

## THE ENGINEERING PROFESSION'S POSITION

- Evidence has shown that airborne pathogens can spread in poorly ventilated and/or crowded indoor settings leading to serious diseases such as COVID-19.
- The World Health Organization (WHO), the US Centers for Disease Control and Prevention (CDC), and members of the scientific community have considered the potential risks that current heating, ventilation, and air conditioning (HVAC) systems pose in spreading of airborne pathogens such as the SARS-CoV-2 virus leading to diseases such as COVID-19. Engineers Canada recognizes that poorly designed or maintained ventilation systems may contribute to the spread of such pathogens.
- Engineers Canada encourages all levels of government, businesses and building owners to review their HVAC systems, under the supervision of a licensed engineer, to ensure that they are functioning correctly, meet the appropriate building codes as well as standards outlined by the Public Health Agency of Canada (PHAC) and the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) along with ASHRAE pandemic guidelines.
- It is vital that federal, provincial, and territorial governments consult licensed professionals, including engineers, in assessing the operation of current HVAC systems and in upgrading or modifying HVAC systems. This is important to maintain good indoor air quality and thereby reduce the risk of exposure to and spread of pathogens leading to COVID-19 type diseases.

### The challenge(s)

The role of ventilation in removing exhaled airborne bio-aerosols and preventing cross infections has been extensively studied by multiple disciplines for decades and was looked at closely after the SARS outbreak in 2003. It has been shown that the SARS-CoV-2 virus (leading to the COVID-19 disease), and other similar pathogens, can spread through aerosolized particles and therefore airborne transmission of the virus must be addressed to curb its spread. The World Health Organization (WHO) and the US Centers for Disease Control and Prevention (CDC) have made explicit references to this concern. The WHO has developed a document entitled: [\*Roadmap to improve and ensure good indoor ventilation in the context of COVID-19\*](#), which defines key questions users should consider to

assess indoor ventilation and the major steps that are required to reach recommended ventilation levels, thereby improving indoor air quality and reducing the risk of COVID-19 spread. Learning to live with COVID-19 and other airborne diseases means that proactive steps to improve ventilation cannot be ignored or postponed. The proposer design, evaluation, engineering adjustments and/or upgrades to HVAC systems by licensed engineers, coupled with stringent maintenance programs, are a key to success as we transition to a post-pandemic world.

Ventilation upgrades and improvements can increase the delivery of fresh air, filtered clean air and dilute potential contaminants<sup>1</sup>. However, applying tools to improve ventilation, such as adjusting HVAC systems to increase airflow to different building types, occupancies, and

<sup>1</sup> Centre for Disease Control and Prevention (2021). "Cleaning, Disinfecting, & Ventilation." Retrieved September 26, 2022 from: <https://www.cdc.gov/coronavirus/2019-ncov/community/ventilation.html>

activities under environmental and seasonal changes and doing so in an economic way, can be challenging.

## Recommendations to the federal government

The federal government must continue to work with provincial and territorial governments in implementing a plan to prioritize and conduct assessments of HVAC systems that adequately address these challenges. Additionally, consultation with experienced and unbiased professionals is required when considering changes to HVAC systems and equipment to help maintain good indoor air quality so that the risk of exposure to airborne diseases and other contaminants remains low.

The Public Health Agency of Canada (PHAC) has developed [COVID-19: Guidance on indoor ventilation during the pandemic](#) to inform Canadians about how indoor ventilation, in combination with other recommended public health measures, can reduce the spread of COVID-19. It provides practical tips on how to improve indoor air, ventilation, and filtration that reduces the spread of COVID-19. ASHRAE has also released several key resources that outline how to create improvements to current HVAC systems, as well as how to properly mitigate the transmission of the COVID-19 virus. ASHRAE's [Building Readiness Guide](#) includes an extensive checklist that makes explicit reference to include licensed and certified professionals that can perform the analysis, testing, design, construction, control programming, balancing, commissioning, maintenance, and operation services that are required to make HVAC adjustments and to achieve optimal performance to reduce the spread of COVID-19<sup>2</sup>. The document recommends "consulting with a local professional

engineer to determine the appropriate minimum RH levels based on local climate conditions, type of construction and age of the building under consideration."<sup>3</sup> ASHRAE also provides extensive resources to mitigate COVID-19 spread in a variety of building types, including guidance on upgrading filtration efficiency.<sup>4</sup>

Engineers Canada strongly agrees with ASHRAE's guidelines and recommends that all levels of government consult with engineers licensed to practice in that area to expertly evaluate existing systems and address HVAC considerations that prevent the spread of COVID-19 and other airborne contaminants. The federal government must be progressive and proactive in its approach to upholding public safety. For this reason, Engineers Canada also recommends that the federal government's [Building management direction for coronavirus disease 2019 \(COVID-19\)](#), introduced under Public Services and Procurement Canada, be amended to include the need for consultation with engineers licensed to practice in that area in the assessments, adjustments and upgrades of HVAC systems.

Engineers Canada recommends that the recommendations for reducing the risk of aerosol transmission of diseases be considered for inclusion in the National Building Code through the normal revision cycle.

## How Engineers Canada will contribute

Engineers Canada will continue to:

- Encourage all governments, businesses and building owners to review their HVAC systems and assess indoor air quality, with the help of an engineer, to ensure that they meet the latest standards and best practices outlined by PHAC and ASHRAE. Where system

<sup>2</sup> American Society of Heating, Refrigerating, and Air-Conditioning Engineers (2020). "Building Readiness." Retrieved September 26, 2022 from: <https://www.ashrae.org/file%20library/technical%20resources/covid-19/ashrae-building-readiness.pdf>

<sup>3</sup> Ibid

<sup>4</sup> American Society of Heating, Refrigerating, and Air-Conditioning Engineers (2020). "Building Readiness." Retrieved September 26, 2022 from: <https://www.ashrae.org/file%20library/technical%20resources/covid-19/ashrae-covid19-infographic.pdf>

deficiencies are identified, Engineers Canada will recommend a risk-based approach to evaluating potential options.

- Monitor for and support the involvement of engineers in assessing and changing HVAC systems and equipment to help maintain good indoor air quality, in a proactive approach, so that the risk of exposure to the pathogens leading to the COVID-19 virus and other airborne diseases remains low.
- Encourage qualified personnel to support the efforts of groups such as PHAC and ASHRAE in the continued research of ventilation related issues and the development of standards surrounding these systems.