



Aldred J, Darling E, Morrison GC, Siegel JA, Corsi RL. 2016. Analysis of the cost effectiveness of combined particle and activated carbon filters for indoor ozone removal in buildings (RP-1491). *Science and Technology for the Built Environment*, **22(2)**, 227-236.
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Abstract

This study involved the development of a model for evaluating the potential costs and benefits of ozone control with combined particle/activated carbon filtration (referred to here as activated carbon filtration) in buildings. The modeling effort included the prediction of indoor ozone and ozone reaction products with and without activated carbon filtration in the HVAC system. Benefit-to-cost ratios were estimated for various types of buildings in 12 American cities in 5 different climate zones. Health benefits were evaluated using disability-adjusted life-years attributed to the difference in indoor ozone concentration with and without activated carbon filtration, and included city-specific age demographics for each simulation. Costs of activated-carbon filters included capital cost differences when compared against conventional HVAC filters of similar minimum efficiency reporting value rating (e.g., minimum efficiency reporting value 6–8), energy penalties due to additional pressure drop, and regional utility rates. When assuming a single-pass ozone removal efficiency of 60%, carbon filtration during the ozone season was beneficial and economically viable in commercial office buildings, long-term health-care facilities, and K–12 schools. Residential activated carbon filtration could be economically viable for conditions of higher ozone removal efficiencies, lower filter costs, and lower pressure drop across the filter.

Practical Implications

Ozone is associated with increased incidences of **mortality** and **morbidity**. Approximately **50%** of ozone exposure occurs **indoors**. As such, effective ozone control via **carbon filtration** is predicted to provide health benefits, especially in cities with high ambient ozone concentrations during the **summer** ozone season.

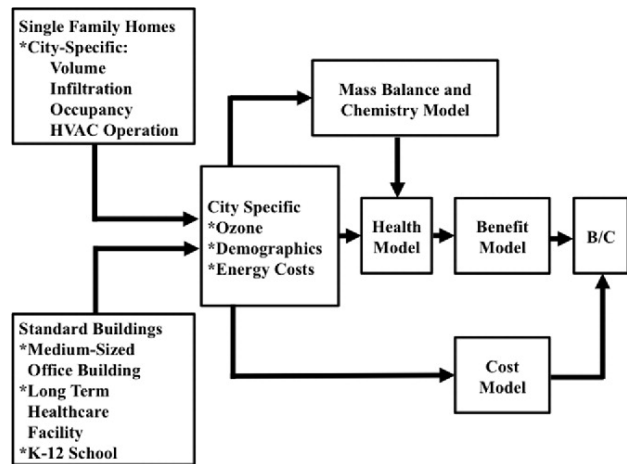


Figure 1. Conceptual model illustrating interconnected sub-models of the CO3B-Calc model.

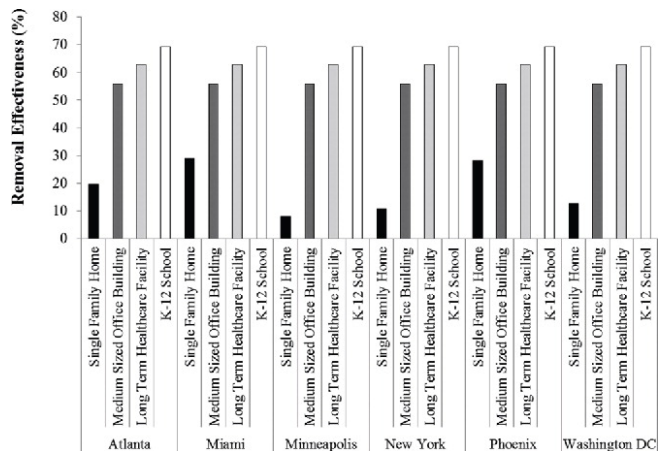


Figure 2. Ozone removal effectiveness when using activated carbon filters in four types of buildings in 6 of the 12 sample cities.

