New York Energy $mart℠

EMEP

Environmental Monitoring, Evaluation, & Protection

New York State uses more than 4 quadrillion Btus of primary energy (4% of the U.S. total) in the form of petroleum, natural gas, nuclear power, coal, hydropower, and biofuels. About 1.5 quadrillion Btus of this primary energy is used to produce electricity. Although energy use is vital to our economy and quality of life, the processes by which it is generated and distributed can create wide-ranging environmental and public health impacts.

In recognition of the link between energy and the environment, the New York Public Service Commission included an environmental research and monitoring initiative in the **New York Energy $mart℠** public benefits program. **New York Energy $mart℠**, which is administered by the New York State Energy Research and Development Authority (NYSERDA), supports energy efficiency, renewable energy, and environmental programs. The public benefits program is funded by a charge paid by electric distribution customers in New York State. The program began in 1998 and is funded through July 2011.

Program Objective and Focus

The primary mission of the Environmental Monitoring, Evaluation and Protection (EMEP) program is to increase the understanding and awareness of the environmental impacts of energy choices and emerging energy options, and provide a scientific, technical foundation for formulating effective, equitable, energy-related environmental policies and resource management practices. The EMEP program focuses on critical information needs and research gaps related to electricity-related environmental issues relevant to New York. The EMEP program supports a diverse research portfolio in five areas:

- Air Quality and Related Health Effects Research
- Ecological Effects of Deposition of Sulfur, Nitrogen and Mercury
- Environmental Effects of Alternative Energy and Other Emerging Energy Options
- Climate Change
- Cross Cutting Environmental Science, Technology and Policy Issues

NYSERDA
New York State Energy Research and Development Authority

New York Energy $mart℠
Public Service Commission — NYSERDA

Top: U.S. Geological Survey staff installing a mercury deposition monitor in the Catskills.

Center: NYS Department of Environmental Conservation staff sampling fish for mercury analysis.

Bottom: Verdant kinetic hydro-turbine prior to installation in the East River.

Program Strategy

Research planning In the fall of 2006, NYSERDA and the New York Academy of Sciences (NYAS) initiated a comprehensive planning effort to provide direction for environmental research in New York State over the next five years, with a focus on pollution associated with energy generation and use. Implementation of the plan's recommendations will help maximize the use of limited resources to serve the needs of New York State and others. Within the plan, NYSERDA and NYAS have identified and prioritized key research areas, which are suitable to be addressed through the EMEP program, and other funding organizations. This plan builds upon the previous EMEP Research Plan that was derived through a similar stakeholder process in 2001. The research plan is available at: www.nyserda.org/programs/environment/emep/emepplan2007.pdf

Competitive solicitations and science/policy review EMEP periodically issues Program Opportunity Notices to seek proposals that address targeted research areas. Projects are reviewed and selected through a competitive process. The program is guided by a steering committee of major stakeholder groups. In addition, a separate science advisory committee provides technical review and project input.

Collaborative research The program supports an interdisciplinary approach to environmental research and seeks to build research capability in New York State to address critical energy-related environmental issues. EMEP has catalyzed numerous multi-institution collaborative efforts, bringing diverse perspectives and expertise into many projects.

Information exchange EMEP places a premium on information exchange. The program seeks to accelerate the process of introducing the latest scientific findings into the realm of policy formulation, ultimately to increase the effectiveness of environmental control strategies. EMEP sponsors topical workshops and biennial conferences that bring together scientists and policy makers to share information on environmental research in New York State and its implications for making and evaluating policy. EMEP produces a variety of technical reports, publications, and Web-based resources (see www.nyserda.org/programs/environment/emep/). More than 180 peer-reviewed publications have been developed and published as a result of EMEP-sponsored research.

For More Information
For more information on the **New York Energy $mart**[SM] Environmental Program, contact Mark Watson at (518) 862-1090, ext.3314, fax (518) 862-1091, e-mail emep@nyserda.org; or visit NYSERDA on the Web at **www.nyserda.org**

The New York State Energy Research and Development Authority, a public benefit corporation created in 1975 by the New York State Legislature, works to improve New York State's energy, environmental, and economic future by sponsoring energy analysis, research and development, and efficiency deployment programs. Funding for these programs comes from the State's investor-owned utilities, the federal government, substantial project partner cofunding, and voluntary contributions from the New York Power Authority and Long Island Power Authority. NYSERDA also manages the Western New York Nuclear Services Center at West Valley and coordinates the State's nuclear energy activities.

NYSERDA

New York State Energy Research and Development Authority

Policy Impacts from EMEP - Funded Research

EMEP projects have affected energy-related environmental policy. EMEP data and studies have been identified as providing critical information to support future policy development and evaluation.

Mercury

- EMEP research has brought to light the vast extent of mercury contamination in fish in waters across New York State. Monitoring data have resulted in one of the largest changes in over a decade in fish consumption advisories by the Department of Health.
- EMEP mercury research was used in determining the need for a New York State rule for mercury control from power plants. Relevant EMEP research used by the NYS DEC included: mercury transport and source attribution modeling, wet deposition monitoring data and mercury surveys in fish and loons.
- EMEP mercury data were cited by the Northeast States for Coordinated Air Use Management (NESCAUM) in their comments on the proposed EPA Mercury Rule.

Acid Deposition

- Data from the Adirondack Lakes Survey Corporation's (ALSC) Long-Term Monitoring project, of which EMEP is the primary funder, and from the EMEP-funded Adirondack Cooperative Loon Project, have been used as the supporting technical rationale for New York's Acid Deposition Reduction Program.
- EMEP-sponsored data have also been cited by the U.S. EPA as supporting technical information in evaluating the Clean Air Act Amendments of 1990 and the Clean Air Interstate Rule.

Fine Particles and Ozone

- EMEP data on fine particle emissions from stationary natural gas combustion were used to update the National Emissions Inventory, which is the basis for air quality management plans in New York State and the United States.
- Results on the speciation of PM2.5 and role of PM precursors from the Supersites programs, including early results of the NY Supersite, were used in EPA's consideration of the Transportation Conformity Rule Amendments for the New PM2.5 NationalAmbient Air Quality Standard: PM2.5 Precursors.
- EMEP analysis has led to an improved method for treating the uncertainties reported in the Fine Particle Speciation Trends Network (STN). The STN data will be used in developing fine particle air-quality management plans, with New York's State Implementation Plans due in 2008.
- Monitoring research projects such as the EMEP-funded NY Supersite will be used to evaluate modeling tools and are expected, over the next few years, to significantly increase confidence in the reliability of these air-quality planning tools.
- EMEP has supported development of the Fluid Dynamic Measurement System (FDMS), based on Rupprecht & Patashnick's (now Thermo Electron) tapered element oscillating microbalance (TEOM) for semi-continuous measurement of fine particles. USEPA has approved the use of the FDMS by State and local air monitoring agencies as part of the AirNow network for fine PM. In addition, the State of California has recognized the FDMS as a California-approved sampler method.
- EMEP-funded ozone and PM research has become central to EPA's science and policy approach with respect to addressing long-range transport, the need for long-term modeling for SIPs, and how models are to be used for making policy.
- EMEP research was used to update EPA's Guidance on Models and Other Analyses in Attainment Demonstrations for the 8-hour Ozone NAAQS and more recently was used in EPA's Technical Support Document for the Final Clean Air Interstate Rule, Air Quality Modeling.
- EMEP research advanced the concept of an "airshed" for ozone and PM management - a concept that now has been embraced in a National Academy of Science report which recommends that new regulations consider how air pollution travels from state to state.
- Several EMEP research projects are providing the scientific foundation for the development of a PM2.5 State Implementation Plan, which will ultimately affect utilities and other fossil fuel combustion systems in New York.

Health Effects

Sulfur Dioxide: The New York State Department of Health recommended that EMEP findings on the effects of short-term SO_2 exposure on asthma be considered in EPA's current review of the SO_2 national ambient air quality standard.

Research Supported by the EMEP Program:

Air Quality and Related Health Research: Particulates (PM), Ozone, and Co-Pollutants

Source Apportionment of Fine Particles in New York City	University of Rochester Medical Center (M. Utell)
Impact of Power Plants on Semivolatile Pollutants and Fine Particles in New York State	Clarkson University (P. Hopke and T. Holsen), State University of New York (SUNY) - Fredonia (M. Milligan)
Enhanced Measurements of Oxidants, Fine Particles, and Precursors	University at Albany (K. Demerjian)
Formation and Transformation of Particles in Motor Engine Exhaust	University at Albany (F. Yu)
Analysis of PM Data in New York Using Advanced Source Apportionment Methods	Clarkson University (P. Hopke)
Assessment of Carbonaceous $PM_{2.5}$ for New York and the Region	Northeast States for Coordinated Air Use Management (P. Johnson)
Physical and Chemical Characterization of Laboratory-Generated Secondary Semivolatile Organic Particles	University at Albany (K. Demerjian)
Chemical Composition of Fine Organic Particles from Urban Regional Background Locations in New York State	Rutgers University (M. Mazurek)
Ultrafine Particles and Cardiac Responses: Evaluation in a Cardiac Rehabilitation Center	University of Rochester Medical Center (M. Utell)

Atmospheric Deposition of Sulfur (S), Nitrogen (N), and Mercury (Hg) and Ecosystem Response

Long-Term Monitoring Program for Evaluating Changes in Water Quality in Adirondack Lakes	Adirondack Lakes Survey Corporation (K. Roy)
Evaluation of the Recovery from Acidification of Adirondack Ecosystems	SUNY College of Environmental Science and Forestry (M. Mitchell)
Mercury in Adirondack Wetlands, Lakes, and Terrestrial Systems	Tetra Tech, Inc. (R. Munson), Syracuse University (C. Driscoll), U.S. Geological Survey (M. McHale)
Long-term Monitoring and Assessment of Mercury Using the Common Loon, Prey Fish, Water, and Sediment	Adirondack Cooperative Loon Program/Wildlife Conservation Society (N. Schoch)
Strategic Monitoring of Mercury in New York State Fish	NYS Department of Environmental Conservation (H. Simonin)
Assessment of Chemistry and Benthic Communities in Streams of the Oswegatchie-Black River Basins of the Adirondack Region	U.S. Geological Survey (G. Lawrence), Adirondack Lakes Survey Corp. (K. Roy), University of Texas (S. Passy)
Assessment of Forest Health and Stream and Soil Chemistry in the Catskill Mountains, New York	U.S. Geological Survey (P. Murdoch), USDA Forest Service (R. Hallet)
Assessment of Nitrogen and Acidic Deposition Impacts to Terrestrial and Aquatic Ecosystems of the Tug Hill Region	SUNY College of Environmental Science and Forestry (M. Mitchell and G. McGee)
Assessing the Sensitivity of New York Forests to Cation Depletion	SUNY College of Environmental Science and Forestry (R. Yanai)
Mercury Deposition Monitoring Network: Adirondacks and Catskills	Syracuse University (C. Driscoll), U.S. Geological Survey (M. McHale)

Projects and Principal Research Partners

Climate Change Research

Regional Assessment of Gas Potential in the Marcellus Shale, New York	NYS Museum Institue (L. Smith and R. Nyahay)
Regional Assessment of Gas Potential in the Utica Shale, New York	NYS Museum Institue (L. Smith and R. Nyahay)
Modeling Zero-Emissions Coal Plants	Columbia University (K. Lackner)
Auction Design for Regional Greenhouse Gas Initiative	University of Virginia (B. Shobe)
Permanent CO2 Sequestration in Ocean Sediments: Flow-Through Reactor Studies	Lamont-Doherty Earth Observatory (D. Goldberg)
Disposing of Greenhouse Gas Through Mineralization Utilizing the Wollastonite Deposits of NYS	Columbia University (K. Lackner)

Projects Crosscutting the Topics of Air Quality, Health, and Ecosystem Response

Quantifying Atmospheric Nitrogen Sources with New Stable Isotope Techniques	U.S. Geological Survey (C. Kendall and D. Burns), SUNY College of Environmental Science and Forestry (E. Boyer)
Quantifying the Environmental Benefits of Increased Deployment of Combined Heat and Power Technologies in NYS and the Impact of Proposed Emissions Standards for Small Distributed Generation	Navigant Consulting (J. Carter)
Ambient Gaseous Ammonia: Evaluation of Continuous Measurement Methods Suitable for Routine Deployment	University at Albany (J. Schwab)

Environmental Effects of Alternative Energy and Other Emerging Energy

Wind Power/Wildlife Interaction Project Services	RESOLVE, Inc. (A. Arnold)
Synthesis of Electricity Generation Impacts to Wildlife	Environmental Bioindicators Foundation (J. Newman)
Roosevelt Island Tidal Energy Project Phase II: Environmental Impact Studies	Verdant Power New York (R.Smith)

The EMEP Website contains a tremendous amount of informative material on energy and environmental topics, including the EMEP research plan, a separate page for each EMEP project, final reports, project updates, topical primers, student/teacher resources, an extensive glossary of terms, funding opportunities, and much more. Visit the EMEP Website at: **www.nyserda.org/programs/Environment/EMEP/**

Completed EMEP Projects

Clinical Studies of Exposure to Ultrafine Particles	New York University Medical Center
Analysis of Ozone and Fine Particles in the Northeast	University at Albany
Effects of Transboundary Pollution on New York's Air Quality	NYS Department of Environmental Conservation
Demonstration of Continuous Ambient Particulate Monitor	Rupprecht & Patashnick Co., Inc.
Demonstration of Innovative Instrument for Ambient Particulate Matter Mass Measurement Standard	Rupprecht & Patashnick Co., Inc
Fine Particle Constituents and Acute Asthma in Urban Areas	NYS Department of Health
Fine/Ultrafine Particulate Emissions Profiles	GE Energy and Environmental Research Corp.
Workshop on Incorporation of Receptor Models into PM and Adverse Health Effects Study	Clarkson University
Monitoring Particle Size Distribution in Rochester	Clarkson University
Effects of Atmospheric Deposition of Sulfur, Nitrogen, and Mercury on Adirondack Ecosystems	SUNY College of Environmental Science and Forestry
Contributions of Global and Regional Sources to Mercury Deposition in New York State	Atmospheric & Environmental Research, Inc.
An Assessment of Recovery and Key Proccesses Affecting the Response of Surface Waters to Reduced Levels of Acid Precipitation in the Adirondack and Catskill Mountains	U.S. Geological Survey, Institute of Ecosystem Studies
Status and Effects of Nitrogen Pollution in Northeastern United States	Hubbard Brook Research Foundation
Atmospheric Transport and Fate of Mercury in New York State	University at Albany
Deposition and Effects of Air Pollution in the Hudson Valley	Institute of Ecosystem Studies
Assessment of Extent to Which Intensively Studied Lakes Are Representative of the Adirondack Mountain Region	E & S Environmental Chemistry, Inc.
Changes in Stream Chemistry and Aquatic Biota in Response to the Decreased Acidity of Atmospheric Deposition in the Neversink River Basin, Catskill Mountains, New York, 1987 to 2003	U.S. Geological Survery
Reducing Emissions from the Electricity Sector: The Costs and Benefits Nationwide and in the Empire State	Resources for the Future
Analysis of New Pollution Control Strategy Utilizing Emission Reduction Credits and Small-Scale Combined Heat and Power Units	Navigant Consulting
New York City Regional Heat Island Initiative: Mitigating New York City's Heat Island with Urban Forestry, Living Roofs and Light Surfaces	SAIC, Columbia University, Hunter College of CUNY

SUNY Environmental Science and Forestry students conducting fieldwork at Arbutus Lake.

Adirondack Loon Conservation Program staff searching for common loons.