New York Energy Smart℠
EMEP NEWS
Spring 2006
Environmental Monitoring, Evaluation, and Protection Program

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NYSERDA

EMEP Is Reauthorized, Plans New Research Agenda

The Environmental Monitoring, Evaluation, and Protection program will continue to support critical energy-related environmental research for the next five years, thanks to a renewal of the **New York Energy $mart℠** program from July 2006 to June 2011. The New York State Public Service Commission in January approved renewal of the **New York Energy $mart℠** program, which sponsors EMEP, with an annual budget of $175 million, for a total five-year budget of $875 million. EMEP will be funded at approximately $3.5 million per year until 2011.

The action allows NYSERDA to meet EMEP's goals for 2006–2011 in three target research areas:

• Ecosystem response to deposition of sulfur, nitrogen, and mercury, including continued support of the Adirondack Lake Water Quality monitoring program with the Adirondack Lakes Survey Corporation and the NYS Department of Environmental Conservation.

• Air quality and related health research associated with particulate matter, ozone, and copollutants, including energy-related research to support development of sound air quality management plans for attainment of new ozone and fine particle standards.

• Crosscutting environmental science, technology, and policy projects, including new initiatives in three areas:

1. regional climate change research, which will explore innovative policy, institutional, and technical solutions to help reduce greenhouse gas emissions and mitigate potential impacts of climate change; and support necessary monitoring data to assess and evaluate impacts;

2. research to evaluate, assess, and minimize environmental impacts of alternative energy resources (e.g., wind and tidal power); and

3. research to mitigate environmental impacts of electricity generation critical to maintaining fuel diversity.

The EMEP research program has been guided by a research plan developed in 2002 (see www.nyserda.org/programs/Environment/EMEP/emepplan.pdf). With the renewal of funding, NYSERDA is developing an updated EMEP research plan. As part of this effort, NYSERDA staff, along with EMEP program advisers and science advisers, will be reviewing progress under the first phase of the EMEP program, surveying ongoing and planned research efforts supported in other programs, and identifying research gaps that need to be addressed for New York State. A series of research planning meetings with scientists and policy makers will be held in spring and summer 2006. A draft research plan will then be posted for comment on the EMEP web page. Research solicitations are scheduled for fall 2006.

Staff are seeking input from the research and policy community in the development of the research plan and welcome suggestions consistent with the broad areas identified above. Please submit suggestions promptly to emep@nyserda.org. Direct questions to Mark Watson at mw1@nyserda.org.

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Latest Round of EMEP Research Projects

In summer 2004, the Environmental Monitoring, Evaluation, and Protection program awarded contracts for nine new cost-shared research projects, for a total of more than $2.1 million in NYSERDA funds:

- Ambient Gaseous Ammonia: Evaluation of Continuous Measurement Methods Suitable for Routine Deployment (University at Albany).
- Physical and Chemical Characterization of Laboratory-Generated Secondary Semivolatile Organic Particulate Matter (University at Albany).
- Assessment of Nitrogen and Acidic Deposition Impacts to Terrestrial and Aquatic Ecosystems of Tug Hill (SUNY Environmental Science and Forestry, Syracuse).
- Assessing the Sensitivity of New York Forests to Cation Depletion (SUNY Environmental Science and Forestry, Syracuse).
- Ultrafine Particles and Cardiac Responses: Evaluation in a Cardiac Rehabilitation Center (University of Rochester Medical Center).
- Chemical Composition of Fine Organic Particulate Matter from Urban and Regional Background Locations in New York State (Rutgers University).
- Assessment of Forest Health and Stream and Soil Chemistry Using a Multiscale Approach and New Methods of Remote Sensing Interpretation, Catskill Mountains, New York (U.S. Geological Survey, Troy, New York).
- Common Loons: An Indicator of Environmental Mercury Contamination and Acid Deposition in Aquatic Ecosystems in the Adirondacks (two-year extension) (Wildlife Conservation Society/Adirondack Cooperative Loon Program).
- Assessment of Carbonaceous $PM_{2.5}$ for New York and the Region (NESCAUM, Northeast States for Coordinated Air Use Management).

Adjunct Assistant Professor Greg McGee and Laura Hartley of SUNY College of Environmental Science and Forestry map out a field site in the Tug Hill to begin their assessment of how nitrogen and acidic deposition have affected terrestrial and aquatic ecosystems. Their research receives funding from EMEP. PHOTO: COURTESY OF GREGORY G. MCGEE

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www.nyserda.org/programs/environment/emep

Major Book, Final Reports, and Journal Articles Detail Recent EMEP Research Findings

Acid Rain in the Adirondacks: A Research Summary, prepared by the Adirondack Lakes Survey Corporation with support from EMEP, was released in October 2005. This large-format, 256-page paperback traces the history of the investigation of acidification, from the first chemical surveys in the 1970s to the latest studies showing signs of lake recovery. Color graphics throughout illustrate ion balances, sulfate retention, nitrogen fluxes, fish losses, pH trends, and other findings. Lead author Jerry Jenkins was joined by Karen Roy, Charles Driscoll, and Christopher Buerkett in writing this book.

In addition, reports on six studies supported by EMEP were completed in 2005:

- Clinical Studies of Exposure to Ultrafine Particles. Mark Utell and Mark Frampton. Final Report 05-11. January 2006.
- Atmospheric Transport and Fate of Mercury and Its Impacts on New York State. Chris Walcek. Final Report 05-05. January 2006.
- Ambient Air Quality Monitoring of Ultrafine Particles in Rochester, New York. Philip Hopke and Mark Utell. Final Report 05-04. December 2005.
- Integrated Assessment of Recovery of Surface Waters from Reduced Levels of Acid Deposition in the Catskills and Adirondacks. Doug Burns and Gary Lovett. Final Report 05-03. September 2005.
- Reducing Emissions from the Electricity Sector: The Costs and Benefits Nationwide and in the Empire State. Karen Palmer. Final Report 05-02. May 2005.
- Monitoring the Deposition and Effects of Air Pollution in the Hudson Valley, New York. Gary Lovett. Final Report 05-01. February 2005.

Final reports can be downloaded from http://www.nyserda.org/programs/Environment/EMEP/publications.asp. Limited hard copies are also available. Send a request to emep@nyserda.org, with the report number and your mailing address.

Since the beginning of 2005, 20 journal articles presenting EMEP-supported research have appeared or are about to be published in the peer-reviewed literature (see box).

Publications, 2005–Present

Acid-Base Characteristics of Soils in the Adirondack Mountains, New York. Sullivan, T.J. et al. *Soil Sci. Society of Am. J.* 70: 141–52 (2006).

Behavior of OH and HO_2 in the Winter Atmosphere in New York City. Ren, X. et al. Submitted to Special Issue, *Atmos. Env.* 2005.

Comparison between Back-Trajectory Based Modeling and Lagrangian Backward Dispersion Modeling for Locating Sources of Reactive Gaseous Mercury. Han, J. et al. *Env. Sci. and Tech.* 39: 1715–23. 2005.

Elemental Composition of $PM_{2.5}$ Aerosols in Queens, New York: Evaluation of Sources of Fine-Particle Mass. Dutkiewicz, V.A. et al. Submitted to Special Issue, *Atmos. Env.* 2005.

Elemental Composition of $PM_{2.5}$ Aerosols in Queens, New York: Solubility and Temporal Trends. Qureshi, S. et al. Submitted to Special Issue, *Atmos. Env.* 2005.

Examination of Model Predictions at Different Horizontal Grid Resolutions. Gego, E. et al. *Env. Fluid Mech.* 5: 63–85. 2005.

Field and Laboratory Evaluation of the Thermo Electron 5020 Sulfate Particulate Analyzer. Schwab, J.J. et al. Submitted to Special Issue, *Aerosol Sci. and Tech.* or *Atmos. Env.* 2005.

Field Evaluation of a TSI Model 3034 Scanning Mobility Particle Sizer in New York City: Winter 2004 Intensive Campaign. Hogrefe, O. et al. Submitted to Special Issue, *Aerosol Sci. and Tech.* 2005.

Field Test Data for 42-Liter-per-Minute $PM_{2.5}$ Aerosol Sampler Used to Collect 6-hr Aerosols Samples during the PMTACS-NY Intensives Held at Queens College, Queens, NY. Dutkiewicz, V.A. et al. Submitted to Special Issue, *Atmos. Env.* 2005.

Impending Reversal of Recent Regional Trends in Aquatic Recovery from Acidification. Sullivan, T. J. et al. Submitted to *Nature.* 2006.

Measurements of Ambient Ammonia Using a Tunable Diode Laser Absorption Spectrometer: Characteristics of Ambient Ammonia Emissions in an Urban Area of New York City. Li, Y. et al. Submitted to Special Issue *J. Geophys. Research,* 2005.

Multi-year Urban and Rural Semi-continuous $PM_{2.5}$ Sulfate and Nitrate Measurements in New York State: Evaluation and Comparison with Filter Based Measurements. Rattigan, O.V. et al. Submitted to Special Issue, *Atmos. Env.* 2005.

A New Time-of-Flight Aerosol Mass Spectrometer (TOF-AMS): Instrument Description and First Field Deployment. Drewnick, F. et al. Submitted to *Aerosol Sci. and Tech.* 2005.

New York State Urban and Rural Measurements of Continuous $PM_{2.5}$ Mass by FDMS TEOM and BAM: Evaluation and Comparisons with the FRM, and Fitted Reconstructions of Mass with and without Volatile Species. Schwab, J.J. et al. Submitted to Special Issue, *J. Air & Waste Management Assoc.* 2005.

Nitrogen Sources in Adirondack Wetlands Dominated by Nitrogen-Fixing Shrubs. Hurd, T.M. et al. *Wetlands* 25(1): 192–99. 2005.

OH and HO_2 during the PMTACS-NY Whiteface Mountain 2002 Campaign: Observations and Model Comparison. Ren, X. et al. Submitted to *J. Geophys. Research.* 2005.

Quantification of the Seasonal Contribution of Secondary Aerosol Photochemical Production Processes to $PM_{2.5}$ Mass in Queens, NY. Demerjian, K.L. et al. Submitted to *Atmos. Env.* 2005.

Real-Time Measurements of Nitrogen Oxide Emissions from In-Use New York City Transit Buses Using a Chase Vehicle. Shorter, J.J. et al. In press, *Env. Sci. and Tech.* 2005.

Real-Time Measurements of SO_2, H_2CO and H_4 Emissions from In-Use Curbside Passenger Buses in New York City Using a Chase Vehicle. Herndon, S.C. et al. In press, *Env. Sci. and Tech.* 2005.

Symbiont Nitrogenase, Alder Growth, and Soil Nitrate Response to Phosphorus Addition in Alder (*Alnus incana* ssp. *rugosa*) Wetlands of the Adirondack Mountains, New York State, USA. Gokkaya, K. et al. *Env. and Exper. Botany* 55: 97–109. 2006.

Adirondack Soil Chemistry May Slow Lake Recovery

Although lake water chemistry has improved following large decreases in acid rain, soil acid-base chemistry may be continuing to deteriorate in most of the acid-sensitive watersheds of the Adirondack Mountains. That's the inference drawn by a team of scientists from E&S Environmental Chemistry, the State of New York, and university researchers in Maine, Oregon, and New York, who have completed a survey of the acid-base chemistry of soil in the Adirondacks—the U.S. region most affected by acid rain.

The research, undertaken with funding from NYSERDA's Environmental Monitoring, Evaluation and Protection program, fills a critical data gap. It is widely believed that air pollution and acid rain have damaged soils and lakes within the Adirondack region by depleting the stored reserves of exchangeable base cations in the soil, particularly calcium, thereby reducing the ability of both soil and surface water (lakes and streams) to neutralize acids from the atmosphere. However, data on soil characteristics were generally not available, thereby preventing scientists from quantifying or monitoring soil conditions. In addition, such soil data are needed for applying mathematical models that simulate future changes in lake chemistry in response to the Clean Air Act Amendments and other federal and state legislation aimed at reducing air pollution.

According to Timothy Sullivan, project leader, "It was critical that we quantify soil conditions in the Adirondack Mountains.… Yet we had little information regarding regional soil conditions. We now have the required soil input data for aquatic and terrestrial effects models intended to project future improvements in water chemistry, biological conditions, and forest health." Sullivan is president and principal scientist of E&S Environmental Chemistry, Inc., of Corvallis, Oregon.

Research Methods and Results

Soil samples were collected from 199 locations within 44 statistically selected lake watersheds plus 26 additional watersheds that are included in long-term lakewater monitoring programs. The study watersheds were chosen to be representative of Adirondack watersheds whose drainage water chemistry has limited acid-neutralizing capacity (ANC less than 200 $\mu mol_c\ L^{-1}$).

Researchers traveled to the randomly selected locations throughout the Adirondack Mountains to collect samples of organic and mineral soil horizons. Sites were accessed on foot or by boat, canoe, or motor vehicle. Samples were analyzed at the University of Maine, Orono, and results were extrapolated to the watersheds of 1,320 low-ANC lakes within the region.

More than 75% of the 1,320 lakes in the target population receive surface water drainage from watershed soils with B horizons that have low exchangeable calcium concentrations (less than 0.52 $cmol_c\ kg^{-1}$), low base saturation (less than 10.3%; a measure of the soil's ability to neutralize acids), and low pH (less than 4.5).

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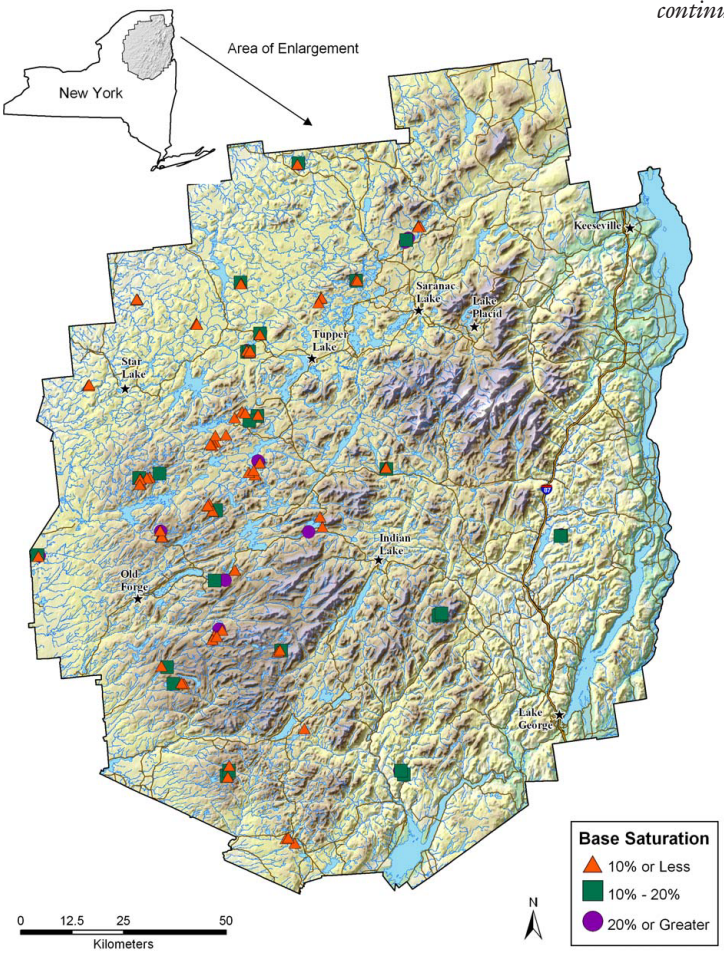

At most of the randomly selected sites in the Adirondacks, soils were found to have low levels of base saturation, indicating that lakes in these watersheds will continue to have a low acid-neutralizing capacity.

These data provide a baseline against which to compare future changes in regional soil chemistry in response to air pollution, climate change, and other stresses.

Comparison of data developed in this study and data collected by the U.S. Environmental Protection Agency in the mid-1980s suggests that despite reductions in acid deposition, Adirondack soil acid-base chemistry may have worsened. That effect would be expected to restrict the extent to which lakes will be able to recover in the future from acidification and might contribute to future adverse impacts on forest vegetation.

In fact, when results of the laboratory analyses were then used as input data for watershed models of acidification response, model projections indicated continuing reduction in soil base saturation. The models predict future chemistry of lakes throughout the region under various scenarios of emissions of air pollutants from power plants, industries, and vehicles. With continuing soil acidification, scenarios that assume future emissions based on existing regulations show reacidification of many lakes that are currently recovering. Model results also suggest that this reacidification might be prevented under more stringent future emissions controls. Policy implications such as these provided the impetus for the research.

The study was conducted from 2003 to 2006. Preliminary results were published in the January-February 2006 issue of *Soil Science Society of America Journal* and also presented at a NYSERDA conference, "Environmental Monitoring, Evaluation, and Protection in New York: Linking Science and Policy," held October 25–26, 2005, in Albany. The full project report will be published by NYSERDA later this year.

New Instrument for Emissions Sampling Improves Accuracy

A new dilution test method for determining fine particle mass in stack gases could make measurement of fine particle emissions from stationary sources more reliable and comprehensive. The new method builds on work by the U.S. Environmental Protection Agency (EPA), the U.S. Department of Energy, the American Petroleum Institute, the California Energy Commission, the Gas Research Institute, and NYSERDA.

Stationary combustion is a major source of airborne fine particles, those measuring 2.5 micrometers or smaller ($PM_{2.5}$), which contribute to visibility impairment (haze) and human health risks. Combustion sources emit particulate matter both in a condensed (solid) phase and as semivolatile material that condenses upon dilution and cooling in the plume. A secondary source of fine particles is formed through atmospheric reactions. Both directly emitted and secondary $PM_{2.5}$ are important for local exposure but also can be transported over long distances.

Measurement Challenges

Effective strategies to reduce $PM_{2.5}$ require reliable emissions testing. Recent research shows that emissions estimates are method-dependent, and methods that sample stack gases at high temperatures and simulate cooling with iced water impingers to account for condensable PM can yield ambiguous results. Further, the composition of emitted particles and associated gases is seldom measured routinely, meaning that semivolatile and stable condensed-phase material is not systematically accounted for. A post-test purge with nitrogen gas can mitigate errors caused by absorption and reaction of sulfur dioxide and organic compounds within the impinger train but does not eliminate them. EPA conditional test method CTM-039 measures PM_{10} and $PM_{2.5}$ from stationary sources using dilution sampling and could be used to better characterize the condensable fraction, include new compounds, and accurately characterize sources of trace metals.

The dilution sampler approach involves a mixing chamber that simulates atmospheric mixing and cooling. Its advantages include comparability with certification methods of measuring fine particle emissions from mobile sources; comparability with ambient measurements to determine attainment; similarity to conditions found in stack gas plumes; improved measurement of chemical and physical characteristics; improved overall in-stack sensitivity associated with analytical sensitivity; and simplification of a procedure for accurate sampling of solid and condensable particles via collection on a single filter.

Comparison with Reference Methods

In two papers,[1,2] England et al. describe the performance of a compact dilution sampler (CDS) for stationary sources. Using research-based dilution and conventional reference methods as benchmarks, they focus on measuring very low emission rates from gas-fired combustors, including mass emission rates, PM precursor gas emissions, and PM source chemical profiles.

The CDS has a conventional heated probe with a $PM_{2.5}$ fractionating cyclone inlet inserted into the stack gas. A mixing section dilutes hot stack aerosol with filtered air; this mixed stream then passes through an aging section and is directed by a second cyclone into sampling manifolds for particle counting or collection. The residence chamber after mixing and the second cyclone after aging distinguish it from the EPA compact unit. Compared with the research-based dilution sampler, it has a shorter distance between the probe and the mixing section, a shorter mixing section, a smaller residence chamber, and a linear flow

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path that minimizes wall losses by impaction.

The CDS is designed to provide rapid, thorough mixing of the raw sample with the dilution air, with minimal back mixing and low pressure drop. Longer residence times for mixing require larger aging chambers, which make for bulkier designs. The CDS weighs about 120 kg total (compared with 113 kg for the EPA test method 5 particulate sampler). The CDS is modular in design for easy assembly and disassembly, to allow the operator to obtain filter samples and recover deposits from the probe and internal surfaces. The analytical methods for emissions characterization can be the same as those used for analysis of ambient particles sampled on filter media.

Test Results

Pilot tests involved natural gas, fuel oil, and coal combustors. Field tests included refinery gas-fired boilers and process heaters; natural gas-fired steam generators, process heaters, and combined-cycle cogeneration facilities; and No. 6 fuel oil-fired boiler and low- and ultralow-sulfur diesel-fired engines. Tests indicate that the CDS and dilution research-based sampler are comparable with 95% confidence limits. The CDS has minimum detection limits substantially lower than the nondilution reference methods. Filterable particulate matter estimates from in-stack methods (e.g., EPA method 5, CTM-040) are systematically lower than those from dilution sampling. By contrast, the sum of filterable and condensable particulate matter from conventional in-stack methods (e.g., EPA CTM-040/202) is higher than from dilution sampling. The most likely explanation for this is measurement artifacts.

Dilution sampling results included the following:

- $PM_{2.5}$ emission rates for gas-fired units are very low, probably near ambient concentration levels; $PM_{2.5}$ emission rates for a No. 6 fuel oil-fired heater and for a diesel engine generator were an order of magnitude larger than for gas-fired sources.
- Most of the material from the tested gas- and oil-fired units is carbonaceous, with substantial organic carbon present. Sulfate and NO_3 are also present, and SO_4 varies approximately linearly with fuel sulfur content. Metals are present in trace amounts in the particles, except for diesel emissions, where no metals were detected.
- A substantial fraction of the organic carbon found in gas-fired plant particle emissions appears to be volatile.

Policy Implications

Based on these findings, EPA has revised the 2002 National Emissions Inventory to decrease emissions of primary PM_{10}, primary $PM_{2.5}$, and condensable PM from natural gas combustion by about 95%.

The current $PM_{2.5}$ emissions inventory, however, is still based on emissions factors from various measurement methods. The research sponsored here has demonstrated that $PM_{2.5}$ source measurements are highly method-dependent and indicates the need for a single, uniform reference methodology for determining $PM_{2.5}$ emissions using best available technology, such as dilution sampling, for revising and updating reported emissions factors. Standard adoption by the American Society of Testing and Materials International would be a step in unifying methods used to characterize emissions.

See http://www.nyserda.org/programs/Environment/EMEP/publications, "Development of Fine Particulate Emission Factors for Oil- and Gas-fired Combustion Systems," Report 04-05, for more information on this research.

1. England, G., J.G. Watson, J.C.Chow, B. Zielinska, M-C.O. Chang, K. Loos, and G.M. Hidy. Dilution-based emissions sampling from stationary sources: Part 1. Compact sampler methodology and performance. *J. Air & Waste Management*. Forthcoming.
2. England, G., J.G. Watson, J.C. Chow, B. Zielinska, M-C.O. Chang, K. Loos, and G.M. Hidy. Dilution sampling based emissions from stationary sources: Part 2. Gas- and oil-fired combustors. *J. Air & Waste Management*. In review.

About NYSERDA and EMEP

NYSERDA is a public benefit corporation created in 1975 by the New York State Legislature. Its responsibilities include conducting multifaceted energy research and development, energy efficiency, and energy planning programs. The Environmental Monitoring, Evaluation, and Protection (EMEP) program is part of NYSERDA's **New York Energy $mart**SM program. EMEP supports research to increase the scientific understanding of the behavior, cycling, and interaction of primary and secondary pollutants related to electricity generation (e.g., sulfur oxides, nitrogen oxides, ozone, particulates, mercury) in the environment so that policy makers can identify effective strategies for mitigating the impacts of energy production and use. The program also supports research that will increase the understanding of the role of local versus regional sources of air pollution in New York State so that more equitable control strategies can be developed.

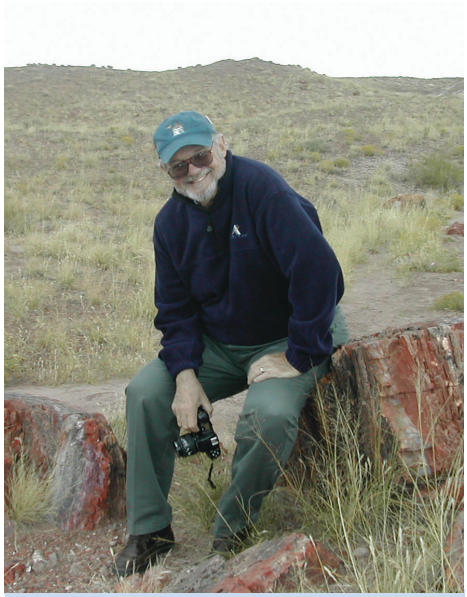
EMEP helps companies in New York develop and commercialize improved instrumentation to measure pollutants associated with electricity generation. In addition, it provides a forum for policy makers and scientists to share information on critical environmental research initiatives in New York to maximize the value of limited research dollars and increase the relevance of environmental research to policy makers.

Funds for NYSERDA's programs come from a system benefits charge paid by the State's investor-owned utilities and are administered under an agreement with the Public Service Commission.

Environmental Research as Detective Work

PROFILE: George M. Hidy, EMEP Science Adviser

As a member of the Science Advisory Committee, Dr. George M. Hidy has helped develop EMEP's strategic plan and review research proposals. Hidy, principal of Aerochem Associates, is internationally known for his leadership in environmental research, particularly atmospheric aerosols and energy-related pollutants. He recently sat down with us to talk about the direction of environmental monitoring.



George M. Hidy. PHOTO: COURTESY OF A&WMA

What initially interested you in environmental issues?

I was born and raised in the West; its great lands have been a major part of my life since childhood. An understanding of the role of technology to create a better life while guarding the wealth of the environment derives from the premier education I experienced in New York and the eastern establishment [Columbia, Princeton, and Johns Hopkins]. My commitment to the study of atmospheric processes came from an intense curiosity about the atmospheric phenomena. Combining fluid dynamics with chemistry at the National Center for Atmospheric Research, and later with aerospace technology at Rockwell, served as a postgraduate foundation for investigating facets of atmospheric behavior. My interest in environmental protection was sparked by my mentor Sheldon Friedlander and interactions with environmentalists in California, including Arie Haagen-Smit.

What will be the most critical environmental issues over the next 10 years?

Over the past 40 years, we have seen the advancement and maturing of American protection of our air and water quality. Our next challenge is to address climate alteration. The worldwide management of our energy needs while fostering continued industrialization and urbanization within the stewardship of the atmosphere is perhaps our greatest sociopolitical goal for many years to come.

Where will you be focusing your efforts?

There remain important unanswered questions about atmospheric aerosols—the detective work of finding the sources and the evolution of suspended particles, and their effects on human and ecological processes. Generally, I'm free of the commitments to institutional operations, so I hope to spend my "dotage" on continuing to investigate atmospheric aerosol phenomena.

What should our approach be to the carbonaceous fraction of particulate matter?

Resolution of the origins and nature of the carbon components of fine particles is a major technical question. There are three fundamental issues. First, we need more confidence in the method for determining the organic and black carbon fractions to ensure that the monitoring data are reliable. The second is the development of a practical set of speciated components that guide consideration of health effects and provide viable tracers for the primary and secondary components of the aerosol. The third concerns the allocation of organic carbon to anthropogenic and natural sources.

What is a reasonable approach to get better, more reliable emissions inventories?

Improvement in emissions inventories will come from applying advanced sampling and measurement methods and increasingly sophisticated analytical methods compatible with users' needs. Most important of all will be the continuing efforts to resolve and quantify uncertainties through comparison of emissions estimates with source measurements and ambient measurements.

What is the role of remote sensing in air quality monitoring?

Remote sensing from airborne platforms has application to certain large-scale problems. Ground-based remote sensing has some applications but is limited in terms of concentration level of detection. I don't see remote sensing as a replacement for direct measurements for some time to come, especially with increasing needs to measure "exotic" pollutants at very low concentrations.

What will be the nexus of science and policy in the future?

I continue to hope that environmental science and technology will lead improvements in policies for environmental protection. This leadership has not been achieved in many past cases. As technocrats, our challenge is to improve communication of complex ideas and knowledge and their uncertainties in a way that policy makers can understand and use wisely. We need to continue to work at this to add value to our work in the public interest.

EMEP Lauches Listserve, Revamps Website

If you're seeking information about upcoming events, funding opportunities, new publications, and other aspects of NYSERDA's Environmental Monitoring, Evaluation, and Protection program, now you can keep up-to-date by joining the new EMEP listserv.

To sign up, send an e-mail to listserv@Listserv.nyserda.org (leave the subject line blank) with the words *subscribe EMEP-L* followed immediately by your first and last name—no other text, including no punctuation and no signature line—in the message. *Example:* subscribe EMEP-L John Smith

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EMEP's new website is easier to navigate. You can download reports and project updates, get the latest information on funding opportunities, find resources for students and teachers, and link to related organizations and institutions. Visit www.nyserda.org/programs/Environment/EMEP/.

Biennial Conference Provides Forum for Latest Research

On October 25–26, 2005, nearly 270 scientists, researchers, regulators, government staff, and members of the environmental and health communities converged on Albany for the fourth EMEP Linking Science and Policy conference.

Sessions focused on the latest research findings on acid deposition, mercury, fine particles, and climate change. Panels addressed emerging environmental issues for the energy industry and energy-related environmental research needs. A poster session showcased more than 50 research activities.

Formal proceedings will not be published, but many conference presentations and posters are available on the EMEP website, http://www.nyserda.org/programs/Environment/EMEP/conference_2005.asp.

Proceedings from the October 2003 EMEP conference are available in hard copy and include summaries of the four major conference sessions, speaker abstracts, and biographical information. To request a printed copy, send an e-mail to emep@nyserda.org; use "2003 Conference Proceedings" as the subject line and include your mailing address. You can also view and download the proceedings from the website at http://www.nyserda.org/programs/Environment/EMEP/conference_2003.asp.

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