Cost of Poor Indoor Air Quality

Indoor air quality (IAQ) affects the prevalence of several very common health effects including communicable respiratory illnesses such as common colds (e.g. rhinovirus infections), influenza, adenovirus infections, and measles; allergies and asthma; and acute nonspecific health symptoms often called sick building syndrome symptoms. These health effects lead to health care costs plus the costs of sick leave.[1]

How Much Could You Be Saving?

The following tables show the cost of sick leave based on median salary data for seven major cities within the United Sates. The costs associated with health care, employee benefits, and overhead are not included in the calculations.

Median Salary by City			
New York	$68,554	Los Angeles	$68,131
Chicago	$62,337	Dallas	$61,172
Houston	$61,448	Washington	$67,382
Atlanta	$61,003	**Median Salary**	**$61,893**

Source: Payscale, Inc. (December 2009) available at www.payscale.com

Annual US Costs

The potential annual savings and productivity gains from improved IAQ in the United States are estimated as high as $14 billion from reduced respiratory disease, $4 billion from reduced allergies and asthma, $30 billion from reduced sick building syndrome, and $160 billion from direct improvements in worker performance that are unrelated to health.[4]

Number of Employees	Cost of 1 Sick Day per Year	Cost of 2 Sick Days per Year	Cost of 3 Sick Days per Year	Cost of 4 Sick Days per Year	Cost of 5 Sick Days per Year
10	$2,398	$4,795	$7,193	$9,590	$11,988
20	$4,795	$9,590	$14,385	$19,181	$23,976
60	$14,385	$28,771	$43,156	$57,542	$71,927
100	$23,976	$47,952	$71,927	$95,903	$119,879
250	$59,939	$119,879	$179,818	$239,758	$299,697
500	$119,879	$239,758	$359,637	$479,515	$599,394
1,000	$239,758	$479,515	$719,273	$959,031	$1,198,788

An even bigger problem may be "presenteeism" - when people come to work even when sick. The problem here is loss of productivity among sick workers. Numerous studies place average productivity losses between 3 and 7 percent (or higher). Overall, presenteeism is 7.5 times more costly than illness-related absenteeism and two to three times more costly than direct medical care. Even more disturbing may be the chain reaction as illnesses are spread to others.[2]

Even when employees are not sick poor IAQ impacts their productivity. Significant measurable changes in people's ability to concentrate or perform mental or physical tasks are associated with indoor pollution due to lack of ventilation or the presence of pollution sources.

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Estimates of performance losses from poor IAQ for all buildings suggest a 2 to 4 percent loss on average.[3] The following table shows the costs associated with a 3 percent loss of productivity based on the median salary of $61,893.

Number of Employees	Annual Cost of 3% Loss of Productivity
10	$18,701
20	$37,402
60	$112,207
100	$187,011
250	$467,528
500	$935,055
1,000	$1,870,110

The potential annual savings and productivity gains from improved IAQ in the United States are estimated as high as $14 billion from reduced respiratory disease, $4 billion from reduced allergies and asthma, $30 billion from reduced sick building syndrome, and $160 billion from direct improvements in worker performance that are unrelated to health. Compared with the personnel costs of the occupants any premium associated with ensuring IAQ is insignificant.[4]

Key strategies for improving IAQ include:

- Maintaining the minimum outdoor air intake flow required by the ventilation rate procedure of Standard 62.1-2007[4]. Ventilation air is used to dilute and remove common sources of indoor contaminants. PCI's OAFE-1500 is an Air Movement and Control Association (AMCA) International certified outdoor airflow measurement system capable of producing an overall ±0.5% accuracy through the velocity range of 200 to 1,200 fpm. Since the OAFE-1500 accuracy of ±0.5% is AMCA certified, utilization of the OAFE-1500 for direct measurement of the minimum outdoor air intake flow rate ensures that ASHRAE Standard 62.1-2007 is met.
- Maintaining a slightly positive building pressure to eliminate infiltration of common sources of outdoor contaminants and infiltration of water vapor (humidity) which can lead to moisture buildup arising from condensation causing mold growth inside buildings.[3] PCI's Airflow Sensing Elements/Stations coupled the MicroTrans Airflow Signal Processor have an accuracy of ±3% of actual flow over a 10:1 turndown range and can be used to accurately maintain building pressure to ensure that returns due to improved IAQ are gained.

References

[1] *Lawrence Berkeley National Laboratory, Indoor Environment Department, Environmental Energy Technologies Division "Health and Productivity Gains from Better Indoor Environments and their Relationship with Building Energy Efficiency" William J. Fisk (2000)*

[2] *Area Development Site and Facility Planning "The Real Cost of Poor Indoor Air Quality" Duran, Alexandra (August 2005).*

[3] *U.S. Environmental Protection Agency "IAQ Building Education and Assessment Model (I-BEAM)" (2002).*

[4] *U.S. Green Building Council "LEED Reference Guide for Green Building Design and Construction" (2009 Edition).*

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