

# Protecting Homes from Outdoor Pollutants

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## Executive Summary

Residential indoor air quality (IAQ) is affected both by pollutants generated inside houses and by pollutants that enter with outdoor air or water. For years, the emphasis on improving IAQ has been to reduce indoor pollutant sources and to facilitate the dilution of pollutants with ventilation by clean outdoor air. The ROCIS initiative deals with situations where outdoor sources – air, water, soil gases, etc. – are a significant source of indoor pollution and those pollutant loads have to be reduced. Establishing the health basis for reducing impacts in specific circumstances is beyond the scope of this paper. Rather, we intend this paper and the related white paper on commercial buildings to serve as guidance on how to identify and mitigate high concentrations of outdoor pollutants.

This paper examines these issues based on the data collected in American and Canadian housing stock. It presents the material as follows.

First, we review the range of outdoor pollutants that can cause problems and also list indoor sources of those same pollutants. We also touch on the established and emerging methods to detect the presence and concentrations of pollutants. These introductory sections establish a context in which to consider potential mitigation strategies. For more detail on air quality and health, readers are directed to another ROCIS document (The Public Health Basis for the ROCIS Initiative) or several excellent reviews on health effects.

We then describe the basic entry pathways for outdoor pollutants as well as approaches to protecting houses against outdoor pollutant entry. Entry pathways include infiltration of outdoor air; spaces attached to the house; soil gas; tracked-in dirt; and groundwater. Mitigation approaches include building envelope tightness (above and below grade); pressure boundaries; interior air circulation and filtration; cleanliness; and water treatment. We also include examples of actual houses where outdoor pollutants have been successfully minimized and emphasize the need to consider the house as a total system in which none of the solutions stands alone. The effects of one solution can amplify or render useless the utility of another.

We then consider potentially new solutions, including improved filter technology, cleaning equipment for tracked-in dirt, and envelope retrofits. We touch on the coming possibility of homeowner-operated detection devices in a widely-distributed, data-tracking network for locally generated pollutants such as wood smoke or industrial sources.

Finally, the recommendations section suggests that further research and monitoring in this relatively new field will help to optimize the mitigation solutions. Priority areas should focus on vulnerable populations and specific high-load pollutant areas.

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