

Researchers study harmful particulates

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Reducing barnyard emissions is one way to help reduce the harmful effects of tiny atmospheric air particles that can cause severe asthma in children, and lung cancer and heart attacks in some adults.

Carnegie Mellon University researcher Peter J. Adams argues that improved control of ammonia emissions from farm barnyards is more economical and efficient than trying to control the effects of sulfur dioxide and nitrogen oxide pollution from some industrial plants.

"In most farms, handling of animal manure is a major source of ammonia being released both to air and water," said Adams, an associate professor of civil and environmental engineering at Carnegie Mellon. "Our research shows that increased control of livestock feed, efficient use of nitrogen on farms, low-emission fertilizers and other improvements to manure handling on farms are cost-effective ways to reduce ammonia emissions and airborne particles."

Adams' research, featured in the 2007 winter edition of *Environmental Science & Technology*, shows that ammonia is a significant contributor to dangerous airborne particle concentrations along the eastern United States — concentrations that the Environmental Protection Agency (EPA) deems hazardous to human health.

The Carnegie Mellon research also reports that the potential savings from controlling ammonia manure emissions from farms is \$8,000 per ton in the winter, a cheaper and overlooked strategy for reducing airborne particle levels compared to controlling dangerous industrial

pollutants like sulfur dioxide and nitrogen oxides. In New York state, each 500-megawatt, gas-burning turbine produces as much as 61 tons per year of pollutants, such as sulfur dioxide and other dangerous airborne particulates, with remediation costs well into the millions, researchers said.

Essentially, people can smell ammonia in concentrations over five parts per million (ppm). And it starts to burn the eyes at 20 ppm.

"While you can only smell the high ammonia concentrations on or near a farm, the more serious health threat occurs further away as a complex set of chemical reactions occur in the atmosphere that convert ammonia into microscopic, airborne particles of ammonium nitrate. Better farming practices could decrease ammonia emissions from farms and potentially save farmers money," Adams said.

Last month, for example, the Indiana Senate Energy and Environmental Affairs Committee began discussing the need to find better ways of controlling agricultural air pollutants like ammonia and other farm odors. Livestock odor is regulated in some states, but not Indiana.

In addition to monitoring ammonia emission on farms, Adams indicated that in urban areas vehicles equipped with catalytic converters emit significant amounts of ammonia as part of a tradeoff in which nitrogen oxide pollution is reduced. While ammonia emissions from catalytic converters are potentially reducible, further research is needed to determine whether catalytic converters can effectively reduce both ammonia and nitrogen oxide pollution, Adams said.

Source: Carnegie Mellon University

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