

**Anti-Biomass Incineration/Forest Protection Campaign (*Energy Justice Network*)**

**HEALTH IMPACTS OF BIOMASS INCINERATION**

- “Less than 4 cents of every health care dollar is spent on prevention and public health. Our health care system has become a disease care system and the time for change is well overdue.”  
-*President Barack Obama*
- “Burning biomass could lead to significant increases in emissions of nitrogen oxides, particulate matter and sulfur dioxide and have severe impacts on the health of children, older adults and people with lung diseases.” - *American Lung Association*
- “Biomass power plants pose an unacceptable risk to the public’s health by increasing air pollution... The burning of biomass releases small particles into the air creating particulate air pollution. Epidemiological studies have demonstrated an association between elevated particulate air pollution levels and adverse health effects and death. Particulate air pollution is associated with increased cardiopulmonary symptoms, asthma attacks, days lost from work due to respiratory disease, emergency room visits, hospitalization rates, and mortality.  
  
“Biomass combustion also releases nitrogen oxides, which help create ozone, a highly reactive oxidant gas. Ozone reacts in the pulmonary airways causing symptoms of chest pain, shortness of breath, cough, wheeze, increased susceptibility to infection, declines in lung function, increases in asthma attacks, increases in asthma medication use, increased rates of emergency room visits for respiratory disease. – *Massachusetts Medical Society*
- “Massachusetts has the 4th highest breast cancer rate in the country...Of particular concern to the breast cancer community about this [Springfield] plant is the release of toxic chemicals like dioxin and polycyclic aromatic hydrocarbons (PAH’s) into the air in communities already experiencing needlessly high rates of breast cancer.”  
–*Massachusetts Breast Cancer Coalition*
- “Biomass burning of poultry litter and wood wastes creates emissions of particulate matter that research has shown increase the risk of premature death, asthma, chronic bronchitis, and heart disease. This burning process also creates numerous byproducts, including nitrogen oxides and volatile organic compounds that increase smog and ozone, which are known to increase lung disease and mortality; sulfur dioxides which also contribute to respiratory disease; arsenic which can increase the risk of cancer; mercury which can increase the risk of brain and kidney disease and affect the developing fetus; and dioxins which may increase the risk of cancer, heart disease, diabetes mellitus, developmental delays in children, neurotoxicity, and thyroid disease.  
  
“These health effects would increase disability and death in all age groups, but particularly in the most vulnerable—developing fetuses, newborns, children, those with chronic illness, and the elderly. As a result of this increased disability and disease, medical costs in the state will increase.” –*North Carolina Academy of Family Physicians*

- “The Florida Medical Association urges state government to adopt policies to minimize the approval and construction of new incinerators including mass-burn, gasification, plasma, pyrolysis, biomass, refuse-derived fuel and other incinerator technologies, and to develop a plan to retire existing outdated incinerators.” –*Florida Medical Association*
- “The Hampden District Medical Society has expanded its opposition to construction and operation of this [Russell plant] and all other biomass power plants in Western Massachusetts ... citing unacceptable health risk to the population... The ramifications of an increase in health problems related to increased air pollution would be far reaching in terms of personal loss, decrease in the quality of life, loss of productivity, and increased healthcare expenses.” – *Hampden District Medical Society*
- “Air pollution is associated with an increased risk of a broad range of medical problems, from asthma attacks and decreased lung growth in children to increased lung disease exacerbations, emergency room use, hospitalization rates, heart attacks, and death rates in adults.” –*Jefferson Dickey, M.D., internist at the Community Health Center of Franklin County*
- Pollutants and potential health impacts from Seneca Sawmill’s proposed biomass incinerator in Eugene, Oregon. –*Oregon Toxics Alliance*

<b>Pollutants</b>	<b>Cancer</b>	<b>Heart</b>	<b>Lung</b>	<b>Other</b>
<i>Nitrogen Oxides (NOx)</i>		X	X	Premature death
<i>Carbon Monoxide(CO)</i>		X	X	
<i>Formaldehyde</i>	X			
<i>Particulates (PM10,PM 2.5)</i>		X	X	Diabetes
<i>Hydrogen chloride (HCl)</i>			X	
<i>Benzene</i>	X			
<i>Chlorine</i>			X	
<i>Naphthalene</i>	X			
<i>Toluene</i>				Harm to nervous system
<i>Styrene</i>	X			
<i>Sulfur Dioxide (SO2)</i>		X	X	
<i>Acetaldehyde</i>	X			

- PM2.5 or fine particles have a diameter that is 2.5 microns or smaller. These particles are released directly from sources such as forest fires and other combustion sources. These particles can remain suspended in the air for a long time because of their small size. With PM 2.5, every combustion unit – industrial boilers, school bus, truck, lawnmower, fireplace, wood boiler, etc - is a source of fine particulate matter.

<http://cfpub2.epa.gov/ncea/cfm/recordisplay.cfm?deid=87903>

UFPs are a subset of PM2.5 particles, and they have a size that is less than 0.1  $\mu\text{m}$  in diameter. These particles are generated primarily by high-temperature combustion sources such as motor vehicles. Because of their very small size, UFPs may be more important from a health perspective than PM2.5 particles because they are present in larger numbers; have large surface areas, which means that UFPs can carry large amounts of adsorbed or condensed toxic air pollutants; and they have high lung deposition efficiencies. There is growing concern that UFPs can produce the most inflammation per unit PM mass because of these factors. (Sioutas, Delfino, and Singh 2005; Delfino, Sioutas, and Singh 2005)

- The Clean Air Scientific Advisory Committee of the EPA, which is mandated by the Clean Air Act to provide scientific advice on setting air quality standards, argued “*there is clear and convincing scientific evidence that significant adverse human-health effects occur in response to short-term and chronic particulate matter exposures at and below 15  $\mu\text{g}/\text{m}^3$ , the level of the current annual PM2.5 standard*” (CASAC 2006).

<http://www.epa.gov/sab/pdf/casac-ltr-06-003.pdf>

## EFFECTS ON CHILDREN

- Air pollution affects the growth of lung function during the period of rapid lung development between the ages of 10 and 18 years. Gauderman et al. (2007)

- Children’s Health study (CHS), which began in Southern California in 1993, included more than 6000 public school children. Many research papers emerging from this study have produced findings showing that exposure to air pollution in the region has resulted in increased school absences, asthma exacerbation, and new-onset asthma. (Künzli et al. 2003).

- Data from the American Cancer Society (ACS) cohort<sup>5</sup> estimated that for each 10- $\mu\text{g}/\text{m}^3$  increase in annual average exposure to PM<sub>2.5</sub>, long-term all-cause, cardiopulmonary, and lung cancer mortality were increased by approximately 4%, 6%, and 8%, respectively. *The relationship between PM<sub>2.5</sub> and adverse health effects was linear and without a discernible lower “safe” threshold.*

<http://circ.ahajournals.org/cgi/content/full/109/21/2655>

## OTHER DATA THAT IS RELEVANT RE PARTICULATES

- suggesting that individual ingredients of air pollution may be responsible for asthma symptoms in young children. The EPA currently sets air pollution standards based on total mass of fine particles. This study adds to a growing body of research suggesting that exposure to pollutants early in life may have health impacts later on. *American Journal of Respiratory and Critical Care Medicine*, December 1, 2009.

- Several controlled-exposure studies demonstrate that inhalation of particles *Am J Respir Crit Care Med.* 2000; 162 (pt 1): 981–988, *Am J Respir Crit Care Med.* 2000; 162: 161–166 and O<sub>3</sub> *Am Rev Respir Dis.* 1993; 148: 1363–1372 evokes both a pulmonary and a systemic inflammatory response in humans. Additional studies support the existence of a systemic inflammatory response beyond the lungs after air pollution exposure. It is possible, therefore, that air pollution–mediated systemic inflammation both promotes atherosclerosis formation over the long term *Circulation.* 2003; 108: 1664–1672 and instigates acute plaque instability and sudden cardiovascular events in the short term. <http://circ.ahajournals.org/cgi/content/full/109/21/2655>

- The latest draft of the US EPA Air Quality Criteria for Particulate Matter has confirmed the presence of an apparent linear dose-response relationship between PM and adverse events. <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=58003> Data from all North American studies demonstrate that this curve is without a discernible threshold below which PM concentrations pose no health risk to the general population. <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=58003>, <http://circ.ahajournals.org/cgi/content/full/109/21/2655>

- A reasonable argument can now be made that the "real" effects [of particulates] are likely to be even stronger than previously estimated.

<http://circ.ahajournals.org/cgi/content/full/109/21/2655>

- Moreover, because a number of studies have demonstrated associations between particulate air pollution and adverse cardiovascular effects even when levels of ambient PM<sub>2.5</sub> were within current standards, even more stringent standards for PM<sub>2.5</sub> should be strongly considered by the EPA. <http://circ.ahajournals.org/cgi/content/full/109/21/2655>

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