



Covid-19:

Impact on existing and future building services design

The Issue.

Not all coronavirus pandemics are the same.

Previous coronavirus pandemics, such as SARS, involved virtually no person to person infections in the UK, whereas Covid-19 is very different, illustrated by this stark contrast in UK numbers:

| | Pandemic | Cases | Deaths |
|------|----------|---------|--------|
| 2002 | SARS | 4 | 0 |
| 2012 | MERS | 4 | 3 |
| 2020 | Covid-19 | 350,000 | 41,554 |

SARS and MERS did not involve person to person transmission to any significant extent. Seasonal influenza accounts for an average of 17,000 deaths per annum

(As 08-09-2020)

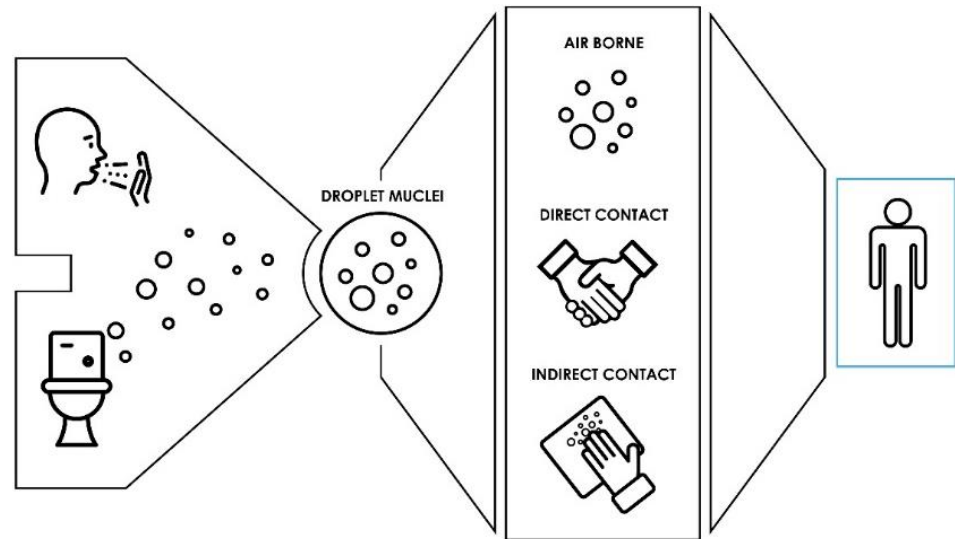
It is the person to person transmission that is making us re-evaluate many of our common practices and how we want to inhabit our spaces.

Transmission.

There is a strong consensus that airborne transmission is by far the most common method of transmission.

Direct contact via surfaces can also be significant and research shows that different surfaces exhibit different properties.

Transmission from infected faecal matter appears to be much less significant, perhaps insignificant, in a workplace environment.



Transmission – aerosols and on surfaces.

It is an established fact that some surfaces can retain bacteria longer than others. Copper or copper alloys such as brass or bronze have good antimicrobial properties.

Materials we would naturally choose for food preparation areas perform amongst the worst, but given the regular cleaning regimes employed, perhaps their other properties outweigh this.

There is a relatively short period that aerosols remain active in the air (around 3 hours) although there is some emerging research to suggest this can be longer under some circumstances, such as in areas of poor ventilation.

As aerosol in the air Up to 3 hrs



On copper Up to 4 hrs



On cardboard Up to 24 hrs



On plastic 2 – 3 days



On stainless steel 2 – 3 days



Health & wellbeing.

We believe it is highly likely that the current pandemic will make occupiers focus even more on the importance of a healthy building, that supports the health and wellbeing of its occupants.

As a performance-based system for measuring, certifying, and monitoring features of the built environment, the WELL Standard perhaps most fully embraces these considerations.

WELL v2 consists of 10 concepts focused on human health:



Air



Water



Nourishment



Light



Movement



Thermal Comfort



Sound



Materials

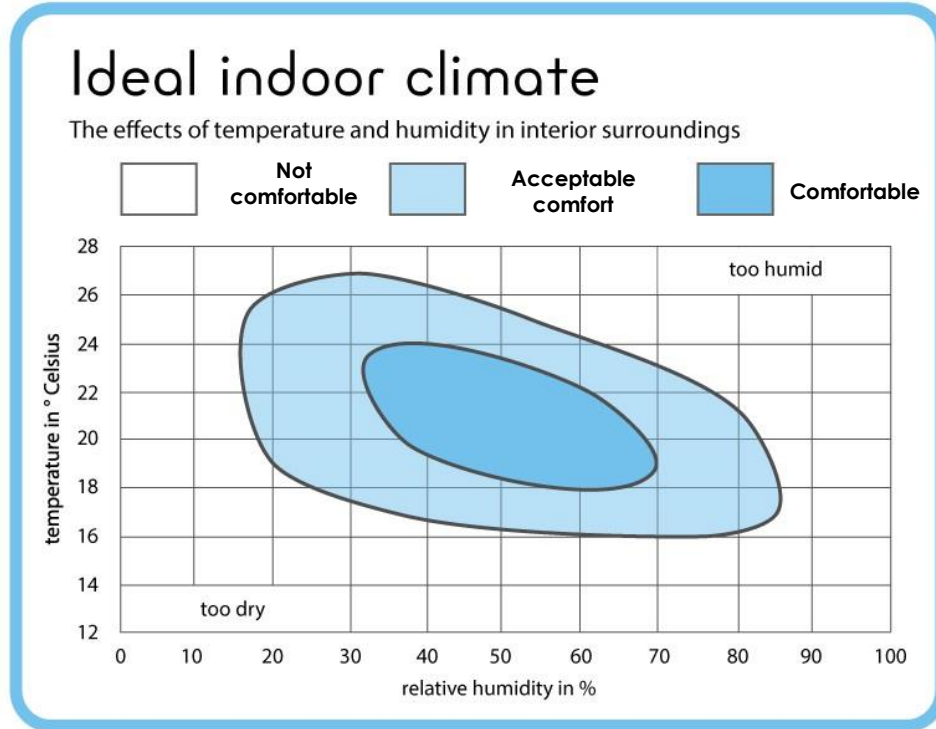


Mind



Community

Thermal comfort.



HUMIDITY

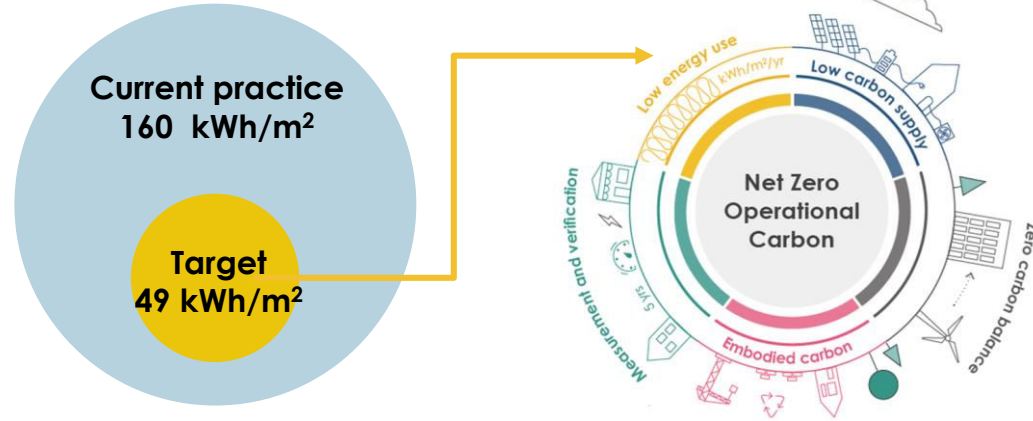
Ideally 40% to 60%,
although 30% to 70% still
ok for the majority.

Very low or high relative
humidity should be
avoided

TEMPERATURE

< 24°C

Let's not forget.

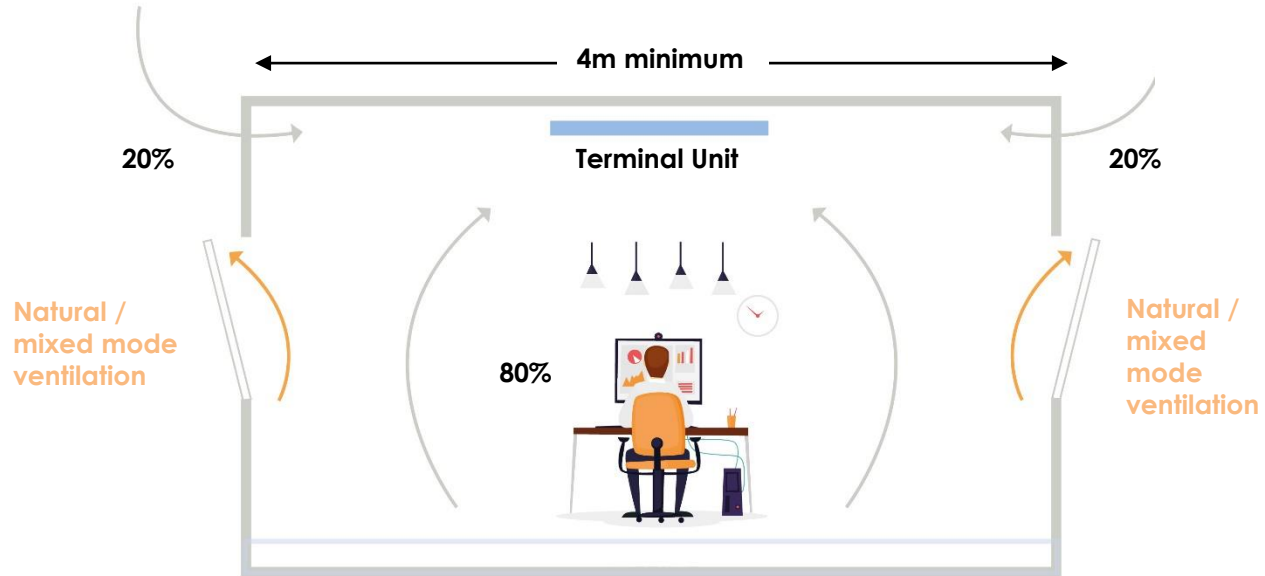


Some pandemic measures may increase energy. We need flexibility in our designs that allow a dual mode of operation. This would involve a 'pandemic mode', which could be initiated when required, but also would allow maximum energy reductions at all other times during the lifespan of a building.

Air Movement.

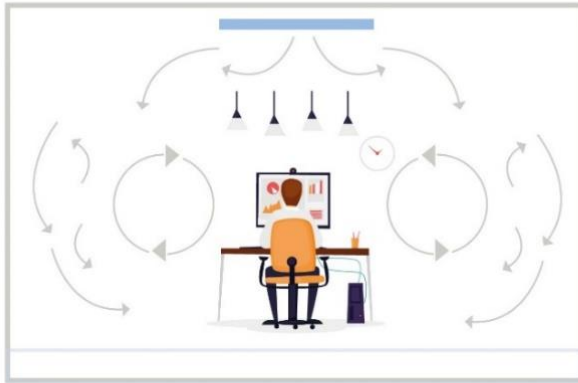
Air movement.

For effective interruption of transmission, air disinfection has to occur in the same room where transmission is occurring.

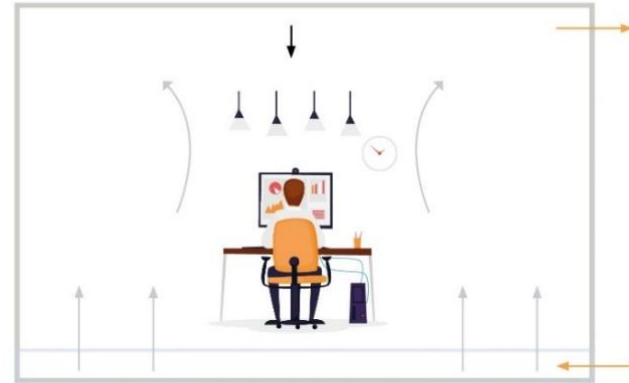


Air movement.

**Consider how different solutions impact air quality and thermal comfort.
Most air conditioning solutions involve a mixing solution, particularly overhead solutions which rely on dilution to reduce pollutants to acceptable levels.**



Mixing

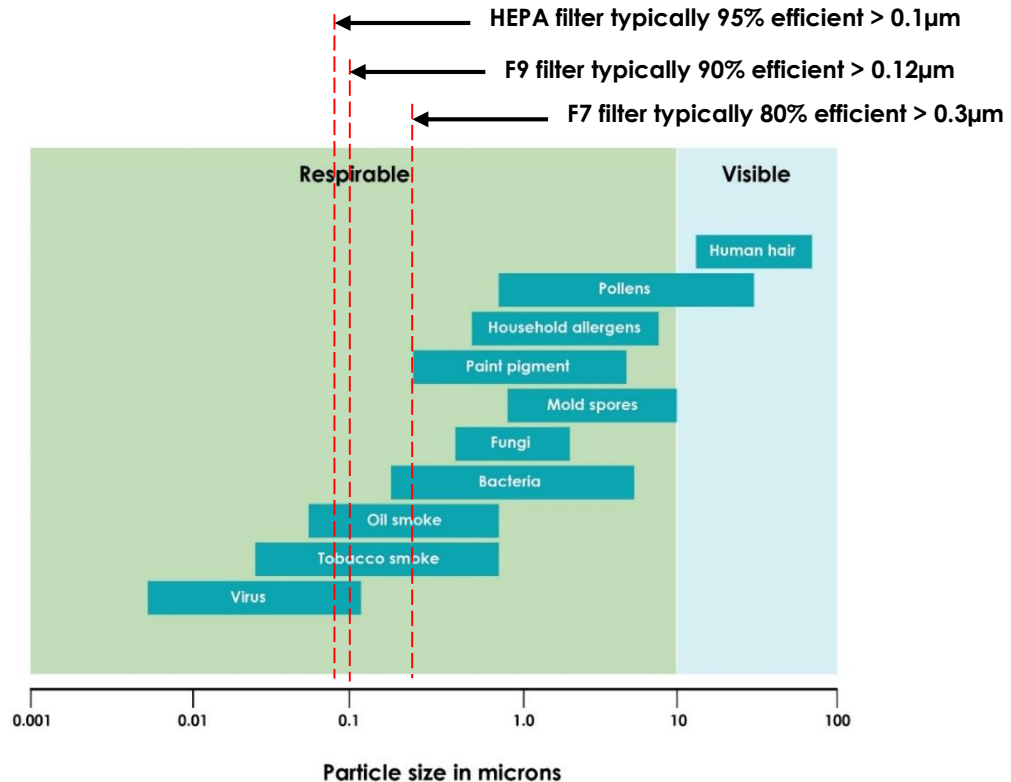


Displacement

Air Quality.

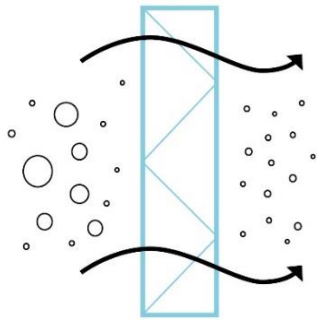
Filtering the air.

When considering filtration, viruses represent some of the smallest particulates we will encounter in the built environment.

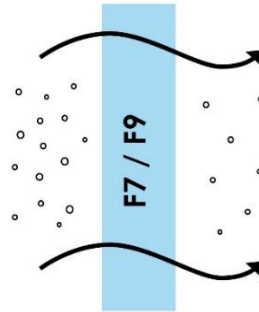


Air quality – filtration.

In a typical building, using F9 over F7 could account for £3,000 per annum additional electrical consumption, equivalent to 9.5 tonnes of CO2 (which represents £17,000 as a carbon offset payment).



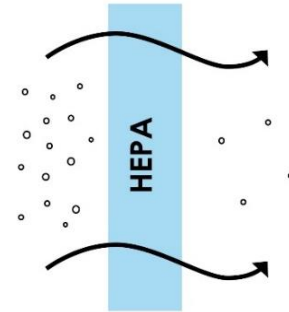
PANEL PRE-FILTER



F7 OR F9 BAG FILTER

Typically 75% - 85% efficient

F9 is a 35%-45% increase in pressure drop over F7



HEPA FILTER

Typically 99.999% efficient (but only at larger particle sizes)

Typically a 40% to 70% increase in pressure drop over F7

Air quality – UVC.

The benefits of UVC light have been known for many years. It has been used in some healthcare facilities, particularly where high levels of recirculation is involved.

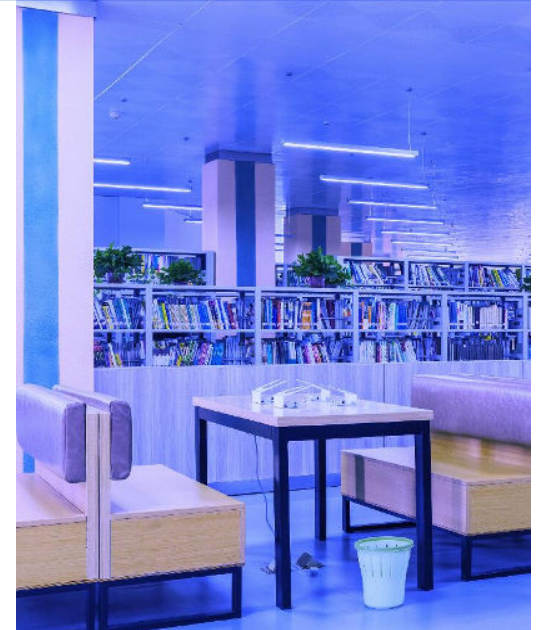
It has never found much traction in general applications, but this may change in response to COVID-19.



Air quality – UVC.

There have been reports of organisations using UVC lighting to disinfect surfaces. Whilst this may work for specific applications, even suppliers acknowledge the challenges and risks of applying UVC lighting in general accommodation, as it comes with potential health risks.

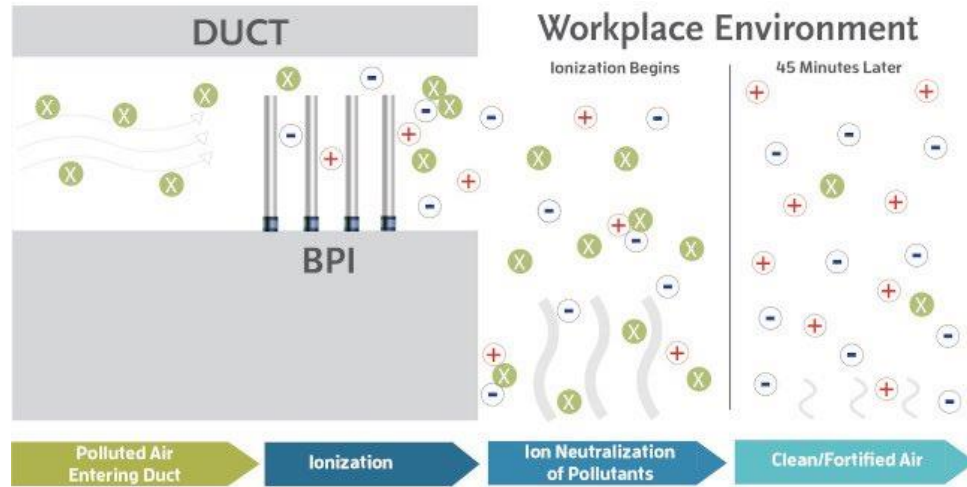
It is also a 'line of sight' technology so anything in a shadow would not be treated.



Air quality – Bi-polar ionisation.

Bi-polar ionisation, sometimes referred to as Plasma or iWave by different suppliers, is another interesting technology that has been available for a number of years.

Positive and negative ions are generated and then released into the airstream. These ions attach themselves to particulates, VOC's and bacteria, making them heavy so that they drop out of the air.



Potential for ducted and in-room applications

Design Challenge.

What do we want our workspace to deliver for us?

FLEXIBLE

(Time & spatial)

ADAPTABLE

DEMOUNTABLE

CONNECTED

(Physically & virtually)

HYGIENIC

AIR, WATER, ACOUSTIC, THERMAL & VISUAL

QUALITY

ACCESSIBLE

(In & out)



New buildings – People and movement.

Where should we be challenging ourselves as designers?

LIFTS

- > Destination control lifts with flexible algorithms
- > HEPA filters, UVC lighting or ionisation units in lift cars
- > Receptions planned to encourage use of stairs, perhaps one-way
- > Touch free solutions wherever practical

TOILETS

- > Chicane entry toilets?
- > Preference for Super-loo style toilets?
- > Touch free solutions wherever practical
- > Select the materials we use for their antimicrobial properties

PEOPLE FLOW

- > Smart building Apps to connect people to their environment
- > Should a Pandemic Plan become a design deliverable?



New buildings – Co-working

Co-working space is currently commonplace in many buildings.

It will be interesting to see how co-working evolves and how people will view sharing space and furniture in the future.

Perhaps co-working space may look more like this?



LONE CO-WORKING

New buildings – Services design.

So how will the design of the engineering services to our buildings change in the future?

- > VENTILATION
- > PANDEMIC MODE
- > USE OF SMART TECHNOLOGIES
- > MATERIALS



Design for the occupant.

Some changes to future designs will inevitably occur, with even greater focus on the health and wellbeing of the occupants being a major factor in the success of a building.

FOCUS ON MEASURES WHICH PROMOTE HEALTH & WELLBEING AND ENERGY/CARBON REDUCTION:

- > Displacement systems
- > Mixed mode/natural ventilation solutions
- > Good air quality
- > Reduce reliance on touch
- > Greater use of smart tech
- > Surface material selection

IMPLEMENT ADDITIONAL MEASURES ONLY WHEN NEEDED:

- > Additional filtration
- > Pandemic control measures
- > Enhanced cleaning regimes
- > Reduced occupancy levels
- > Extended ventilation operation

Want to know more?
Get in touch with
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