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Five revealing statistics from the BCIA's latest technical white paper

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The BCIA recently launched its most recent technical white paper, entitled 'Comfort, Efficiency and Health: The Untapped Potential of Building Energy Management Systems'.

This comprehensive look at the vital need to improve energy consumption, building performance and occupant health and comfort comes at a vital time – with rising average global temperatures and the UK's net zero target of 2050 ever-approaching.

Drawing on in-use performance data and utilising economic modelling, the white paper revealed some fascinating insights into the impact BEMS can have on carbon emissions, building energy use and costs. In fact, it highlighted five fascinating statistics when it comes to the air quality challenges facing schools and the vital role building controls can have in enhancing pupil comfort, productivity and health.

1. Average ventilation rate of schools across the UK was 5.3 l/s per person

With ventilation a vital aspect of building design due to indoor CO2 concentrations, the importance of enhancing the ventilation rate in schools across the UK cannot be understated. Research discussed in the whitepaper revealed the average ventilation rate of schools in the UK was around 5.3 L/s per person.

Despite this average, there are many classrooms across the UK that fall short of the recommended guidelines, which state a minimum of 5 L/s per person.

This therefore increases the likelihood of higher indoor CO2 concentrations causing negative productivity

and health outcomes. Advanced building controls, however, can provide the required solution – measuring CO2 concentrations and adjusting ventilation accordingly.

In fact, evidence suggests improving ventilation and maintaining a comfortable temperature in this way can improve academic outcomes and lower student sickness absences.

2. Recent illness rates equated to 88 million absence sessions

With low ventilation rates meaning pupils are more likely to fall ill with diseases and illnesses transmitted in the air and then be absent from school for a short period, it is perhaps no surprise to discover the most recent illness rates recorded in English state primary and secondary schools were 3.06% and 3.87% respectively.

This equates to around 88 million absence sessions – either a morning or an afternoon.

The specification and installation of effective ventilation systems, made cost and energy efficient by building energy management systems (BEMS), could effectively replace air in classrooms based on demand.

Consequently, this would lower the likelihood of the transmission of airborne illnesses and diseases. This was supported by an empirical study of schools, which found that for every L/s per person increase in ventilation rate, illness absence rates decreased by between 1.4% and 1.8%.

3. Absences could be reduced by 16-20 million sessions per year

The white paper estimated that with Class A BEMS installed, a classroom would be expected to achieve optimal indoor air temperature and CO2 concentration levels. This would be in no small part down to the BEMS' CO2 sensors having greater responsiveness to indoor air quality changes and the ability to maintain a steady level of CO2.

As a result, student attendance and academic performance would be enhanced.

So, by utilising building controls and automation to increase the effective ventilation rate from 5.3 L/s per person to 19.3 L/s per person, absences in UK state schools and primary schools could be decreased by 16-20 million sessions per year.

4. The UK economy could be boosted by up to £709 million

In addition to enhancing the productivity of pupils, reducing the number of school absences due to illness would have a substantial effect on parents and guardians, too.

With parents or guardians having to take time away from work to collect and then take care of unwell children absent from school, they are ultimately less productive – incurring a significant cost to the

economy.

Therefore, implementing BEMS to improve air quality and pupil health and wellbeing could provide the UK economy with a major cash boost.

The white paper's economic modelling assumed a pupil has two parents or guardians and that an absence will incur a cost of the median daily salary when both are employed. Assuming that pupil illness absences only impact parents once per day, and that parental working times are affected for 30% of absence sessions for secondary school pupils, and 100% for primary school students, a benefit of up to £565-£709 million could be yielded for the UK economy.

5. An extra 522,000 pupils could have passed their national exams

White paper data suggested the installation of a Class A BEMS that maintained 900ppm CO2, compared to a Class C system maintaining 1500ppm CO2, would increase children's performance from 97% at 1,500ppm to 100% at 900ppm.

Consequently, if Class A BEMS had been deployed in all classrooms across the UK, an additional 522,000 pupils could have passed their national exams in 2024.

This is equivalent to around 6% of all students. While a significant number, it's perfectly achievable should those in charge of schools and other educational establishments across the UK focus their efforts on improving air quality and comfort in their premises.

BEMS has a crucial role to play in the UK's decarbonisation and building performance efforts. However, there is still a lack of awareness when it comes to the energy consumption, health, productivity and wellbeing benefits it provides.

This technical white paper, and ongoing efforts by the BCIA to increase knowledge and understanding both inside and outside the industry, will hopefully go a long way towards enhancing that awareness and ensuring more comfortable, productive and healthy educational environments in the months and years to come.