

## **BUILDING ENGINEERS 'NEED MORE SCIENTIFIC DATA TO IMPROVE PROTECTION FROM VIRUSES'**

11TH FEBRUARY 2021 HERPREET KAUR GREWAL, facilitate



Many buildings are not even achieving current ventilation standards, says Professor Cath Noakes – Ken Kittl-Shutterstock

**Ventilating buildings has never been more crucial or high-profile, but the building engineering industry needs much more scientific data to help it improve protection from viral infections, says one of the country's experts on airborne infection.**

"This is a very complex issue and it will take years to build up the amount of data needed to make sure we can do this better. However, as a rule of thumb, we should aim for [air change rates of] 10 litres per second (l/s) per person and CO<sub>2</sub> concentrations below 800 parts per million."

Professor Cath Noakes, one of the two engineer members the Scientific Advisory Group for Emergencies (SAGE), confirmed that studies had shown the risk was higher indoors when ventilation provided less than 3 l/s per person and that household transmission was a particular concern. She also explained that the virus thrived in cool, dry and dark conditions – so controlling relative humidity should also be considered.

BESA's head of technical Graeme Fox said Noakes' "advice was consistent with the messages in BESA guidance on ventilation and indoor air quality that was attempting to turn the lessons learned during the pandemic into practical measures for building owners and managers as well as engineers".

Fox added: "Her presentation exposed the full complexity of this issue, which reinforces the urgent need for simplified, practical guidance... It also confirmed that there are no silver bullets and our industry is at the forefront of efforts to develop properly planned solutions for the long-term health and wellbeing of building occupants."

## **WE MAY NEVER HAVE ALL THE ANSWERS, WARNS SCIENTIST**

THURSDAY, FEBRUARY 4, 2021, BESA Building Engineering Services Association

Ventilating buildings has never been more important and higher profile, but the building engineering industry needs much more scientific data to help it improve protection from viral infections, according to one of the country's leading experts on airborne infection.

Professor Cath Noakes, one of the two engineer members the Scientific Advisory Group for Emergencies (SAGE), told a webinar hosted by the Building Engineering Services Association (BESA) that it was not enough to simply increase ventilation rates in buildings to mitigate transmission of the Covid-19 virus.

"We don't yet know how much ventilation we need to get this under control; we might never know that and there will always be some risk, but we can aim to reduce the residual risk as much as possible," she told the BESA webinar. "It is not enough to just say let's increase ventilation rates. We know it matters and will be critical for health and wellbeing (including mental health) beyond Covid so we must get this right.

"We can say we have not seen any evidence of high transmission in well-ventilated spaces – so if we are designing and delivering to the standards set in current building standards that will help, but we may need to go beyond that."

She pointed out that many buildings were not even achieving current standards and many "had no proper ventilation at all". She also expressed particular concern about naturally ventilated spaces.

### **Forever**

"So we might not have all the answers, but we do know we need to ventilate better. We also know that ventilation is forever. Even if we get this health crisis under control; what about the next one? We need to get the engineering solutions right for the long term."

Noakes, who is Professor of Environmental Engineering for Buildings at the University of Leeds, has been providing advice on airborne transmission to the NHS and the government throughout the pandemic and was recently featured on Radio 4's 'The Life Scientific'.

"Who would have thought that ventilation would become so high profile?" she asked BESA chief executive David Frise, who chaired the webinar.

She said bespoke solutions would be needed to deal with the wide range of factors in each indoor space and long-term solutions depended on collaboration between engineers, researchers and policy makers.

"This is a very complex issue and it will take years to build up the amount of data needed to make sure we can do this better. However, as a rule of thumb we should aim for [air change rates of] 10 litres per second (l/s) per person and CO2 concentrations below 800 parts per million."

She confirmed that studies had shown the risk was higher indoors when ventilation provided less than 3 l/s per person and that household transmission was a particular concern. She also explained that the virus thrived in cool, dry and dark conditions – so controlling relative humidity should also be considered.

Engineering controls should sit above the measures that rely on human behaviour such as distancing and wearing face coverings in any “hierarchy of risk control”, according to Noakes. Building managers should address source control before studying ventilation requirements. This approach would not necessarily lead to increasing ventilation rates.

This is not just about flow rates as it depends on the size of the space. 10l/s per person is the ideal, but if people are close together and for an extended period we may need more flow rate. You can also have quite a lot of people in a large space with lower ventilation rates.

There was also very little ‘real world’ evidence to prove the effectiveness of air cleaning devices – performance data had come mainly from laboratory-based studies – but they may improve indoor air quality (IAQ) by removing some other airborne pollutants. However, there are other risks with some air cleaning devices including exposure to blue light and secondary pollutants.

Part F of the Building Regulations, which is currently under review, could be used to beef up the IAQ measures likely to be introduced in the forthcoming Environment Bill, the BESA webinar heard.

The gap is between what we write down as a standard and how we deliver. There are buildings out there that don’t have any controlled ventilation at all – they don’t meet any building standards, but we can’t just close them down. The government will have to find a balance between its ambition for a net zero carbon built environment and one that achieves good health outcomes for people, she added.

“I hope that people have recognised early enough that ventilation is really important. There is a risk that we try to deal with net zero by sealing [buildings] up more. The problem is that it is always much easier to measure energy performance than ventilation effectiveness – we have to address that too.”