PROJECT UPDATE

December 2005

New York State Energy Research and Development Authority

Environmental Monitoring, Evaluation, and Protection Program

Assessment of Carbonaceous Fine Particles ($PM_{2.5}$) for New York and the Region

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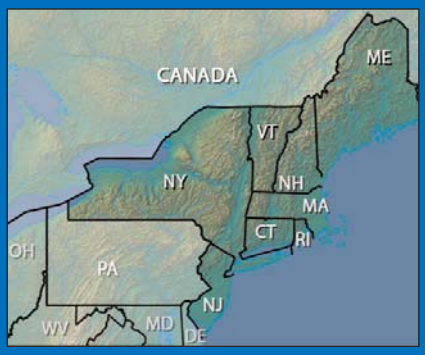
Project Location



Contact Information

For more information on this project see:

http://www.nyserda.org/programs/environment/emep

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Keywords

- Carbonaceous $PM_{2.5}$
- Control Strategies
- Emissions Sources
- Fine Particulate Matter ($PM_{2.5}$)
- Health Effects

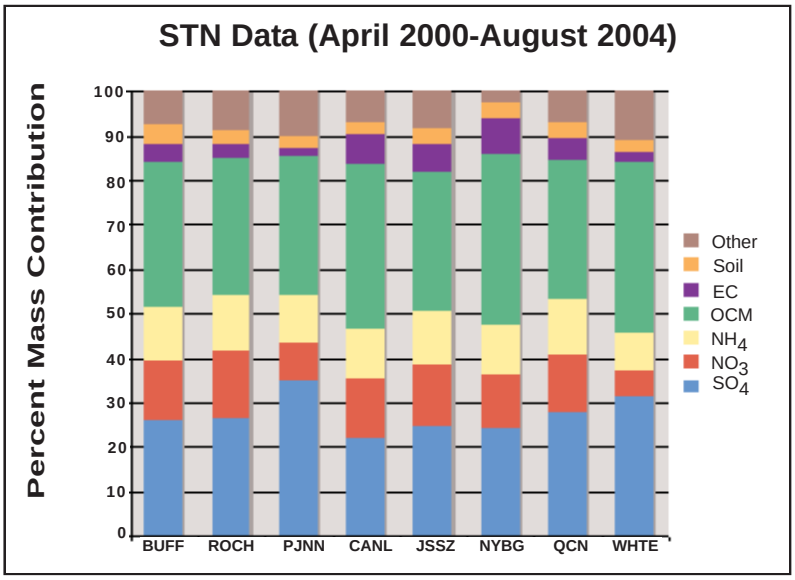
PROJECT FOCUS

This project aims to produce a policy-relevant, comprehensive assessment of carbonaceous fine particulate matter ($PM_{2.5}$) in New York and the region. In order to integrate scientific knowledge and policy efforts, available and emerging information in three key areas will be synthesized:

- Atmospheric emissions sources and chemistry
- Health effects
- Control strategies

CONTEXT

Airborne PM is a broad class of materials, transported as solid particles or liquid droplets (aerosols). These particles are emitted from a variety of natural processes and human activities, including fossil-fuel combustion, forest fires, wind erosion, agricultural practices, industrial manufacturing, and construction. They can be emitted directly into the atmosphere (primary particles) or formed in the atmosphere (secondary particles) from precursor gases such as sulfur dioxide, nitrogen oxides, ammonia, and volatile organic compounds.



New York State $PM_{2.5}$ Speciation Trends Network (STN) Results
The graphic shows the relative contribution of major mass component species (Sulfate, Nitrate, Ammonium, Organic Carbon, Elemental Carbon, and Soil) to total $PM_{2.5}$ levels at eight New York State DEC fine particle speciation monitors over the period of April 2000-August 2004.

In July 1997, motivated by concerns about adverse health effects associated with $PM_{2.5}$, the U.S. Environmental Protection Agency proposed new National Ambient Air Quality Standards (NAAQS). The current health-based standards consist of a 24-hr average (65 $\mu g/m^3$) and an annual mean (15 $\mu g/ m^3$). Although these standards use $PM_{2.5}$ mass concentrations to gauge air quality, some particles that contribute to PM mass may be more toxic than others. Thus, focusing on all particles that contribute to PM mass may lead to less efficient and effective control strategies than focusing specifically on the particles that are more implicated in adverse health effects.

Carbonaceous $PM_{2.5}$, a significant component of $PM_{2.5}$ pollution in many areas in the Northeast, may play a critical role in observed adverse health effects associated with particulate matter exposure. At an urban location such as New York City, pollutant levels are influenced by many factors, including local and distant point sources, land use patterns, and mobile sources. The carbonaceous component of New York City aerosol levels may reach as high as 50% of total $PM_{2.5}$ mass (see Figure above).

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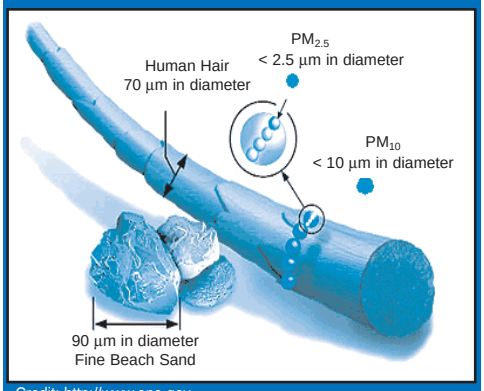


Credit: http://www.epa.gov

Particle Size of PM $_{10}$ and PM $_{2.5}$

Project Status

- Initiated November 2004
- Project ongoing

New York Energy $mart^{SM}$
Public Service Commission — NYSERDA

Since 1975, the New York State Energy Research and Development Authority (NYSERDA) has developed and implemented innovative products and processes to enhance the State's energy efficiency, economic growth, and environmental protection. One of NYSERDA's key efforts, the Environmental Monitoring, Evaluation Protection (EMEP) Program, supports energy-related environmental research. The EMEP Program is funded by a System Benefits Charge (SBC) collected by the State's investor-owned utilities. NYSERDA administers the SBC program under an agreement with the Public Service Commission.

METHODOLOGY

With regard to **atmospheric emissions sources and chemistry**, the assessment of carbonaceous $PM_{2.5}$ will consist of the following specific tasks:

- Characterization and assessment of the complex nature of the chemical and physical atmospheric processes of carbonaceous $PM_{2.5}$ and its precursors;
- Assessment of the varied local and regional sources of carbon impacting New York and the region;
- Evaluation of the existing and emerging monitoring and analytical methods for carbonaceous aerosols; and
- Discussion of gaps in knowledge and current thinking on future research needs.

The **health effects** component of the research will include

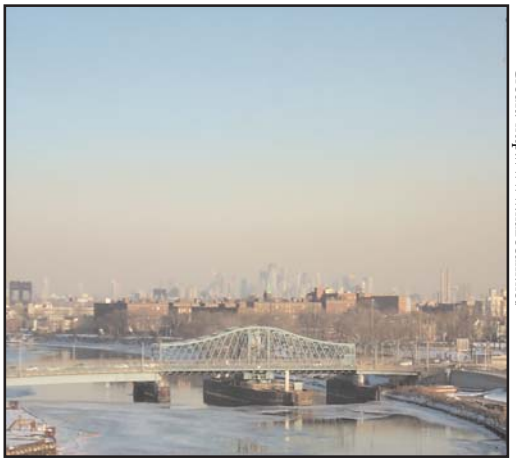
- Characterization of emerging work in both atmospheric and health-related research relating to the carbonaceous components of PM;
- Evaluation of different health/exposure investigation methods currently being used to study the role of carbon PM sources in adverse health outcomes;
- Assessment of suitability of ambient PM national ambient air quality standards with respect to carbon fine particles and precursors; and
- Discussion of gaps in knowledge and current thinking on future research needs.

In its assessment of **control strategies**, the project will include

- Identification and evaluation of potential emissions reduction strategies that could be implemented to reduce carbonaceous $PM_{2.5}$ and precursor emissions from various stationary and mobile sources, and
- Discussion of gaps in knowledge and current thinking on future research needs.

PROJECT IMPLICATIONS

Better knowledge of carbonaceous $PM_{2.5}$ is an important component of an integrated plan to reduce PM emissions in New York. This project's comprehensive assessment of carbonaceous $PM_{2.5}$ will clarify what is currently known and not known about its atmospheric emissions sources and chemistry, health effects, and control strategies in New York State and the region. The synthesized information will significantly benefit policymaking efforts to improve air quality, in particular by assisting in the development of New York's $PM_{2.5}$ State Implementation Plan (SIP) options for meeting national ambient air standards.



Credit: http://www.hazecam.net/

"Bad" air quality over New York City, as seen from Newark, NJ, 2005.

Credit: http://www.hazecam.net/

"Good" air quality over New York City, as seen from Newark, NJ, 2005.