

Tradeoffs Between Indoor Air Quality and Sustainability for Indoor Virus Mitigation Strategies in Office Buildings

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The COVID-19 pandemic has motivated building operators to improve indoor air quality (IAQ) through long-term sustainable solutions. This paper develops a modeling capability using the Modelica *Buildings* library to evaluate three indoor virus mitigation strategies: use of MERV 10 or MERV 13 filtration and supply of 100% outdoor air into a building with MERV 10 filtration. New evaluation metrics are created to consider the impact of improving IAQ on financial and environmental costs. The mitigation strategies are studied for medium office buildings in three locations in the United States with differing climates and electricity sources. The results show that use of 100% outdoor air can significantly improve IAQ with limited increases in costs in the milder climate, but leads to very high costs in the hot and humid and very cold climates. MERV 13 filtration can improve IAQ relative to MERV 10 filtration with small increases in costs in all locations.