

CVDR/S6/21/9/5

## COVID-19 Recovery Committee

9th Meeting, 2021 (Session 6), Thursday, 4  
November 2021

SPICe: issues paper

Baseline health protection measures

### Witnesses

This session will include witnesses with expertise in the **technology, the practicalities and some of the challenges of ventilation**

- [Dr Shaun Fitzgerald OBE, University of Cambridge](#), and Director of the Centre for Climate Repair at Cambridge, who describes his research as being in low energy natural ventilation, (recent media has included an [appearance on BBC breakfast](#) talking about ventilation in schools, and this [article in the Guardian](#) about ventilation in cinemas).
- [Professor Catherine Noakes of the University of Leeds](#) leads research into ventilation, indoor air quality and infection control in the built environment. Professor Noakes co-authored a report (July 2021) "[Infection Resilient Environments: Buildings that keep us healthy and safe – initial report](#)". Recent media for Professor Noakes included this [article in the Guardian](#) on ventilation in schools)
- [Professor Tim Sharpe of the University of Strathclyde](#) is also a member of SAGE Environmental and Modelling Group and chaired the Scottish Government's expert advice group on ventilation. Recent media appearances have included one on [BBC news discussing ventilation in schools](#)
- [Dr Hywel Davies, Technical Director for The Chartered Institution of Building Services Engineers \(CIBSE\)](#). The CIBSE has [produced guidance](#) to give business owners and managers an outline of ventilation systems commonly encountered in buildings and to advise on how they can be used, now and in the future, to maintain adequate air quality and reduce the risks of airborne infection.

## How does the virus spread?

A [note from the Parliamentary Office of Science and Technology](#) (POST) explains that SARS-CoV-2, the virus which causes COVID-19, spreads through [three main routes](#):

- inhalation of droplets suspended in the air,
- direct deposition of droplets on mucous membranes, and
- the carriage of virus particles from contaminated surfaces to the mucous membranes.

It is the first of these routes, inhalation, that ventilation aims to minimise.

## Transmission by inhalation

Respiratory droplets can stay suspended in the air for some time. Suspended droplets are also called an aerosol. If such droplets are inhaled, they can infect respiratory cells. How long droplets stay suspended in the air depends not only on their size, but also the velocity at which they were expelled from the body and the surrounding air's temperature, humidity, and velocity. Larger droplets tend to fall to the ground quickly, while smaller droplets stay suspended in the air for longer and can travel longer distances.

While larger particles stay suspended for much shorter periods of time, they can still be inhaled when close to an infected person. Very small airborne droplets can travel much longer distances (virus particles have been detected more than 50 meters from an infected patient) and may pose an infection risk even after the infected person has left the room.

Ventilation helps to disperse aerosols and reduce the accumulation of virus-containing droplets in the air. The risk of infection is therefore much lower outside and is increased in poorly ventilated and crowded spaces.

## Evidence for airborne transmission

The extent to which the virus is 'airborne' has been the subject of some debate.

In 2020, [a group of scientists wrote an open letter](#) claiming the virus was airborne. That is, they believed that 'microdroplets' released during normal activities such as talking and breathing were capable of remaining suspended in the air and travelling longer distances to potentially infect people.

Initially the World Health Organisation (WHO) cited a lack of evidence for this theory, stressing its position that SARS-CoV-2 is spread mainly by large respiratory droplets which fall quickly to the floor once expelled. However, it was argued that, in the absence of definitive evidence, the precautionary principle should be applied.

WHO eventually [changed its FAQs](#) to recognise the possibility of infection by smaller aerosols but it still stresses the main route of transmission as aerosol or droplet spread between people in close contact:

- Current evidence suggests that the virus spreads mainly between people who are in close contact with each other, typically within 1 metre (short range). A person can be infected when aerosols or droplets containing the virus are inhaled or come directly into contact with the eyes, nose or mouth.
- The virus can also spread in poorly ventilated and/or crowded indoor settings, where people tend to spend longer periods of time. This is because aerosols remain suspended in the air or travel farther than 1 metre (long range).

## Learning Estate CO2 Monitoring

As indicated above the Cabinet Secretary for Education and Skills [wrote to the Education, Children and Young People Committee](#) on 29 October 2021 with an update on the progress that local authorities have made in completing CO2 assessments of schools and other education facilities. The letter said the £10m package of funding was earmarked as follows:

- £7m capital for the purchase and installation of CO2
- £3m revenue to fund associated additional staff, training or consultant resource requirements.
- After the above has been prioritised, to cover some of the costs of any remedial action required that has been identified by monitoring

The letter indicated that progress was being made, but said that as of 15th October local authorities had reported completing initial CO2 monitoring of the following overall percentages of learning, teaching and play spaces across Scotland:

- 85% of primary school spaces
- 83% of secondary school spaces
- 75% of ASN school spaces, and
- 72% of local authority early learning and childcare (ELC) spaces

This represented a total of 79% of all planned assessments of learning, teaching and play spaces in Scotland (that translates as around 41,000 of approximately 52,000 identified learning, teaching and play spaces). Local authorities had purchased and deployed (or were awaiting delivery of) c.22,000 monitors.

Based on further local authority updates and forecasts, the total overall planned initial assessment of learning, teaching and play spaces across Scotland is at:

- 83% (as at 29th October) with 24 local authorities at 100% complete;
- And is expected to rise to 95% by the following Friday (5th November) with 31 local authorities at 100% complete; and 100% by the next week (12th November) with all 32 local authorities at 100% complete. The [spreadsheets alongside the letter](#) indicate progress by different local authorities

## Report on “Buildings that keep us safe”

A [July 2021 report](#), co-authored by Professor Catherine Noakes of the University of Leeds, for the Royal Academy of Engineering answered two questions from the UK’s Chief Scientific Adviser, Sir Patrick Vallance, to look at the strategic challenges of making buildings more infection resilient, and also the shorter-term measures needed for winter 2021/22. The report said that:

“We have found that the COVID-19 crisis has revealed flaws in the way in which we design, manage and operate buildings that, if left unchecked, will disrupt management of this and other pandemics, impose high financial and health costs on society, and constrain our ability to address other challenges such as climate change

There is a moment of opportunity to make a transformational change to how we design and manage our buildings to create good, healthy and sustainable environments for those who use them. Many of these changes have relevance well beyond COVID-19

**Recommendations in response to the strategic challenge** “how we can redesign and retrofit buildings and transport to make them more infection resilient in the future?”, included the following:

- Government should provide support to map the knowledge and skills requirements across the building industry, general businesses, and the engineering professions to manage buildings in a way which minimises infection risks. It should then work with professional bodies, sector skills organisations and training boards to put in place plans to address the skills gaps identified.
- Working with the National Core Studies Programme, UKRI and the National Academies, government should put in place an action plan to address key research gaps on an accelerated basis.
- Government should undertake a rapid review of the capacity and capability requirements among regulators (including local authorities) to support and enforce standards in maintaining buildings for public health.
- Demonstration projects should be commissioned to fill specific knowledge gaps to underwrite regulation and enforcement such as the acceptable minimum standards for ventilation to manage infection risk.
- Government policy on net zero must be developed in a way that is consistent with priorities around indoor air quality and making buildings resilient to infection

**Recommendations in response to the immediate focus** “what should be done ahead of winter 2021/2 to operate buildings and transport in a way that reduces the risk of COVID-19 transmission, and makes them acceptably safe, while enabling a degree of normality” included the following:

- Government and its agencies should collaborate to rapidly develop and deliver clear communications aimed at building owners and operators with the

lowest capability, emphasising the importance of improving ventilation whilst maintaining wider good practice on infection control.

- Communications should be accompanied by guidance, available via trusted and widely accessible sources, to support owners and operators to establish an appropriate balance of measures to manage infection risks, alongside thermal comfort, air quality and energy efficiency.
- Government and professional engineering bodies should provide rapid and specific technical guidance to enable owners and operators to select and effectively implement appropriate technology (e.g. conventional ventilation systems, CO2 monitoring).
- Government should provide incentives to encourage private and public sector organisations to improve the poorest performing spaces in buildings.

## A tool to assess ventilation

The Health and Safety Executive (HSE) worked with the British Occupational Hygiene Society to develop a [free tool](#) to assess the effect that individual ventilation arrangements are likely to have on reducing COVID transmission in the workplace.

## Some issues to consider

Members may wish to explore the following issues and questions:

- What is the current scientific consensus on the extent of airborne transmission of the virus?
- How useful can ventilation be in reducing transmission if the virus is mainly spread between short distances?
- How effective are we at present in our approach to ventilating in Scotland, both in the design and operation of buildings? How does that compare to other (cold) countries?
- How can we assess when ventilation is poor, what levels (of CO2) are generally deemed to be *good enough*, how do we know when occupancy of a space is too high, and how can we monitor that effectively? And related to that what types of space are most suitable for monitoring?
- What are the options for adapting older public buildings (such as for example Victorian schools), and what could be the cost implications? How much of the challenge can be met by physical investment and adaptation, and how much by changes to human behaviour (or both)?
- Overall, what investment, or other support is required to make our buildings and transport more infection resilient in the future?
- Which parts of economy or society tend to pose the greatest risks in terms of ventilation – for example health, education, transport, retail, hospitality etc?

- Are there skills and knowledge gaps in the management of buildings and infrastructure – what training, re-skilling and recruitment is needed? Which sectors are there gaps – e.g. hospitals, transport, education, retail?
- In relation to ventilation, what are the challenges of tackling health and climate policies together?
- What are the wider health and wellbeing benefits of good ventilation?

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