building health & comfort
binnenmilieu

Field experiences with PECS in The Netherlands

AIVC Webinar
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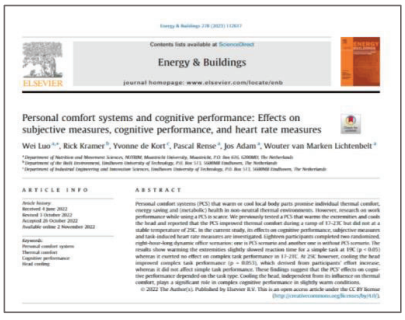
Supposed advantages of microclimate control

Responding better to individual differences in comfort experience (also in open office environments)
Reduce the risk of mutual transmission of infectious diseases (COVID, influenza, etc.) through the air (provided microclimate control with ventilation function)
Reduce overall energy consumption (if combined with adjustment of setpoints ambient temperature)
Increase productivity*

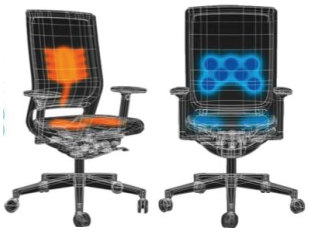

Energy & Buildings

Personal comfort systems and cognitive performance: Effects on subjective measures, cognitive performance, and heart rate measures

** Research by Maastricht University and Eindhoven University of Technology shows that the use of micro-climate control helps to improve performance; especially if the environment is a bit warmer (around 25°) (Lou et al, 2023)*

Ready-to-use products office market

- Klimastuhl Kloeber
  (developed with TU Kaiserslautern)

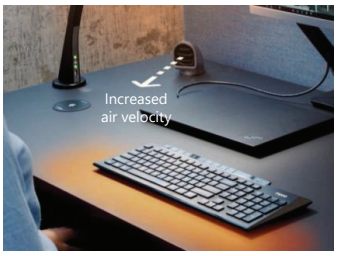


Source: Kloeber

- JEP systeem Van Delft groep
  (developed with bba binnenmilieu)

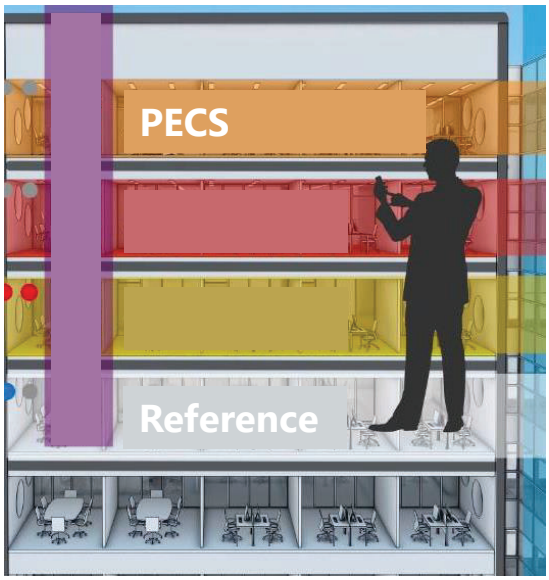
Source: Van Delft group

- AHREND Balance Comfort workplace
  (a.o. tested in Rijswijk, presented fieldstudy)



Source: AHREND

Field study 'comfort desks'



Source figure: adjusted from https://www.rijksvastgoedbedrijf.nl

Office building selected for field study to test energy efficiency innovations.

One floor served as a reference floor.
One floor was provided with Balance Comfort workplaces (PECS).

The room setpoint was adjusted from 22°C to 21°C after the placement of the 'PECS workplaces'.

Evaluation of user satisfaction:
- Winter 2019 #1
- Autumn 2019 #2
- Winter 2020 #3

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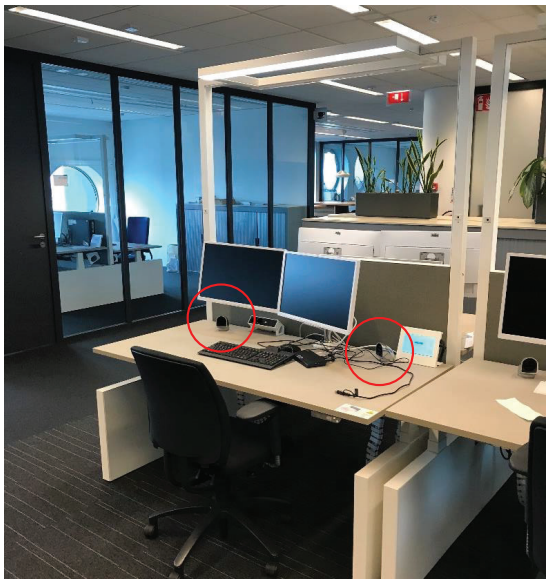
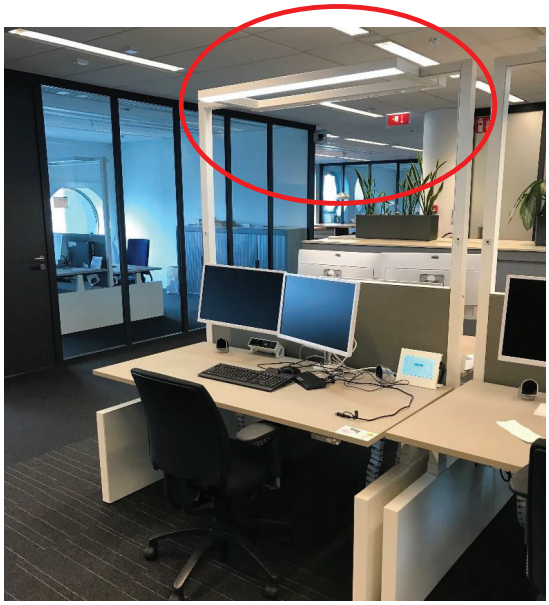


- **Fans**
- Lighting adjustable in intensity & CCT
- Desk heating
- Interface with touchscreen

Field study ‘comfort desks’



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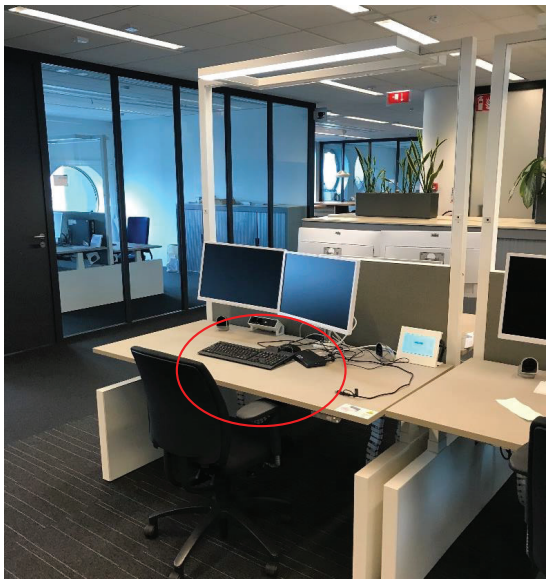

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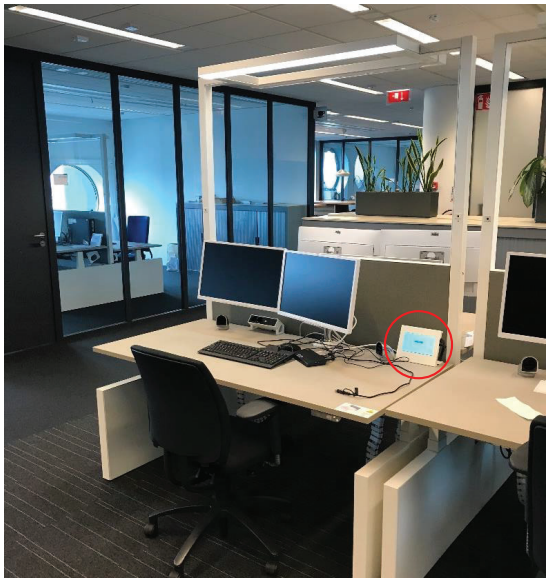

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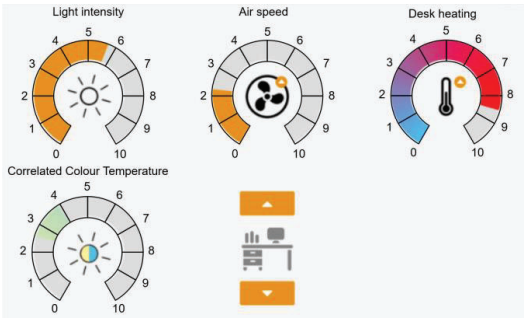
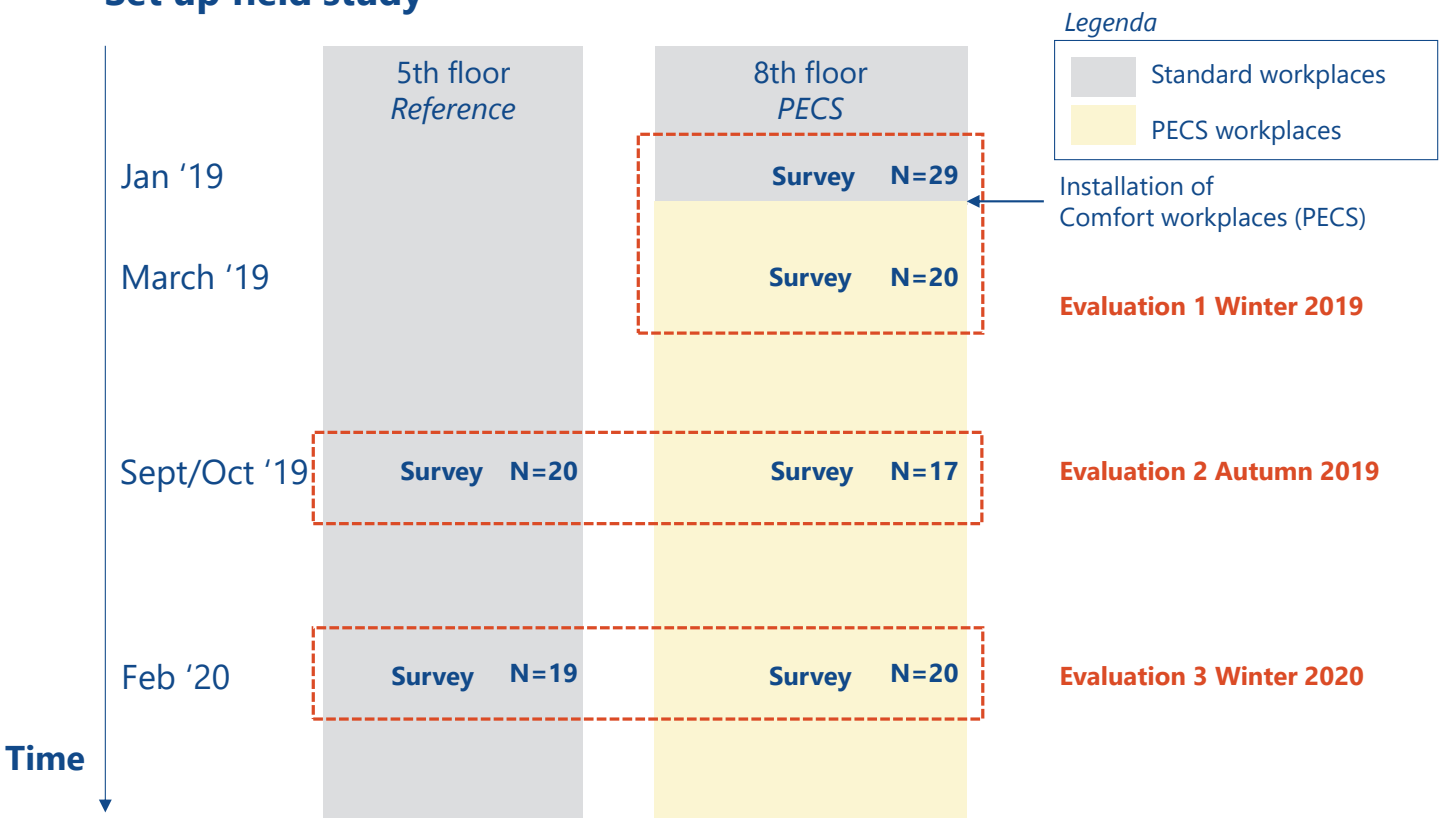
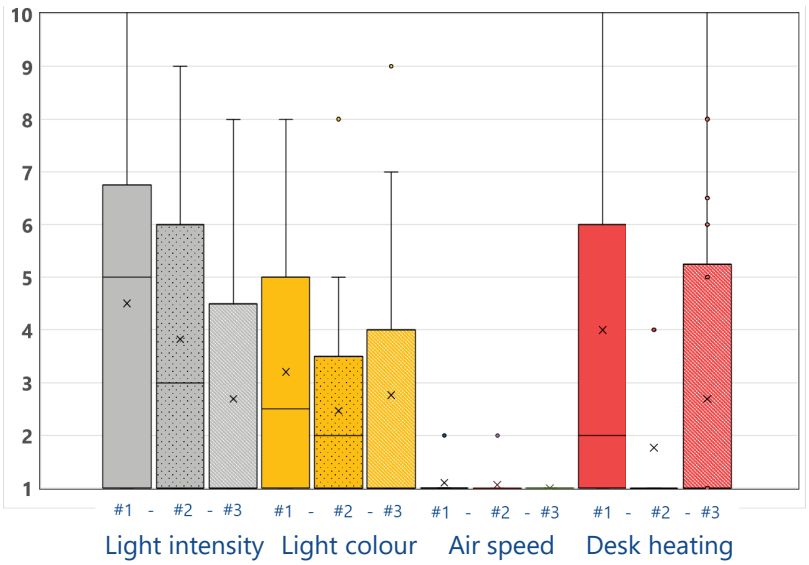


Set up field study



Did people use the control opportunities?



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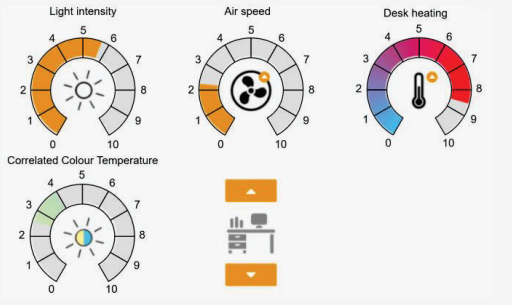
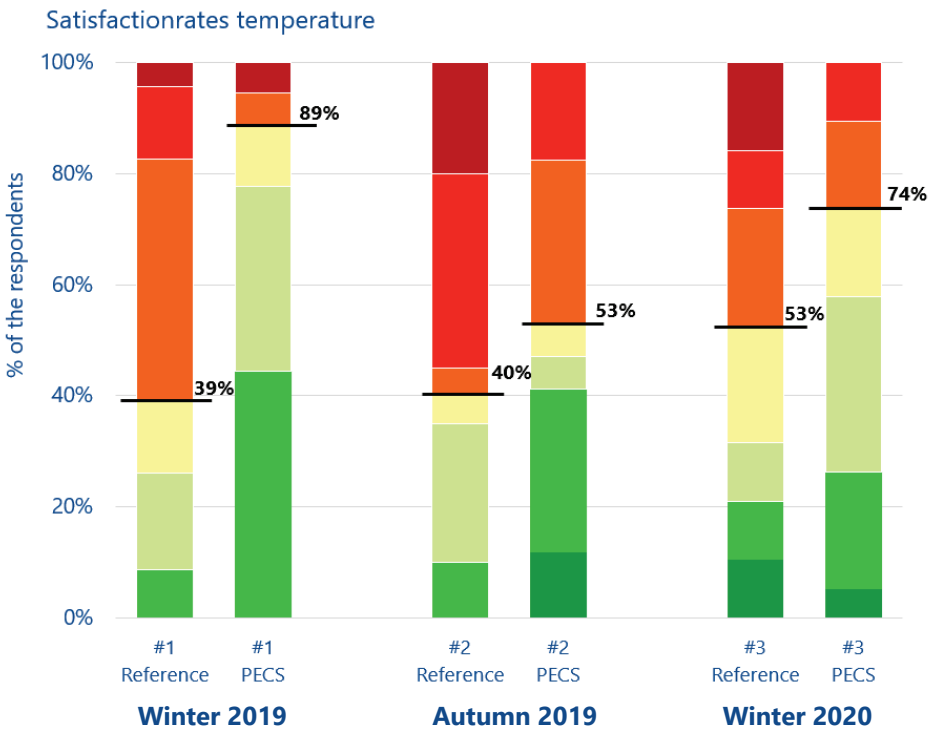
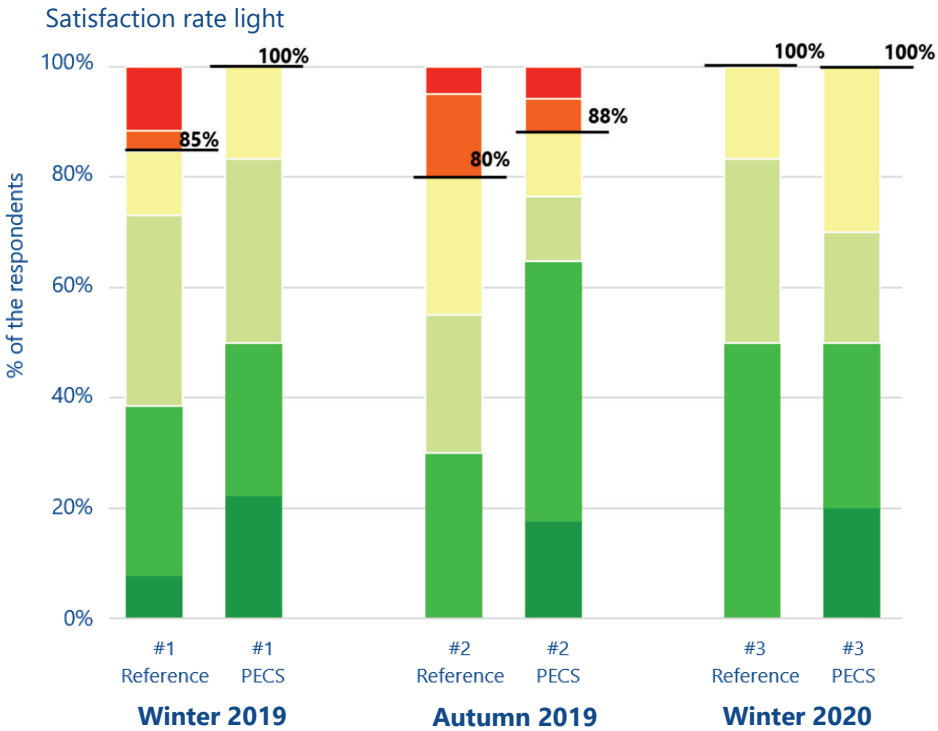


Did PECS positively affect IEQ satisfaction? - Temperature



"I'm really happy with the new desks. It's always comfortable now!"

Did PECS positively affect IEQ satisfaction? - Light



What are the learning points for application of PECS?

Room temperature setpoint: • A gradual change in room temperature so building occupants can adapt. • Different temperature setpoints within one building can result in a lower acceptance rate. • Communication with the building occupant about the adjustments	
Fans: noise & air speed • Noise levels of fans should be acceptable. • Airs speed should not be too high. E.g. to prevent paper to blow away (i.e. max 1,5 m/s at workplace).	
Background light levels should be adjustable. • Allow an adequate background light intensity also when occupancy is low.	
Easy to use interface • Touchscreen did not require connection with smartphone: no issues.	

Results from other field studies

Research UC Berkeley (Zhang et al., 2015): 'Energy savings of 30% possible when using micro-climate control systems; partly dependent on local outdoor climate and on choices regarding setpoints ambient temperature; advice regarding the latter is to assume range 18-28°C (!).'

Research TU Eindhoven (Zeiler et al., 2010): 'In the Dutch climate, energy savings of 14% can be achieved with microclimate control if the setpoint range (ambient temperature) is 'widened' to range 19-25°C (if 100% satisfaction is maintained)'

Research AHREND in collaboration with Strukton in the Dutch office (field research): 'Energy savings of at least 16% possible when using micro-climate control'

Conclusions

The fieldstudy showed that the introduction of micro-climate control leads to more comfort in the workplace and an improvement in the control experience.

Research by third parties also shows that the energy saving potential (in offices) can be as high as 14 to 30%.

Suppose you want to work with wider range ambient temperature setpoint settings e.g. ranging from 18°C (winter) to 28°C, then PECS need to be used to remain thermal comfort.

Thank you for your attention

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