Clearing the Air:
The Facts About Ventilation

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The only effective way to fully protect nonsmokers from exposure to secondhand smoke is to eliminate smoking in indoor public spaces.

Secondhand smoke is a serious health hazard. Ventilation technologies do not sufficiently protect individuals from the harmful effects of breathing in secondhand smoke. Reports from two different Surgeon Generals have found that there is no safe level of exposure to secondhand smoke.[i, ii] While ventilation or air purification systems are sometimes promoted as a way to reduce exposure to secondhand smoke, ventilation cannot remove all secondhand smoke and does not purify the air at rates fast enough to protect people from harmful toxins. The Surgeon General has concluded that even separating smokers from nonsmokers, cleaning the air, and ventilating buildings cannot eliminate exposure of nonsmokers to secondhand smoke. The only effective way to fully protect nonsmokers from exposure to secondhand smoke is to completely eliminate smoking in indoor public spaces.[iii]

The Facts on Secondhand Smoke and Air Quality

Secondhand smoke is a major source of particulate matter, a type of air pollution. Conventional air cleaning systems can remove large particles, but not the smaller particles or gases found in secondhand smoke.[iv] Particulate matter, of the size found in cigarette smoke, is easily and deeply inhaled into the lungs and can lead to disease and death. Exposure to secondhand tobacco smoke has been causally linked to cancer, respiratory and cardiovascular diseases, and numerous other adverse health effects.[v]

Numerous studies over the past two decades have repeatedly shown that secondhand smoke is a cause of pollution and smoke-free laws are the only effective way to reduce exposure to secondhand smoke. For example:

- The pollution generated from three lit cigarettes in a room of 197 cubic feet was higher than the pollution generated from a diesel engine in a closed private garage.[vi]
- Between 90 and 95 percent of airborne pollution in Delaware hospitality venues was caused by smoking before the state's smoking ban went into effect.[vii] Levels of cancer-causing pollutants were found to be 4 times greater than National Ambient Air Quality Standards (NAAQS) outdoor requirements in six Delaware bars, one casino, and one pool hall before implementation of a statewide smoking ban.[viii]
- Studies have found that in restaurants and bars where smoking was previously allowed, particulate matter decreased 80-90 percent within months of a smoke-free policy taking effect.[ix]

The American Society of Heating, Refrigeration, and Air-Conditioning Engineers: [xii]

- Concludes that the only way to eliminate the health risks of secondhand smoke exposure is to prohibit the smoking behavior
- Furthermore, no engineering approaches, including ventilation and air cleaning technologies, can eliminate the health risk.
- Includes marijuana smoke in the definition of environmental tobacco smoke (also called secondhand smoke).

What is Ventilation?

Ventilation uses controlled airflow to curb airborne contaminants.[x] Despite the fact that ventilation systems cannot remove carcinogens found in secondhand smoke from a workplace or public place, the tobacco industry and their allies have promoted ventilation as a method to accommodate both smokers and non-smokers. There are two types of ventilation that are commonly used in commercial and industrial buildings.[xi]

- **Local exhaust ventilation** attempts to trap pollutants at or near their source. It is geared toward environments with high pollution levels and requires low levels of air circulation. The theory is that pollutants are trapped at their source and are not diffused throughout the air.[xii] Ventilated ashtrays are one example of local exhaust technology. Once a cigarette is placed into an ashtray, a filter would isolate any pollutants emitted from the burning tip. Canopy hoods are another example and work by filtering out any smoke that is exhaled directly above restaurant and gaming tables. In practice, local exhaust ventilation is not fully effective and requires substantial maintenance, making the technology ineffective, inefficient and costly for businesses to operate.
- **Dilution ventilation,** also known as general ventilation, involves saturating a room with clean, unpolluted air in an attempt to dilute airborne contaminants—in this case tobacco smoke—to safe and comfortable levels. The process requires high levels of air circulation and works best in environments with low pollution levels spread over a large area. However, exposure to secondhand smoke, at any level, is neither safe nor acceptable; the health consequences are immediate and can be life-threatening. Because dilution ventilation allows tobacco smoke to travel throughout a room, it offers little protection from secondhand smoke exposure and can even distribute secondhand smoke throughout a building.[xiii, xiv] In addition to being ineffective, it may be costly for businesses to install.

Ventilation is Ineffective

The U.S. Surgeon General has concluded that separating smokers from nonsmokers, air cleaning technologies, and ventilating buildings cannot eliminate secondhand smoke exposure.[xv] Research has shown that "tornado-like levels of ventilation" would be needed in restaurants, bars, and gaming establishments to protect hospitality workers from secondhand smoke.[xvi] For example:

- Placing hoods over gaming, restaurant and bar tables to filter secondhand smoke would require "impracticably high" minimum airflows in excess of 300 cubic feet per minute per hood (cfm/hood).[xvii]
- Ventilation was unable to control pollution in seven hospitality venues that were surveyed in Boston, Massachusetts, prior to the city's smoke-free ordinance. Indoor air pollution levels were four times higher than NAAQS outdoor requirements.[xviii]
  A study of 36 tribal casinos found that air pollution was more than four times as high in the non-smoking gaming areas of casinos that allowed smoking than smoke-free casinos when there was no separation from smoking gaming areas. Even when there was complete separation between smoke-free and non-smoking gaming areas, air pollution was an average of 40 percent greater in the non-smoking areas of casinos that allowed smoking than completely smoke-free casinos.[xix]

A study comparing indoor air quality at U.S. airports with and without smoking lounges found significantly more secondhand smoke particles in airports with smoking lounges, even in non-smoking parts of the airport. In airports with smoking lounges, the amount of secondhand smoke in the areas adjacent to the smoking lounges – where smoking was not allowed – was four times higher than the average amount of secondhand smoke in the non-smoking parts of airports that allowed smoking and five times higher than the average amount of secondhand smoke in completely smoke-free airports.[xx] Despite ventilation, secondhand smoke from the airport smoking lounges penetrated the non-smoking parts of the airports, exposed non-smoking employees and travelers to secondhand smoke.

Manufacturers and sellers of air filtration technologies admit that their products do not protect consumers from the health risks imposed by secondhand smoke.[xxi] The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) re-affirmed in 2016, that the only means of effectively eliminating the health risk associated with indoor exposure is to prohibit smoking activity.[xxii] According to ASHRAE:

- No other engineering approaches, including current and advanced dilution ventilation or air cleaning technologies, have been demonstrated or should be relied upon to control health risks from secondhand smoke exposure in spaces where smoking occurs.[xxiii]
- While some engineering measures may reduce secondhand smoke exposure and some of the corresponding odor and irritation, smoke-free air cannot be accomplished with any engineering or other approaches besides prohibiting smoking.[xxiv]

Even the tobacco industry acknowledges that ventilation and air filtration technologies are ineffective at removing secondhand smoke.

- British American Tobacco (BAT) acknowledged that its Colt air filtration unit was only 34 percent efficient at removing particulate matter from tobacco smoke. The unit failed to eliminate carbon monoxide and other volatile organic compounds found in cigarette smoke.[xxv] The Colt unit only reduced "haze, tobacco-smoke aroma and total perceived smoke," thus making the air more comfortable to breath, but not less harmful.[xxvi]
- Phillip Morris USA states that "the public should be guided by the conclusions of public health officials regarding the health effects of secondhand smoke."[xxvii] The company further acknowledges that "the conclusions of public health officials concerning environmental tobacco smoke are sufficient to warrant measures that regulate cigarette smoking in public places." Even the tobacco company itself does not promote ventilation as an alternative to smoke-free laws.

ACS CAN on Ventilation

ACS CAN supports local, state, and federal initiatives to eliminate public exposure to secondhand smoke, including 100 percent smoke-free laws, prohibiting smoking in all workplaces, including restaurants, bars and casinos, which are key to protect nonsmokers, children and workers from the deadly effects of secondhand smoke.

ACS CAN does not support smoke-free laws that allow for separating smokers from nonsmokers or ventilating buildings as alternatives to requiring a 100 percent smoke-free environment, as the evidence is overwhelming that these measures cannot eliminate exposure of nonsmokers to secondhand smoke.

ACS CAN's work to create 100 percent smoke-free environments is part of a comprehensive approach to addressing tobacco use and exposure to secondhand smoke in the United States.

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[i] U.S. Department of Health and Human Services (HHS). *The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General.* U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2006.

[ii] HHS. *How Tobacco Smoke Causes Disease: The Biology and Behavioral Basis for Smoking-Attributable Disease.* U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2010.

[iii] HHS, 2006.

[iv] HHS, 2006.

[v] HHS. *The Health Consequences of Smoking—50 Years of Progress. A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2014. Printed with corrections, January 2014.
[vi] Invernizzi G, Ruprecht A, Mazza R, et al. Particulate Matter from Tobacco Versus Diesel Car Exhaust: An Educational Perspective. *Tobacco Control* 2004; 13:219-221.
[vii] Repace, J. Respirable Particles and Carcinogens in the Air of Delaware Hospitality Venues Before and After a Smoking Ban. *Journal of Occupational and Environmental Medicine* 2004; 45(9): 887-905.
[viii] Repace, 2004.
[ix] Babb S, McNeil C, Kruger J, Tynan MA. Secondhand Smoke and Smoking Restrictions in Casinos: A Review of the Evidence. *Tobacco Control* 2014; doi:10.1136/tobaccocontrol-2013-051368.
[x] Repace J. Can Ventilation Control Secondhand Smoke in the Hospitality Industry? June 2000. Available online at http://www.dhs.ca.gov/ps/cdic/tcs/documents/pubs/FedOHSHAets.pdf. Accessed November 11, 2014.
[xi] Repace, 2000.
[xii] Repace, 2000
[xiii] Repace, 2000
[xiv] American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE). ASHRAE Position Document on Environmental Tobacco Smoke. Approved by ASHRAE Board of Directors October 22, 2010. Reaffirmed by ASHRAE Technology Council June 29, 2016.
[xv] HHS, 2006.
[xvi] Repace, 2000.
[xvii] Repace, 2004.
[xviii] Repace, J. An Air Quality Survey of Respirable Particles and Particulate Carcinogens in Boston Pubs Before and After a Smoking Ban. Bowie, MD: Repace Associates, Inc, 2003.
[xix] Babb, 2014.
[xx] Centers for Disease Control and Prevention. Indoor air quality at nine large-hub airports with and without designated smoking areas – United States, October-November 2012. *MMWR* 2012; 61(46): 948-951.
[xxi] Americans for Nonsmokers' Rights. Ventilation and Air Filtration: What Air Filtration Companies and the Tobacco Industry Are Saying. August 2005. Available at http://www.no-smoke.org/document.php?id=267.
[xxii] ASHRAE, 2016
[xxiii] ASHRAE, 2016.
[xxiv] ASHRAE, 2016.
[xxv] Leavell NR, Muggli ME, Hurt RD, and Repace J. Blowing Smoke: British American Tobacco's air filtration scheme. *British Medical Journal* 2006; 332: 227-229.
[xxvi] Leavell, 2006.
[xxvii] Phillip Morris USA. Smoking and Health Issues. 2014. Available at http://www.philipmorrisusa.com/en/cms/Products/Cigarettes/Health_Issues/Secondhand_Smoke/default.aspx. Accessed November 11, 2014.