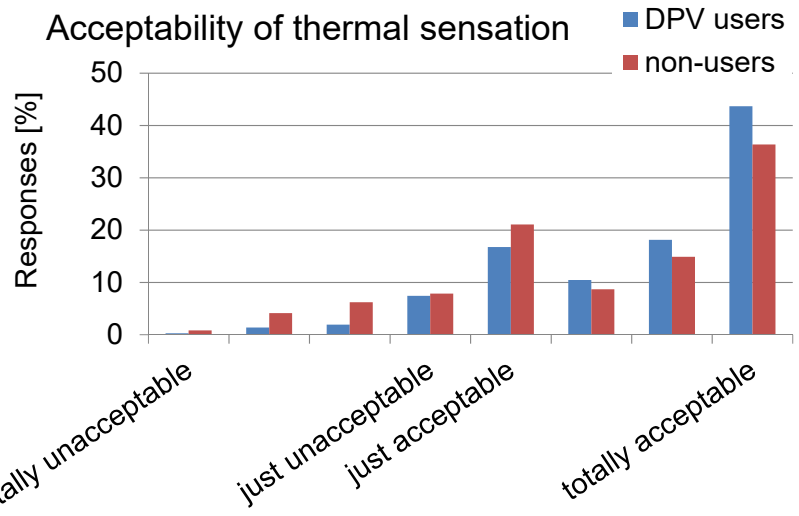
- hot
- warm
- slightly warm
- neutral
- slightly cool
- cool
- cold



Performance of the PV: Field Study

Acceptability scale

- totally unacceptable
- just unacceptable
- just acceptable
- totally acceptable



Performance of the PV: Field Study

Acceptability scale

o totally unacceptable
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o just unacceptable
o just acceptable
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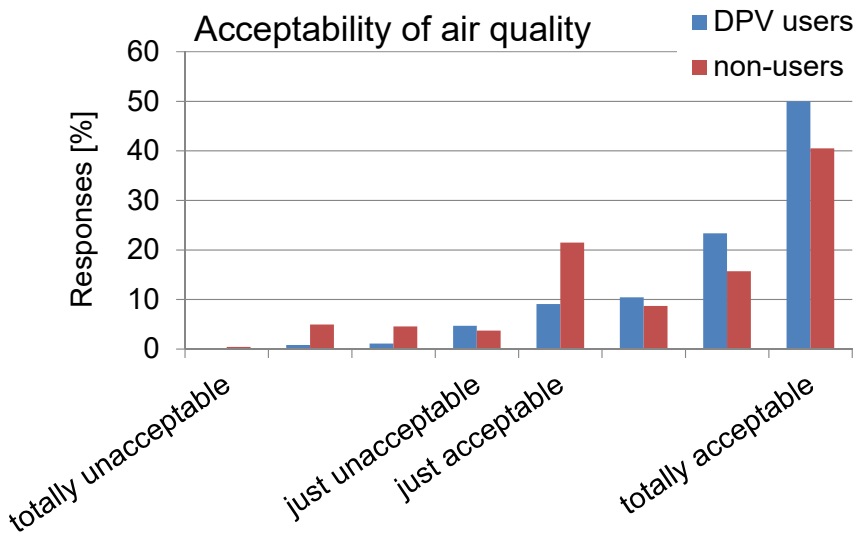
o totally acceptable



Performance of the PV: King & King Building

Acceptability scale

o totally unacceptable
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o just unacceptable
o just acceptable
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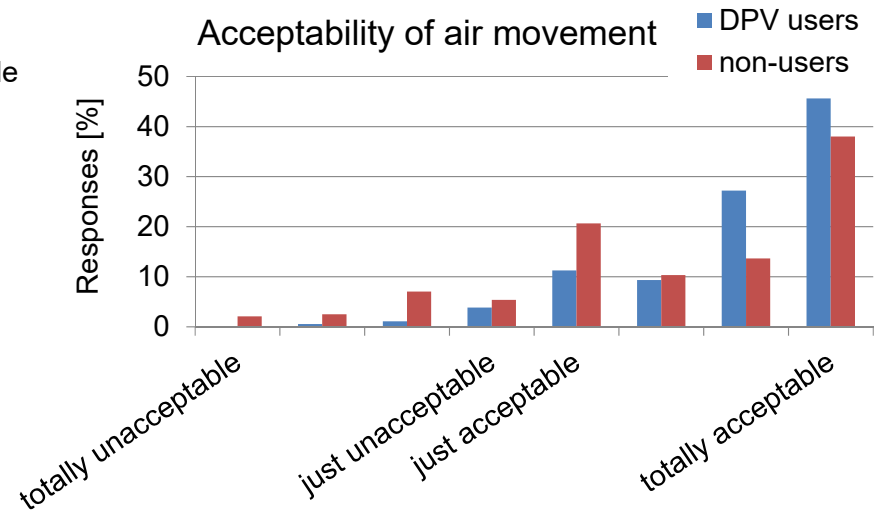


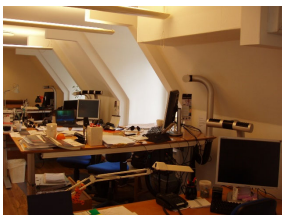
Performance of the PV in the ”King & King Building”

Conclusions

- The implementation of personalized ventilation showed potential for improving PAQ and thermal comfort
- The acceptability of thermal sensation/air quality/air movement was higher among DPV users compared to non-users
- The installation of personalized ventilation will be beneficial for providing preferred microenvironment at workstations and for increasing occupants satisfaction

Personalised Ventilation: ”Magnus Building”



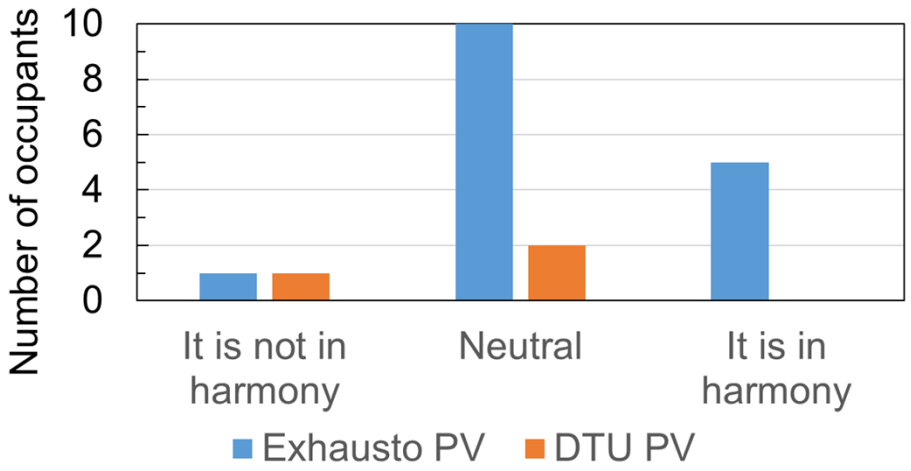


DTU PV design Exhausto PV design

- Office building (Copenhagen, DK)
- Field Study:
  - Before renovation:
    - Natural ventilation
  - After renovation:
    - Mechanical ventilation + PV

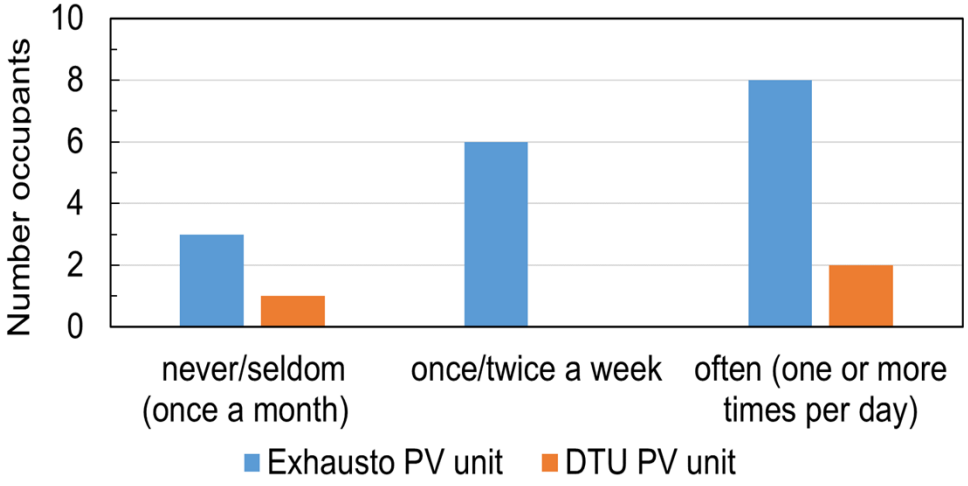
Performance of the PV: ”Magnus Building”

Is the PV in harmony with the surroundings at your workplace?

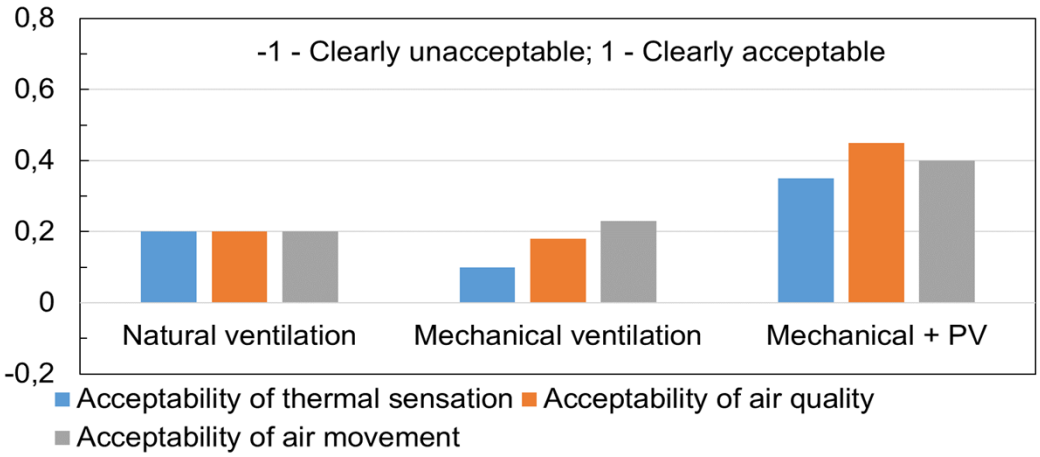


Performance of the PV: ”Magnus Building”

How often do you adjust the air velocity/airflow?



Performance of the PV: ”Magnus Buildig”



	Natural Vent.	Mixing Vent.	Mixing Vent. + PV
No. occupants	17	18	19
Average Temp.	24,7 ±0,3ºC	24,4 ±0,3 ºC	24,6 ±0,3 ºC

Performance of the PV: Magnus Building

Conclusions

- The PV in conjunction with mechanical ventilation performed better than natural ventilation as well as mechanical ventilation alone
- The design of the PV is important for its acceptance by the occupants and its control
- Long term field studies are recommended to investigate the impact of PV on occupants' health, comfort and performance in office buildings

Thank you!