

Can gas-phase air cleaning partly substitute outside air?

Results of Annex 78

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ABSTRACT

Ventilation accounts for approximately 20% of the global energy use for providing an acceptable indoor environment. The requirements for ventilation in most standards and guidelines assume acceptable quality of (clean) outdoor air. Worldwide, there is an increasing number of publications related to air cleaning and an increasing sale of gas-phase air cleaning products. This situation creates a need to verify the influence of using air cleaning on indoor air quality, comfort, well-being, and health, as well as standardizing the testing of air cleaners. It is additionally vital to learn to which extent air cleaning can supplement ventilation by improving air quality, i.e., whether it can partly substitute the ventilation rates required by standards. Finally, the energy impact of using air cleaning as a ventilation supplement must be estimated. In many locations worldwide, the outdoor air quality is so bad that ventilation decreases indoor air quality rather than improves it. In these cases, the alternative to using ventilation is to substitute it with gas-phase air cleaning to keep the indoor air of high quality. Even when outdoor air is of good quality, using air cleaning to substitute or supplement ventilation could reduce the rate of outside air supplied indoors, thereby saving energy for its conditioning (heating/cooling) and transporting (fan energy). Since gas-phase air cleaning is expected to improve indoor air quality and reduce energy use for ventilation, it should be considered an exciting technology that can be used in the future. However, there is a need for a better evaluation of the potential of gas-phase air cleaning to improve indoor air quality and substitute ventilation rates, as well as of the energy implications when used. There is also a need to develop standard test methods for the performance of gas-phase air cleaning devices. Consequently, it is proposed to develop a standard for testing gas-phase air cleaning technologies. To tackle the above issues, IEA EBC Annex 78 Supplementing Ventilation with Gas-phase Air Cleaning, Implementation, and Energy Implications was started to bring researchers and industry together to investigate the possible energy benefits of using gas-phase air cleaners (partial substitute for ventilation) and establish procedures for improving indoor air quality or reduced amount of ventilation by gas phase air cleaning. This presentation will summarize the results of the Annex, focusing mainly on the development of methods for rating gas-phase air cleaners, calculation of clean air delivery rate, and the potential of using air cleaners as a supplement to ventilation.

KEYWORDS

Ventilation; Gas-phase pollutants; Air Cleaning; Standard; Testing method