A CONCEPTUAL MODEL FOR THE DEVELOPMENT OF AN AIR QUALITY MANAGEMENT PLAN FOR THE STATE OF NEW YORK

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DIVISION OF AIR RESOURCES

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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1.0 INTRODUCTION

New York State has a history of being a leader in environmental stewardship and fostering policies that improve environmental and public health. In 1984, New York enacted the Acid Deposition Reduction Act to cut in-state sulfur dioxide (SO_2) and nitrogen oxides (NO_x) emissions beyond federal requirements, thus accelerating ecosystem recovery in the sensitive ecosystems of the Adirondacks. In 1996, the Environmental Bond Act ushered in numerous environmental programs, including preserving lands for future generations, brownfields cleanup, and the Clean Fuel Bus Program.

Recognizing increasingly expensive energy production and use as key to economic productivity as well as a large source of ambient air emissions, New York State has become a national leader in promoting energy efficiency and clean energy development. It has also required stricter limits on emissions through various mechanisms, including tax credits, regulations, and policies.

New York State initiated the discussions that led to the Regional Greenhouse Gas Initiative (RGGI), an effort by the Northeast and Mid-Atlantic states to reduce greenhouse gas emissions through a cap-and-trade program. Leadership in energy initiatives such as the New York Energy $mart Program, renewable portfolio standards, and energy efficiency portfolio will lead to greater energy efficiency, reliability, and emissions reductions. Innovative use of allowance set-asides in the Clean Air Interstate Rule (CAIR) program will accelerate these changes. In 2007, Governor Paterson chaired the Renewable Energy Task Force, setting new goals for increased energy efficiency and renewable energy for New York State.

On Earth Day 2007, Mayor Michael R. Bloomberg released PlaNYC, a comprehensive sustainability plan for New York City's future. PlaNYC puts forth a strategy to reduce the City's greenhouse gas footprint, while also accommodating a population growth of nearly one million, and improving its infrastructure and environment.

All of the above initiatives will have varying effects on SO_2, NO_x, carbon dioxide (CO_2), particulate matter (PM), mercury (Hg), and other air toxic emissions. They will also have varying affects on public health, ecosystem recovery, and climate. Understanding how various energy and control technologies can yield various emissions impacts for a broad range of pollutants, and understanding their effects on public health, environment, and the economy, is critically important in order to avoid unintended consequences.

Historically, these air quality concerns have been addressed on a pollutant-by-pollutant basis where each criteria pollutant and non-criteria pollutant requires its own planning effort. Climate change has also become an important air quality challenge. A comprehensive multi-pollutant approach that integrates air quality and climate goals with air quality forecasting, energy and economic models would help to satisfy these multiple environmental requirements.

2.0 PURPOSE

This conceptual model provides a vision for the multi-pollutant air quality management planning pilot project being conducted by the Department with the United States Environmental Protection Agency. Many state, local and tribal governments are moving away from single-pollutant planning towards multi-pollutant strategies that address future air quality needs. New York believes that this is the future of air quality planning, and is taking steps to create a comprehensive air quality management plan that is multi-pollutant in nature and may provide for a more efficient pollution control process.

The Department's air quality management plan expects to address air quality concerns and goals such as nonattainment and maintenance of criteria pollutant national ambient air quality standards, sector-based emission control strategies, emission and risk reductions of Hazardous Air Pollutants (HAPs), climate change, regional haze and visibility. It will also address other considerations such as land-use, transportation, energy and ecosystem health to the extent practicable.

This conceptual model incorporates the following Department priorities and provides details on the Department's air quality planning goals and potential strategies by which these goals may be achieved, as well as the technical approaches that will be used.

3.0 DEPARTMENT PRIORITIES

On April 11, 2008, Commissioner Grannis revised the issue priorities for the Department. They are:

① Connect New Yorkers to Nature

Under this priority area, the Department will continue to promote environmental education and outdoor experiences for all. The Department will increase participation in hiking, camping, fishing, bird watching, hunting, and trapping, and seek to provide state-of-the-art facilities and opportunities for high-quality outdoor experiences. The Department will make a special effort to preserve and provide access to waters and green space close to where people live and work, and reach out to under served populations. The Department's efforts to connect New Yorkers to nature will be conducted with the goal of providing access, increasing environmental literacy, enhancing public health and quality of life, and building the next generation of New Yorkers that care about conservation.

② Promote a toxic free future

The Department's specific regulatory functions fall within its larger mission of protecting human health and the environment. Fulfilling that broad mandate means promoting safer, greener ways of doing business and living our lives. The key to reducing waste and creating a toxic free future rests on reducing or eliminating the use of toxic chemicals and reducing energy, water and other resources throughout a product's life cycle.

Accomplishing this involves both pollution prevention – addressing toxics and waste at their source by choosing alternative practices, redesigning products, and adopting new manufacturing processes – and maximizing materials recovery through product stewardship, remanufacturing, and recycling. Government has a pivotal role to play in every aspect of this transformative approach. It can invest in green chemistry and green technology, practice green purchasing, mandate safer technologies and products, provide technical assistance, and influence consumer choice through education and outreach.

Prevention, however, is an evolving goal. Toxic chemicals are still a part of commerce, and unnecessary waste remains a challenge. Because of this, vigilant "end-of-the-pipe" controls and waste management will continue to play a fundamental role in the Department's mission – protecting human health and the environment and ensuring a level playing field for green alternatives. The Department has a long and effective history of addressing pollution in all media – air, water, soil, and sediment – and these flagship programs will remain central to our mission even as we move toward a new vision of the future.

③ Safeguard New York’s Unique Natural Assets

Conserving and protecting unique natural assets is at the core of the Department’s mission. New York's exceptional natural resources include the coasts of Long Island, the Hudson River, the Adirondack and Catskill Forest Preserve, the Finger Lakes and Great Lakes, the Tug Hill Plateau, and the Niagara River Escarpment. Our natural assets encompass the watersheds that provide abundant and clean water supplies, the wetlands that provide habitat and prevent flooding, and the natural heritage and beauty that brings tourism and enhances our quality of life. New York State has a long history of protecting these valuable natural assets. The Department is directly responsible for more than four million acres of land and is charged with ensuring the sound stewardship of over 15 million acres of privately owned forest lands. New York's quality of life stems in part from the quality of its water, which is maintained by healthy coasts, watersheds, wetlands, marine ecosystems and infrastructure, including flood control and wastewater treatment infrastructure.

Under this priority, the Department will strive to conserve and restore watersheds; apply state-of-the-art management techniques including ecosystem-based management; ensure sufficient water management infrastructure; promote sound land use and planning; add unique and valuable ecosystems to the Forest Preserve; and protect endangered species, biodiversity, and unique ecosystems.

④ Work for Environmental Justice

Environmental Justice is the fair treatment of all people regardless of race, color, national origin or income with respect to the development, implementation and enforcement of environmental laws, regulations and policies. To achieve environmental justice, the Department must ensure that all communities enjoy the same degree of protection from environmental and public health threats and equal access to the decision-making process. Fostering environmental justice in New York involves a range of activities that both reduce environmental burdens and target benefits to under served populations or areas struggling with disproportionate burdens.

In recognition of the importance of environmental justice, the Department has an Office of Environmental Justice as well as a Commissioner's Policy on Environmental Justice (EJ). The Office recently added new staff (a Chief Advocate and a Special Counsel for Community Initiatives) and formed a Department-wide network of professionals who will focus on a reinvigorated effort to integrate environmental justice principles into all department activities.

⑤ Combat Climate Change

Human-induced climate change has been called the most pressing environmental issue of our time. Tackling this global problem requires new policies to reduce emissions and changes to the way we think, operate, and fund environmental protection efforts. Climate change must be considered in our approach to natural resource stewardship and efforts to ensure adequate environmental infrastructure for New York's future. It requires new partnerships to share knowledge and develop effective policies to reduce greenhouse gas emissions and adapt to unavoidable impacts. In short, the Department needs to apply a climate change lens to the full range of activities, such as planning, permitting, rulemaking, grantmaking, wildlife management, enforcement, and public outreach and education. This priority involves initiatives to reduce greenhouse gas emissions from important source categories; encourage low-carbon design technologies; elevate climate change awareness, research, and adaptation ability; foster carbon sequestration and sustainable forestry; and lead other state agencies in our collective efforts to reduce emissions and adapt to changes in the climate.

There is ample evidence of our leadership in the climate change arena. The Department developed regulations for the first-in-the-nation power plant carbon cap with an allowance auction; has adopted California's greenhouse gas standards for new motor vehicles; has joined the Climate Registry; is a steering committee member of the International Carbon Action Partnership; is active in the Governor's Renewable Energy Task Force; and has formed an interagency workgroup on carbon capture and sequestration. The Department is also exploring policies to incorporate greenhouse gas assessments into environmental reviews and to address the various sources of significant greenhouse gas emissions.

⑥ Foster Green and Healthy Communities

The Department’s job is to foster the green and healthy communities that we need for New York's future. Its remediation programs allow cities and towns to clean up and safely redevelop contaminated land — a key aspect of smart growth. Its air program works towards a future where every New Yorker breathes air that consistently meets health-based standards. The Department partners with municipalities in efforts to enhance recycling and to reduce and safely manage waste, and its minerals program works to ensure that mining activities do not pose risks to people and communities. The Department has programs to protect open space, promote urban forestry, and preserve wetlands help communities maintain green spaces and streetscapes. Its water programs help prevent pollution of rivers and streams and reduce the risks from flooding. Through its unique role in implementing the State Environmental Quality Review Act, the Department has a general responsibility to protect and enhance the human environment, including

existing community or neighborhood character. Moreover, certain environmental goals —reducing non-point water pollution and reducing greenhouse gas emissions — clearly require that New York grow smarter, utilizing new models of community design and transportation efficiency. When the Department achieves success in these programs, it is achieving more than meeting its obligations under the law, it is helping municipalities improve the quality of life. Under this priority, the Department will continue to build even better programs, and work with cities and towns to help them create the green and healthy communities that make New York a great place to live.

The diversity of these priorities illustrates how critical the Department's work is to so many aspects of the economy and quality of life in New York. Several of the priorities incorporate air quality initiatives which are being addressed in this conceptual model.

4.0 POLLUTANTS TO BE ADDRESSED IN AQMP

In order to develop a successful air quality management plan, it is important to establish a workable set of boundaries. In consideration of the Commissioner's priorities and the Department's mission, the initial scope of the project will address the following pollutants, in alphabetical order, that most affect air quality in New York State:

1,3-butadiene
Acetaldehyde
Acrolein
Ammonia
Benzene
Carbon Dioxide and other "greenhouse" gases
Diesel Exhaust
Fine Particulate Matter ($PM_{2.5}$)
Formaldehyde
Lead
Mercury
Nickel compounds
Oxides of Nitrogen
Ozone
Particulate Matter (PM_{10})
Polycyclic organic matter (POM)
Sulfur Dioxide

In the future, the AQMP may be expanded to included additional pollutants.

5.0 AIR QUALITY IN NEW YORK STATE

The overall air quality in New York has been continually improving over the last several decades. The addition of control requirements and the gradual replacement of older cars with new vehicles have significantly contributed to this improvement. However, indigenous source pollution as well as the transport of pollutants into the state continue to be an issue and the state continues to have areas that are in nonattainment for ozone and fine particulate matter.

5.1 OZONE

Ground-level ozone, a primary ingredient in smog, is formed when volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) react chemically in the presence of sunlight.

Oxides of nitrogen are a group of gases including nitric oxide (NO) and nitrogen dioxide (NO_2). NO_2 is a reddish-brown, highly reactive gas that is formed in the air through the oxidation of NO. When NO_2 reacts with other chemicals in the atmosphere, it not only results in the formation of ozone, but it also forms particulate matter (PM), haze and acid rain. Sources of NO and NO_2 include motor vehicle exhaust (including both gasoline-fueled vehicles and diesel-fueled vehicles), the burning of coal, oil or natural gas, and industrial processes such as welding, electroplating and dynamite blasting. Transportation is considered a mainly localized contributor of NO_X, while stationary source fuel combustion has transport impacts, making it more of a regional issue.

Although most NO_x is emitted as NO, it is readily converted to NO_2 in the atmosphere. In the home, gas stoves and heaters produce substantial amounts of nitrogen dioxide. As much of the NO_x in the air is emitted by motor vehicles, concentrations tend to peak during the morning and afternoon rush hours. Also, due in part to poorer local dispersion conditions caused by light winds and other weather conditions that are more prevalent in the colder months of the year, NO_x concentrations tend to be higher in the winter than the summer.

VOCs are chemicals that evaporate (or volatilize) when they are exposed to air. They are called organic because they contain carbon. Some VOC compounds are highly reactive with a short atmospheric lifespan, while others can have a very long lifespan. The short-lived compounds contribute substantially to atmospheric photochemical reactions and thus the formation of ozone.

VOCs are used in the manufacture of, or are present in, many products used daily in both homes and businesses. Some products, such as gasoline, actually are VOCs. VOCs are used as fuels (gasoline and

heating oil) and are components of many common household items such as polishes, paints, cosmetics, perfumes and cleansers. They are also used in industry as degreasers and solvents, and in dry cleaning. VOCs are present in many fabrics and furnishings, construction materials, adhesives and paints. In offices, VOCs can be found in correction fluid, magic markers, paper, rubber bands, invisible tape and other products. The names of many VOCs may be familiar: carbon tetrachloride, trichloroethene (TCE), tetrachloroethene (PCE), trichloroethane (TCA), benzene and toluene. Because of their widespread historical use, and past lack of stringent disposal requirements, they are in our air, soil, and water in varying concentrations. Human-made VOCs are primarily emitted into the air by motor vehicle exhaust, industrial processes and from the evaporation of solvents, oil-based paints and gasoline from gas pumps.

Ozone pollution is a concern during the summer months when the weather conditions needed to form ground-level ozone – sunshine and hot temperatures – normally occur. Ozone is unhealthy to breathe, especially for people with respiratory diseases and for children, the elderly and adults who are active outdoors. Symptoms include reduced lung function and chest pain, and can lead to respiratory diseases such as bronchitis or asthma.

Emissions from point, area, non-road mobile, on-road mobile and biogenic source sectors contribute to the ozone non-attainment problem. Emissions data from point sources, including electricity generating units, is obtained directly from Title V major sources via required annual emission statement surveys. Emissions from all other sources are estimated using EPA approved methodologies. Area sources collectively represent individual stationary sources that have not been identified as specific point sources. Examples of area source categories include architectural coatings, dry cleaning and ethylene oxide sterilizers. The on-road component includes emissions from all motorized vehicles operated on public roadways. The non-road component includes emissions from motorized vehicles and equipment that are not typically operated on public roadways (e.g. locomotive, construction equipment, aircraft, marine vessels, recreational equipment and lawn and garden equipment). Biogenic emissions are naturally occurring emissions from vegetation and nitric oxide (NO) and carbon monoxide (CO) emissions from soils.

All sectors will be evaluated for potential additional control measures as part of the development of the air quality management plan.

The evolution of severe ozone episodes in the eastern United States often begins with the movement of a large high pressure area from the Midwest to the middle or southern Atlantic states, where it assimilates into and becomes an extension of the Atlantic (Bermuda) high pressure system.

During its movement east, the air mass accumulates air pollutants emitted by large coal-fired power plants and other sources located outside the Ozone Transport Region. As the air mass passes over the eastern United States, sources within the Ozone Transport Region contribute to the air pollution burden. These expansive weather systems favor the formation of ozone by creating a vast area of clear skies and high temperatures. These two prerequisites for abundant ozone formation are further compounded by a circulation pattern favorable for pollution transport over large distances. In the worst cases, the high pressure systems stall over the eastern United States for days, creating ozone episodes of strong intensity and long duration.

One transport mechanism that has fairly recently been discovered and can play a key role in moving pollution long distances is the nocturnal low level jet stream. This low level jet is a regional scale phenomenon of higher wind speeds that often forms during ozone events a few hundred meters above the ground just above the stable nocturnal boundary layer. It can convey air pollution several hundreds of miles overnight from the southwest to the northeast, directly in line with the major population centers of the Northeast Corridor stretching from Washington, D.C. to Boston, Massachusetts. The nocturnal low level jet extends the entire length of the corridor from Virginia to Maine, and has been observed as far south as Georgia. It can thus be a transport mechanism for bringing ozone and other air pollutants into the Ozone Transport Region from outside the region, as well as move locally formed air pollution from one part of the Ozone Transport Region to another.

Other transport mechanisms occur over smaller scales. These include land, sea, mountain, and valley breezes that can selectively affect relatively local areas. They play a vital role in drawing ozone-laden air into some areas, such as coastal Maine, that are far removed from major emission source regions.

With the knowledge of the different transport scales into and within the Ozone Transport Region, a conceptual picture of bad ozone days emerges. After sunset, the ground cools faster than the air above it, creating a nocturnal temperature inversion. This stable boundary layer extends from the ground to only a few hundred meters in altitude. Above this layer, a nocturnal low level jet can form with higher velocity winds relative to the surrounding air. It forms from the fairly abrupt removal of frictional forces induced by the ground that would otherwise slow the wind. Absent this friction, winds at this height are free to accelerate, forming the nocturnal low level jet. Ozone above the stable nocturnal inversion layer is likewise cut off from the ground, and thus it is not subject to removal on surfaces or chemical destruction from low level emissions. Ozone in high concentrations can be entrained in the nocturnal low level jet and

transported several hundred kilometers downwind overnight. The next morning as the sun heats the Earth's surface, the nocturnal boundary layer begins to break up, and the ozone transported overnight mixes down to the surface where concentrations rise rapidly, partly from mixing and partly from ozone generated locally. By the afternoon, abundant sunshine combined with warm temperatures promotes additional photochemical production of ozone from local emissions. As a result, ozone concentrations reach their maximum levels through the combined effects of local and transported pollution. Ozone moving over water is, like ozone aloft, isolated from destructive forces. When ozone gets transported into coastal regions by bay, lake, and sea breezes arising from afternoon temperature contrasts between the land and water, it can arrive highly concentrated.

During severe ozone episodes associated with high pressure systems, these multiple transport features are embedded within a large ozone reservoir arriving from source regions to the south and west of the Ozone Transport Region. Thus a severe ozone episode can contain elements of long range air pollution transport from outside the Ozone Transport Region, regional scale transport within the Ozone Transport Region from channeled flows in nocturnal low level jets, and local transport along coastal shores due to bay, lake, and sea breezes.

In New York, the New York State counties south of the Mid-Hudson area are separated by the Hudson Highlands, which are a range of hills whose southern edge runs roughly along the Orange/Rockland and Putnam/Westchester county lines. Although it is a relatively small mountain range, it is situated such that it serves as a boundary between the coastal plain climate regime and the inland climate regime. The Highlands tend to inhibit low-level air flow from the coastal plain into the Mid-Hudson area. Local sea breeze circulations, which are common during the ozone season, occasionally extend as far inland as the Highlands, but rarely cross the Highlands into the Mid-Hudson area. Local sea breeze circulations, which are common during the ozone season, occasionally extend as far inland as the Highlands, but rarely cross the Highlands into the Mid-Hudson region. Additionally, a weather feature known as the lee trough, (the most common feature associated with high ozone events in southeastern New York), tends to set up near New York City. The trough forms during periods of northwesterly wind flow aloft and is "dragged" off the terrain a bit in the NW flow (more or less depending on the strength of the flow). In these weather situations, the high ozone band, along with the sea-breeze front, stretches along and south of the trough line. When this occurs, the Lower Hudson Valley Region is in a westerly or west-northwesterly surface wind flow (coming from a relatively sparsely populated area with lower emissions) and ozone values tend to be lower compared with the New York City area, where the west-southwesterly

surface wind flow ahead of the trough brings in air from areas with higher ozone concentrations and higher emissions of ozone precursors.

The New York City Metropolitan Area, which includes counties in New Jersey and Connecticut, is presently in non-attainment of both the 1-hour and 1997 8-hour ozone National Ambient Air Quality Standard (NAAQS). The most recent Design Values (DVs) for monitors in New York State on which compliance with standards are determined show exceedances of the 1997 8-hour ozone NAAQS in Suffolk, Richmond, Queens and Westchester Counties. While all monitors show that the 2006 DV levels are lower compared to 2002 DVs, several of the monitors continue to be above the 1997 8-hr ozone NAAQS level. There was a slight upturn in measured ozone levels for 2007. Current modeling projects that 2009 DVs will be well above the 1997 8-hr ozone NAAQS, but will be below the 1997 NAAQS in 2012 as a result of new controls. For the monitors in New York State, the only appreciable upward changes were found at the White Plains monitor in Westchester County and the Riverhead monitor in Suffolk County. Since the long term trends at these locations show declining ozone, data from these sites will need to be examined carefully in the future. The Department submitted a final proposed state implementation plan to EPA on February 8, 2008 that demonstrates attainment of the 1997 8-hour ozone NAAQS in 2012 and contains new controls that will continue improving ozone levels. Applicable ozone SIPs will be included in the Air Quality Management Plan as an appendix.

5.1.1 8-Hour Ozone Non-attainment Areas (0.08 parts per million (ppm) NAAQS)

New York-Northern New Jersey-Long Island, NY-NJ-CT Area (Moderate – Requested re-classification to serious on April 4, 2008)

Bronx, Kings (Brooklyn), Nassau, New York (Manhattan), Queens, Richmond (Staten Island), Rockland, Suffolk and Westchester Counties

Poughkeepsie, NY Area (Moderate)

Dutchess, Orange and Putnam Counties

Jefferson County, NY Area (Clean Data Area approved by EPA on March 25, 2008 (73 FR 15672))

Jefferson County

Albany-Schenectady-Troy, NY Area (Clean Data Area approved by EPA on March 25, 2008 (73 FR 15672))

Albany, Greene, Montgomery, Rensselaer, Saratoga, Schenectady and Schoharie Counties

Buffalo-Niagara Falls, NY Area (Expect to be proposed as Moderate in upcoming Federal Register Notice)

Erie and Niagara Counties

Essex County, NY Area (Expect to be proposed as Marginal in upcoming Federal Register Notice)

The portion of Whiteface Mountain above 1900 feet in elevation

Jamestown, NY Area (Expect to be proposed as Moderate in upcoming Federal Register Notice)

Chautauqua County

Rochester,NY Area (Clean Data Area approved by EPA on March 25, 2008 (73 FR 15672)

Genesee, Livingston, Monroe, Ontario, Orleans and Wayne Counties

5.1.2 1-Hour Ozone Non-attainment Areas (0.12 ppm)

New York-Northern New Jersey-Long Island, NY-NJ-CT Area (Severe) -

Bronx, Kings (Brooklyn), Nassau, New York (Manhattan), Queens, Richmond (Staten Island), Southern Orange (including Towns of Blooming Grove, Chester, Highlands, Monroe, Tuxedo, Warwick & Woodbury), Suffolk, Rockland and Westchester Counties.

Poughkeepsie, NY Area (Moderate)

Dutchess, Northern Orange (excluding Towns of Blooming Grove, Chester, Highlands, Monroe, Tuxedo, Warwick & Woodbury) and Putnam Counties.

Albany-Schenectady-Troy, NY Area (Clean Data Area approved by EPA on March 25, 2008 (73 FR 15672))

Albany, Greene, Montgomery, Rensselaer, Saratoga, and Schenectady Counties.

Buffalo-Niagara Falls, NY Area (Clean Data Area approved by EPA on March 25, 2008 (73 FR 15672))

Erie and Niagara Counties

Jefferson County, NY Area (Clean Data Area approved by EPA on March 25, 2008 (73 FR 15672))

Jefferson County

Essex County, NY Area (Clean Data Area approved by EPA on March 25, 2008 (73 FR 15672))

The portion of Whiteface Mountain above 4500 feet in elevation.

Applicable ozone SIPs will be included in the Air Quality Management Plan as an appendix.

5.2 FINE PARTICULATE MATTER ($PM_{2.5}$)

The direct emission of particulate matter, especially fine particulate matter (particles with a diameter less than 2.5 microns in size), sulfur dioxide, and nitrogen oxides are the primary contributors to the exceedance of the particulate matter air quality standards. Particulate matter can be emitted directly from sources, or be comprised in part of nitrate and sulfate particles formed through atmospheric reactions involving nitrogen oxides, sulfur dioxide, VOCs, windblown dust, and ammonia. These constituents are capable of being transported great distances while in the atmosphere. Due to this, sources may contribute to PM nonattainment far downwind of their location requiring a regional solution.

There are a myriad of sources of particulate matter, ranging from stationary and mobile sources, to small area and biogenic sources. The greatest contributor to particulate emissions is combustion, which occurs in many forms at power plants, in cars, through the use of heavy construction equipment, and in home heating. To reduce pollution, a comprehensive program must be developed and implemented that is able to account for the contributions from all of these source types.

All sectors will be evaluated for potential additional control measures as part of the development of the air quality management plan.

The Federal Reference Method (FRM) data collected across the New York metropolitan area over the past seven years suggest that $PM_{2.5}$ levels are generally higher in the core urban areas compared to the surrounding suburban counties. While this is a rather short time period, it appears that $PM_{2.5}$ levels have been decreasing across the entire metropolitan area since the early 2000's. It appears that emissions control programs that target precursors will be needed to further reduce $PM_{2.5}$ levels across the metropolitan area.

Applicable particulate matter SIPs will be included in the Air Quality Management Plan as an appendix.

5.2.1 $PM_{2.5}$ Non-attainment Areas

New York-Northern New Jersey-Long Island Area-
Bronx, Kings (Brooklyn), New York (Manhattan), Queens, Richmond (Staten Island), Nassau, Suffolk, Westchester, Rockland and Orange Counties

5.3 CARBON MONOXIDE

New York State is in attainment of the Carbon Monoxide NAAQS. A maintenance plan for the New York City Metropolitan area has been approved by EPA, and will be included in the Air Quality Management Plan as an appendix.

5.4 TOXICS

New York State's need to reduce hazardous air pollutant (HAP) emissions statewide is driven by the following agency and national goals:

(1) The Department's commissioner priorities' for the agency, including 6NYCRR Part 212, and

(2) The Clean Air Act (CAA), including 40 CFR Part 63, the National Emission Standards for Hazardous Air Pollutants program (NESHAPs) and §112(k) of the CAA, Integrated Urban Air Toxics Strategy. HAPs represent a subset of the numerous air toxics emitted to the ambient air.

As stated above, New York's AQMP will focus on the following urban Hazardous Air Pollutants (HAPs) emitted from both stationary and mobile sources: acetaldehyde, acrolein, benzene, 1,3-butadiene, formaldehyde, mercury, nickel compounds and polycyclic organic matter (POM). Diesel exhaust was not listed as a §112(k) HAP but was estimated in NATA. The AQMP will put particular emphasis on highly exposed individuals, such localized communities of high concentrations and specific population subgroups (e.g., children, the elderly, and low-income communities).

Based upon EPA's 1999 National-scale Air Toxics Assessment (NATA), benzene is the most significant air toxic for which cancer risk could be estimated. The estimated air concentrations for benzene contributed 25 percent of the average individual cancer risk identified. The 1999 national emissions inventory reports the following key sources for benzene: on road (49%) and non-road mobile sources (19%), and open burning, prescribed fires and wildfires (14%). Residential heating from wood combustion accounts for approximately 6% of the total benzene emissions.

In New York State, the primary benzene emissions are also on-road and off-road mobile sources. Benzene is also emitted during the fueling of gasoline bulk storage tanks and the fueling of vehicles. Several HAPs are present in gasoline and are emitted to the air when gasoline evaporates or passes through the engine as unburned fuel. A significant amount of automotive air toxics come from the incomplete combustion of compounds in gasoline, such as toluene and xylene, both that are chemically similar to benzene. Formaldehyde, acetaldehyde, diesel exhaust particulate matter POM, and 1,3-butadiene are not present in fuel but are by-products of incomplete combustion. Formaldehyde and acetaldehyde are also formed through a secondary process when other mobile source pollutants undergo chemical reactions in the atmosphere.

The statewide monitored annual average for benzene in 2007 was 0.91 $ug/m^{3,}$ which is 7.0 times (0.91/0.13) the annual guideline concentration as reported in the 2007 AGC/SGC tables of DAR-1. The average measured concentration in New York City's seven metropolitan sites for 2006 was 1.2 ug/m^3 or 9.2 times the AGC for benzene. A targeted goal of 75% reduction in benzene emissions statewide would equate to an overall emission level of 0.22 ug/m^3.

The statewide monitored 2007 annual average for 1,3 –butadiene was 0.12 ug/m^3 , this is 3.5 times (0.12/0.033) the annual guideline concentration as reported in the 2007 AGC/SGC tables of DAR-1. The average measured concentration in New York City's seven metropolitan sites for 2006 is 0.14 ug/m^3 or 4 times the AGC for 1,3 –butadiene emissions.

In EPA's assessment, the 1999 NATA reports that acrolein contributes 91 percent of the nationwide average non-cancer hazard index. Based on the national emissions inventory, the key sources for acrolein are open Burning, prescribed fires and wildfires (61%), on road (14%) and non-road (11%) mobile sources.

POM and fine particles are a component of diesel exhaust. Diesel exhaust is described by EPA under NATA as:

Diesel Particulate Matter (PM) is a mixture of particles that is a component of diesel exhaust. EPA lists diesel exhaust as a mobile source air toxic due to the cancer and non-cancer health effects associated with exposure to whole diesel exhaust. EPA believes that exposure to whole diesel exhaust is best described, as many researchers have done over the years, by diesel particulate concentrations.

In 1998, nickel compounds were identified as pollutants of concern from the firing of oil in the §112(n) Study of Hazardous Air Pollutant Emissions

from Electric Utility Steam Generating Units, Final Report to Congress. This finding was overturned in 2004 and subsequently remanded by the District Courts. Nickel should be identified as a pollutant of concern for the multi-pollutant study SIP and emissions of nickel from sources should be addressed.

Nickel compounds have been identified as a major concern in the burning of fuel oil. 1999 NATA estimates a range in urban counties of 0.009 to 0.060 ug/m^3. The current AGC for nickel is 0.0042 ug/m^3 based upon carcinogenic health effects. Monitored 2000 speciated $PM_{2.5}$ data reports the nickel component at 0.01 to 0.06 ug/m^3 at urban sites.

5.5 MERCURY

In lieu of accepting the model rule requirements of the federal Clean Air Mercury Rule, the Department incorporated 6 NYCRR Part 246 of Title 6 of the New York Codes, Rules and Regulations entitled "Mercury Reduction Program for Coal-Fired Electric Utility Steam Generating Units", into the Mercury State Plan.

Part 246 will achieve a ninety percent reduction in mercury emissions from the coal-fired electricity generating units covered by the federal Clean Air Mercury Rule in two phases.

> Phase One of Part 246 imposes facility-wide mercury emission limitations based upon the state mercury budget distributed to New York State by the United States Environmental Protection Agency. The facility-wide emission limitations will be in effect from 2010 to 2014.
>
> Phase Two of Part 246 establishes a unit-based emission limit of 0.6 pounds per trillion British Thermal Units on a 30-day rolling average basis for each applicable unit starting in 2015.

The New York Section 111(d) State Plan for the Implementation of Coal-Fired Electric Steam Generating Unit Mercury Emission Guidelines will be included in the Air Quality Management Plan as an appendix.

Additional controls may be considered as a result of the analytical phase of the air quality management plan development.

5.6 CARBON DIOXIDE

Scientific evidence suggests that a warming climate poses a serious threat to New York's environmental resources and public health. Climate changes will have effects on air quality, water quality, fisheries, drinking water supplies, wetlands, forests, wildlife, and agriculture. Flooding from severe weather events and rising sea levels can damage communities and infrastructure in floodplains and along coastlines.

In 2005, 244.96 million tons of carbon dioxide (CO_2) and 819,252 tons methane were emitted in New York State. Carbon dioxide formed during fuel combustion accounts for the vast majority of greenhouse gas emissions in New York State, approximately 88.5 percent. The largest single source of emissions is transportation fuel combustion, representing more than 30 percent of the total. Burning fossil fuels for electric generation is also a major contributor of CO_2 to the atmosphere, and in New York, electric power plants emit approximately 25 percent of all CO_2 emissions. This means that reducing the amount of CO_2 emitted by power plants is a necessary piece of any solution to climate change. (Source: NYS Greenhouse Gas Emissions Inventory, NYSERDA, Draft dated May 22, 2007)

The Regional Greenhouse Gas Initiative, or RGGI, is a regional agreement to reduce greenhouse gas emissions from power plants. Under the RGGI agreement, the governors of 10 Northeastern and Mid-Atlantic States have committed to cap the amount of carbon dioxide that power plants are allowed to emit. State regulations will hold the allowed level constant through 2014, and then gradually reduce it. By 2019, the cap will be 10 percent lower than it initially was, and emissions are estimated to be 16 percent lower than they would be if the power plants had continued emitting on a business-as-usual basis.

The RGGI states have negotiated a regional CO_2 budget of approximately 188 million tons, and have apportioned it among themselves. New York's initial CO_2 budget will be approximately 64.3 million tons (before the 10 percent reduction is made).

Responsibility for implementing RGGI will be shared by three departments of New York State government: the Department, the Department of Public Service, and the Energy Research and Development Authority (NYSERDA). The Department and NYSERDA adopted 6 NYCRR Part 242 and 21 NYCRR Part 507 in the fall of 2008, respectively.

The Department has established New York's CO_2 Budget Trading Program through Part 242 while NYSERDA will administer the auction process by which the state will sell emissions allowances to the power plants through Part 507, CO_2 Allowance Auction Program. Under this rule, proceeds from sale of the allowances will fund projects and programs for energy efficiency and clean renewable energy.

5.7 Regional Haze

Regional haze is a persistent issue across the country. The northeast, in particular, has seen reductions in visibility of up to 83 percent from natural conditions. Because the pollutants that cause visibility impairment (primarily SO_2, PM_{10}, and NO_x) are easily transported great distances, the EPA presented a regional solution to the problem. On July 1, 1999, EPA released its final Regional Haze Rule, which contained the goal of reaching natural visibility conditions by 2064. The regional approach presented within this rule means that many states, including those which do not contain Federal Class I areas, must participate in haze reduction efforts.

The Department is currently finalizing its Regional Haze State Implementation Plan (SIP). New York State, although containing no Class I areas, is a member of the Mid-Atlantic/Northeast Visibility Union Regional Planning Organization (MANE-VU RPO). As a state which significantly contributes to the regional haze problem in downwind Class I areas within MANE-VU, the Department is required to make certain commitments to reduce emissions of these visibility-impairing pollutants. Among these commitments are the timely promulgation of a Best Available Retrofit Technology (BART) regulation, which addresses these pollutions for older stationary sources; a 90 percent or greater reduction in SO_2 emissions from the highest-polluting electric generating unit sources in the state; and, the implementation of a low-sulfur fuel oil strategy. Aside from the visibility improvement that is expected within Class I areas, these measures should result in visibility, acid rain, ozone, and PM benefits within New York.

5.8 Lead

With the phasing-out of leaded gasoline and lead-based paints, lead emissions within the United States have decreased dramatically since 1980. Despite this progress, recent research on the effects of lead on the nervous system (with associated IQ losses and behavioral issues), cardiovascular system, and immune system, implied that a much more stringent standard was necessary. EPA responded to this evidence on October 15, 2008 by strengthening the standard from 1.5 $\mu g/m^3$ to 0.15 $\mu g/m^3$.

There are no nonattainment areas within New York State under the old standard of 1.5 $\mu g/m^3$. The Department believes New York State may fall under nonattainment of the new lead NAAQS in at least one downstate county due to emissions from a lead smelting facility. The Department is obligated to submit its designation recommendations to EPA by October 15, 2009. Should there be any areas within New York State designated as nonattainment , the Department will take the appropriate measures to meet attainment as expeditiously as practicable.

5.9 Acid Deposition

Acid deposition is largely a result of the SO_2, NO_x, and ammonia (NH_3) emissions from power plants and other stationary sources burning fossil fuels (coal, oil, natural gas, etc.), as well as from vehicle emissions. Sulfuric and nitric acid are formed in the atmosphere, and return through wet deposition (commonly referred to as acid rain) or dry deposition. Such deposition affects forest and aquatic ecosystems, visibility, and human health.

While many areas of New York State are not sensitive to acidity because of limestone deposits or soils which neutralize the acid, the Adirondacks, Catskills, Hudson Highlands, Rensselaer Plateau and parts of Long Island are particularly sensitive to acid deposition. The soil and bedrock in these areas are not able to counteract the acid in the rain and snow.

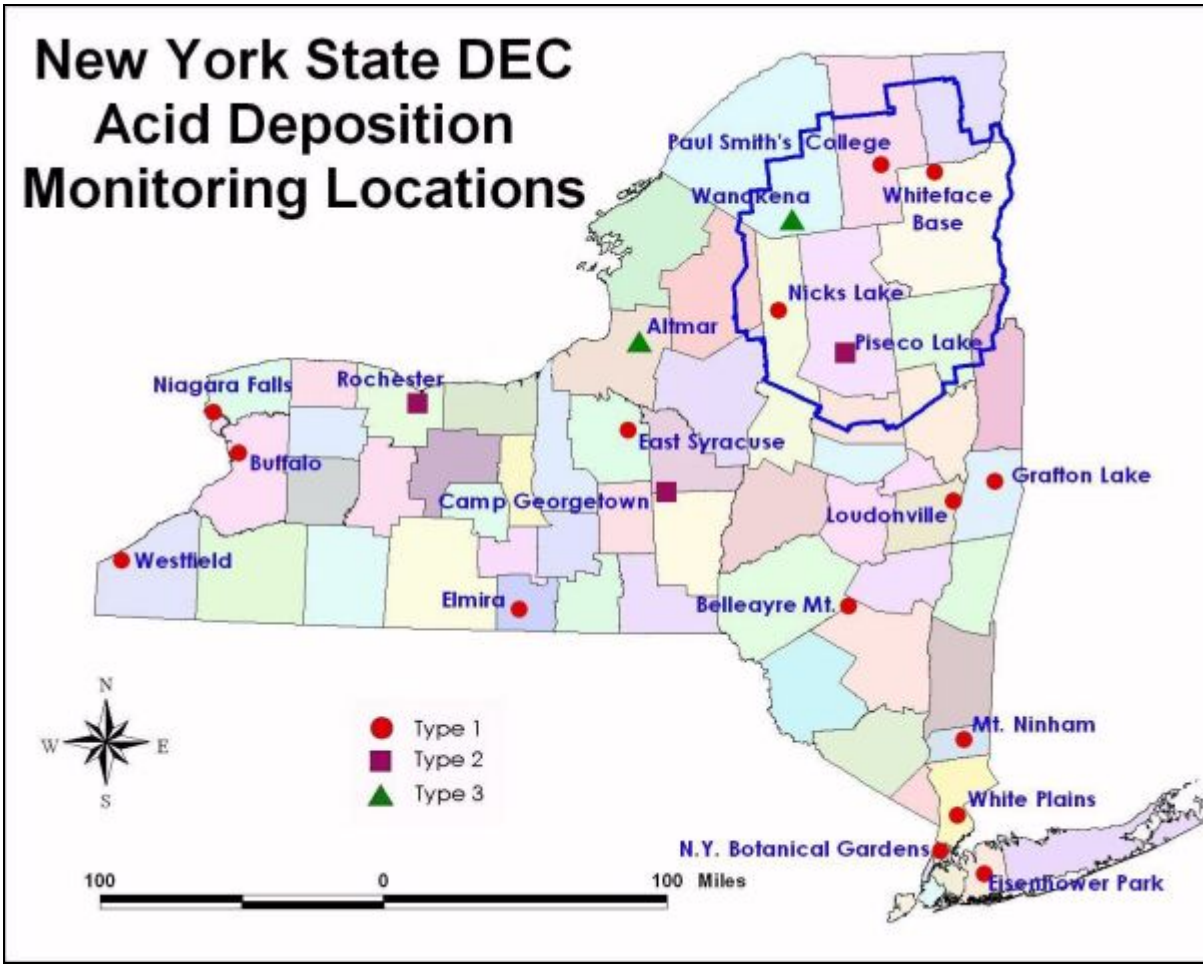
New York monitors and tests for acid deposition through the New York State Atmospheric Deposition Monitoring Network, which was designed in 1985 to carry out requirements of the State Acid Deposition Control Act (SADCA). The monitoring network collects and analyzes precipitation parameters (pH, Sulfate, Nitrate, Calcium, Magnesium, etc) to assess the effectiveness of sulfur control policy and other strategies aimed at reducing the effects of acid rain.

The network's objectives are:

- Provide a consistent, quality-assured, long-term acid deposition database.
- Measure acid deposition in sensitive receptor areas.
- Measure acid deposition in urban and upwind areas.
- Use these data to perform spatial and temporal analyses of acid deposition, its precursors, and its effects.
- Track the effectiveness of programs to reduce acid deposition precursor emissions.

The monitoring network consists of about 20 sites located throughout the state, in both rural and urban areas. Rainfall measurements are automatically recorded, but for other parameters, samples are collected manually from each site and then transported to our laboratory for analysis. Instrumentation is unavailable to automate the deposition sampling and analysis of pH, conductivity, cation concentrations and anion concentrations.

The Department is presently monitoring acid deposition. Sample collection began in June, 1986, with 12 sites, but these data are not considered valid due to shakedown. The official start-up for the network is January 1, 1987. Sites were added in 1987, 1988, 1989, 1990, 1991, 1994, 2001, and 2004. The Department will try to continue to expand the network until the design target of 25 sites is reached. The schedule depends upon budget provisions.



The Department has responded to the Acid Deposition problem by promulgating a number of regulations that effectively reduce emissions of

these pollutants. This includes the implementation of budget trading programs for SO_2 (6 NYCRR Part 238) and NO_x (6 NYCRR Part 204 during the ozone season; 6 NYCRR Part 237 during the non-ozone season). Parts 237 and 238 are collectively referred to as the Acid Deposition Reduction Program (ADRP). EPA also adopted the Clean Air Interstate Rule (CAIR) in 2005, applicable to all states east of the Rocky Mountains. New York State has adopted three emissions cap-and-trade rules in response to CAIR. They are:

6 NYCRR Part 243 establishes the CAIR NO_x Ozone Season Trading Program;

6 NYCRR Part 244 establishes the CAIR NO_x Annual Trading Program; and

6 NYCRR Part 245 establishes the CAIR SO_2 Trading Program.

Acid Rain data collected through 2004 are continuing a "slightly" decreasing trend for both SO_4 concentration and deposition. The concentration and deposition downward trend is not as evident for NO_3^- and NH_4^+. Data show slight pH improvements. The trends in acid deposition data are similar to the emissions trends. Acid Deposition annual reports through 2007 are available at http://www.dec.ny.gov/chemical/41319.html.

Only by the continued collection and analysis of acid deposition will it be possible to verify that improvements are occurring due to the reductions of SO_2 and NO_x legislated in the 1990 CAAA and ADRP.

More information on the Department's Acid Deposition program can be found at http://www.dec.ny.gov/chemical/283.html .

6.0 NEW YORK STATE ENVIRONMENTAL GOALS

Department staff considered the Commissioner's current overarching environmental issue priorities as well as specific program goals established through the Clean Air Act, executive orders, statutes and regulations. From these goals, a set of environmental targets were identified. Below, the goals and targets are listed and organized by the Commissioner's priorities.

Commissioner's Priority: Combat Climate Change

- Reduce greenhouse gas emissions
- Encourage low-carbon design technologies
- Elevate climate change awareness, research and adaptation ability
- Foster carbon sequestration and sustainable forestry
- Lead state agencies' efforts to tackle climate change

Air Program Response/Environmental Goals:

2013: Achieve the Renewable Portfolio Standard goal of 25 percent of energy to be produced from renewable sources.

2015: Implement "45 by 15", a comprehensive plan where New York will meet 45 percent of its electricity needs through improved energy efficiency and clean renewable energy. In January 2009, Governor Paterson proposed increasing the Renewable Portfolio Standard from 25 percent to 30 percent and set a goal of decreasing electricity usage by 15 percent from forecasted levels by 2015.

2020: Achieve a 10 percent reduction in vehicle miles traveled.

2020: Achieve a 30 percent reduction in CO_2e emissions.

2050: Achieve an 80 percent reduction in CO_2e emissions.

Strategies Under Consideration:

1. Increase the proportion of renewable electricity used by New Yorkers from the 2004 baseline of 19.3% to at least 25% by the year 2013 through increased use of:
    a. wind
    b. hydroelectric
    c. solar
    d. biofuels.

2. Continue the Systems Benefits Charge (SBC) to fund public policy initiatives not expected to be adequately addressed by New York's competitive electricity markets. The SBC programs are designed to serve the diverse needs of New York

energy consumers from residential homeowners and tenants to manufacturing plants and commercial office buildings.

3. Implement recommendations of the Governor's Renewable Energy Task Force.

4. Develop and implement new energy efficiency programs in industry.

5. Develop and implement new energy efficiency programs in government.

6. Create new appliance efficiency standards: require all new installations/sales to be Energy Star products
    a. Electric: hot water, space heating, cooking, electricity
    b. Gas: hot water, space heating, cooking
    c. Oil: hot water, space heating
    d. Market penetration of compact fluorescent light bulbs

7. Set more rigorous energy building codes: require all new commercial sector construction to be LEED Certified.

8. Demand side solar

9. Transportation
    a. Efficiency standards (baseline 25 mpg gasoline LDV, 12,000 VMT/year)
        i. LDV Hybrid (37% fleet conversion @ 50 mpg)
        ii. LDV Gas -> Diesel (10% fleet conversion @ 37mpg)
        iii. HDV (6 mpg baseline +10% efficiency increase = 6.6 mpg)
    b. Fuel/electric conservation (VMT reduction programs)
        i. Subway system upgrades (electric efficiency increase on 2,900 MWh/year consumption @ 1092 lb CO2/MWh NYS grid average)
            1. Aluminum rail installation (3%)
            2. Regenerative braking on all cars (25%)
            3. Railcomm switch, 3rd rail heaters, insulator cleaning (8%)
        ii. Light rail extension
        iii. Car-share program
        iv. Subsidized public transportation
        v. Diesel idle reduction (shore power, truck stop electrification)
    c. Fuel Switching
        i. Biodiesel (all "yellow grease" to produce biodiesel)
        ii. Corn-ethanol (E-85 blend at 50% gasoline consumption)
        iii. PHEV (60% fleet conversion, 90% electric miles)

10. Power Generation
    a. Coal conversion/repowering to oil, gas
    b. Nuclear
    c. Wind (max build-out at 10,000 MW installed capacity)
    d. Solar

e. Solar thermal (offset electric, gas or oil emissions)
    i. Absorption cooling
    ii. Hot water
f. Hydro
g. Biomass
h. Coal gasification

11. Municipal Solid Waste
    a. Recycling (all paper, glass and metal) (MSW= 30% paper, 20% glass/metals)
    b. Composting (30% MSW stream)
    c. Waste to energy (All landfill methane and anaerobic digestion at WWTT must reclaim energy)

12. Forest Carbon Sequestration–
    a. Afforestation: grassland/cropland to forest
    b. Forest management

13. Soil Storage - No till practice: farming

14. Transmission & Distribution
    a. Upgrade 10,000 miles of high voltage lines
        i. SF6 alternatives
        ii. Increased delivery efficiency (8% line loss down to 4%)
            1. Advanced Aluminum lines (2%)
            2. Improved transmission pathways (2%)
            3. Super Conducting technologies (2%)

15. Natural Gas line leakage - upgrade/replace compressor stations, seals, etc.

16. Combined Heat & Power
    a. Reduce space heating needs – electric/fossil fuel
    b. Efficient power generation

17. Cement Manufacture
    a. Wet to dry rotary kiln conversion (~20% CO_2 reduction/ton clinker)
        i. 2 of 3 kilns in NY are still Long Wet Rotary Kilns
    b. Non-rotary kiln technology?

Commissioner's Priority: Foster Green and Healthy Communities

- Use the Department's program areas to encourage smart growth
- Clean up contaminated land, especially in urban centers
- Attain and maintain all National Ambient Air Quality Standards

Air Program Response/Environmental Goals:

2010: Attain the 1997 0.08 ppm 8-hour ozone standard in the Poughkeepsie, NY; Buffalo – Niagara Falls, NY; and Jamestown, NY non-attainment areas (based on 2007-2009 ambient data).

2010: Attain the 15 ug/m3 annual $PM_{2.5}$ standard in the New York-N. New Jersey-Long Island, NY-NJ-CT-PA non-attainment area (based on 2007-2009 ambient data).

2013: Attain the 1997 0.08 ppm 8-hour ozone standard in the New York – N. New Jersey – Long Island, NY-NJ-CT non-attainment area (based on 2010-2012 ambient data).

2013: Attain the 2008 0.075 ppm 8-hour ozone standard in the Albany-Schenectady-Troy, NY; Essex Co. (Whiteface Mountain), NY; Jefferson County, NY; Syracuse Area, NY; and Rochester, NY projected to be marginal non-attainment areas.

2014: Attain the new 2006 24-hour $PM_{2.5}$ NAAQS of 35 $\mu g/m^3$ in the New York-N. New Jersey-Long Island, NY-NJ-CT-PA nonattainment area. (Approximate attainment date is March 18, and would incorporate 2011-2013 ambient data).

2016: Attain the 2008 0.075 ppm 8-hour ozone standard in the New York – N. New Jersey – Long Island, NY-NJ-CT; Poughkeepsie, NY; Buffalo – Niagara Falls, NY; and Jamestown, NY projected to be moderate non-attainment areas.

Strategies Under Consideration:

1. NO_x RACT for ICI Boilers - requires implementing control measures for:
   a. Industrial/Commercial/Institutional (ICI) boilers that fire natural gas and/or fuel oil and have heat input values in the range of 10 to 250 million Btu per hour
   b. Combined cycle, cogeneration, and simple cycle combustion turbines.

2. Asphalt Production NO_x Controls

   The Department is proposing to revise its regulations to require NO_x controls consistent with the OTC guidelines for minor hot mix asphalt production plants. In addition to helping to attain the ozone NAAQS, this rule revision will result in a decrease of fine particulate matter

($PM_{2.5}$) formation from the operation of hot mix asphalt production plants during the non-ozone season, thus aiding in attainment of the $PM_{2.5}$ NAAQS.

The addition of hot mix asphalt paving production requirements to current regulations is primarily for the benefit of the various ozone nonattainment areas throughout the state. Because most asphalt paving operations are performed during the summer months, NO_x emissions are more inclined to react with volatile organic compounds (VOCs) in the summer heat to form ground-level ozone. Reducing the NO_x emissions formed largely during the drying process at asphalt production plants will aid in reducing ambient ozone concentrations. This revision to the regulations will also prove important in contributing to the attainment of the revised 2008 8-hour ozone standard.

During paving operations in the cooler months outside of the ozone season, NO_x emissions would be more likely to contribute to ambient particulate levels. These new asphalt paving production requirements are expected to be included in the $PM_{2.5}$ SIP for the downstate nonattainment area as a measure needed to help reach attainment by 2010.

3. Cement Kilns and Glass Manufacturing NO_x RACT - require updated NO_x RACT at portland cement plants, and NO_x RACT at glass manufacturing plants.

4. Adhesives and Sealants

Currently State regulations control VOC emissions from surface coating operations by giving facilities one of two options. One option is to only use coatings which have a threshold on the amount of VOC the coating contains. The second option is to install a system which captures the VOC emissions from the coating process and routes the emissions to a control device (e.g., an incinerator which reduces the amount of VOC's that are released into the atmosphere by 85 percent).

The Department intends to propose the addition of 40 different types of commercial/industrial adhesives, sealants and primers and would also add the option for facilities using adhesives to route the emissions to a control device in order to achieve 85 percent reduction in VOC emissions. It would also limit availability of these adhesives, sealants, and primers on the retail market to those meeting the VOC content limits in the table.

It is estimated that enacting these amendments to include the commercial/industrial use of adhesives and sealants will result in a 64 percent reduction in the emissions of VOC from the facilities that use

adhesives. In New York State, that will result in approximately 27,990 tons of VOC emission reductions.

5. Consumer Products

   a. Incorporate 11 new categories along with their respective VOC limits for the following: adhesive remover (including subcategories), anti-static (non-aerosol), electrical cleaner, electronic cleaner, fabric refresher, footwear or leather care, graffiti remover, hair styling products, shaving gel (the first tier VOC limit of seven percent), toilet/urinal care, and wood cleaner. The Department is not adopting the categories anti-static (aerosol) and the second tier Shaving Gel (VOC limit of four percent).
   b. Revise the existing VOC limit for the contact adhesive product category and to include additional requirements for two previously regulated product categories: air fresheners and general purpose degreasers.
   c. Prohibit the use of three Toxic Air Contaminants (TACs), methylene chloride (MeCL), perchloroethylene (Perc), and trichloroethylene (TCE) in seven categories in the revised consumer products rule. The seven categories are as follows: 1) adhesive removers (including subcategories: floor or wall covering, gasket or thread locking, general purpose, and specialty), 2) contact adhesive, 3) electrical cleaners, 4) electronic cleaners, 5) footwear or leather products, 6) general purpose cleaners, and 7) graffiti removers. This prohibition will not apply to electrical cleaner products (energized electrical cleaner) used exclusively for cleaning energized equipment because of a safety issue if the TACs were banned from the category energized electrical cleaner.
   d. Prohibit para-dichlorobenzene (PDCB), which is a chlorinated benzene compound, in the categories solid air fresheners and toilet/urinal care products.
   e. Modify several existing definitions by expanding some of the product category definitions (for example: hair spray and hair styling product) to include additional products.
   f. Exclude certain product definitions because those products have been included in their own separate category (for example: some solid air fresheners are now under the definition of toilet/urinal care product).
   g. Modify the existing definition of “deodorant” and to propose a new definition for “deodorant body spray.” The revised definition of “deodorant” states that a deodorant is any product manufactured on or after January 1, 2009 that states on the product’s container or packaging that it can be used on or applied to the human axilla to provide a scent and/or minimize odor. The new definition for “deodorant body spray” states that a product that falls under this category that was manufactured before January 1, 2009 and on or after January 1, 2009 with 20 percent or less fragrance would be a “personal fragrance product.” A product manufactured on or after January 1, 2009 that falls under the category “deodorant body spray,” is a “deodorant” if the product’s container or

packaging states that the product can be used on or applied to the human axilla.

6. Portable Fuel Containers
    a. Propose revisions that are consistent with the Federal Rule, 40 CFR Part 59.600 – 59.699, which will become effective January 1, 2009
    b. The proposed revisions reduce the maximum emission rate to 0.3 grams per gallon per day and allows more flexibility in the design of the PFC.

7. Graphic Arts VOC RACT - The revisions now being proposed are based on the September 2006 CTGs and primarily involve the expansion of the regulation's applicability criteria and the imposition of more stringent control requirements that apply to facilities engaged in rotogravure, flexographic, offset lithographic printing, and letterpress printing.

8. CAIR (adopted)

9. Asphalt Paving - revise the restrictions on the use of cutback asphalt products and establish a limit on the VOC content of asphalt paving for all classifications of asphalt. The reduction is consistent with a regional effort to reduce VOC emissions from asphalt paving, agreed upon through the Ozone Transport Commission (OTC).

10. Distributed Generation
    a. Establish NO_x emission limits for new and existing distributed generation (DG) sources, especially those sources not subject to Subpart 227-2.
    b. Emissions testing and record keeping requirements will be proposed.
    c. Limits on the number of existing DG sources that may be considered demand response sources will be proposed.

11. Stationary Combustion Installations - sources with potential direct PM2.5 emissions greater than 100tpy would be required to perform a case-by-case RACT analysis to determine the appropriateness of controls.

12. New Source Review (no additional information available at this time).

The Department modified its regulations to comply with the 2002 Federal New Source Review (NSR) Rule as amended on December 21, 2007 and to correct deficiencies that EPA identified in regards to New York's existing Nonattainment New Source Review (NNSR) regulation. The 2002 Federal NSR Rule modified both the NNSR and Prevention of Significant Deterioration (PSD) regulations at 40 CFR 51.165 and 52.21, respectively, and requires states with State Implementation Plan (SIP) approved NSR programs to revise their regulations in accordance with the 2002 Federal NSR Rule and submit the revisions to EPA for approval into the SIP. The Department's existing NNSR program at

Part 231 is subject to this requirement. Another purpose of the recent rulemaking was to adopt a State PSD program for proposed new major facilities and major modifications to existing facilities located in attainment areas. Part 231 incorporates provisions from the federal PSD regulations in significant part with additional provisions to ensure enforceability of the rule and effective monitoring, recordkeeping and reporting.

The revisions to 6 NYCRR Part 231 were adopted by the Department on January 6, 2008.

13. Develop outdoor wood boiler control measures.

14. Develop open burning control measures.

15. Promote a wood stove change-out program.

Commissioner's Priority: Promote a Toxic-Free Future

- Reduce waste and use of toxics
- Promote green alternatives and technologies
- Enhance public access to information on toxics

Program response/environmental goals:

2014: Achieve a statewide average of 50 percent reduction in emissions of diesel particulate matter, especially polycyclic organic matter (POM) formaldehyde, acetaldehyde, diesel particulate matter, and 1,3-butadiene. This should coincide with the 2014 24-hour $PM_{2.5}$ NAAQS of 35 ug/m^3.

2014: Reduce ambient nickel concentrations associated with the burning of distillate and residual oil in downstate urban areas to coincide with the 2014 24-hour $PM_{2.5}$ NAAQS of 35 ug/m^3 .

2015: Full implementation of 6NYCRR Part 246, Mercury Reduction Program for Coal-fired Electric Utility Steam Generating Units to help achieve regional wide Total Maximum Daily Load (TMDL) projections.

2016 Achieve a 75 percent reduction in benzene emissions statewide, equating to an overall statewide average monitored level of 0.2 ug/m^3. This should coincide with the 2016 8-hour ozone standard of 0.075 ppm for moderate non-attainment areas.

Strategies Under Consideration:

1. Expand the reformulated gasoline (RFG) program to marginal ozone nonattainment areas.
2. Require the use of stage II gasoline dispensing devices state-wide/Use of enhanced Stage II compatible with ORVR.
3. Promulgate regulatory changes to diesel and gasoline fuel composition (e.g., such as reducing sulfur, benzene or other aromatic chemical compounds) regionwide.
4. Explore the introduction of lower benzene and nickel concentration fuel alternatives to residential and commercial fuel firing (includes OWBs and other wood-burning technologies).
5. Reduce VMT.
6. Explore alternative non-petroleum vehicle fuels that are less polluting than current gasoline and diesel fuels.
7. Identify geographical "low impact zones" where critical loads exceedences can be addressed most readily
8. Develop TMDLs for mercury and other toxics.
9. DERA

Commissioner's Priority: Safeguard New York's Unique Natural Assets

- Conserve, protect and restore watersheds and coastal resources
- Protect biodiversity and unique ecosystems across New York

Air Program Response/Environmental Goals:

2018: Make progress toward achieving critical loads at all areas that currently exceed critical loads for deposition of sulfur, nitrogen, and mercury.

Strategies Under Consideration:

1. Identify geographical "low impact zones" where critical loads exceedences can be addressed most readily
2. TMDL's (Mercury, toxics, etc.)
3. CAIR (adopted)

<u>Commissioner's Priority</u>: Connect New Yorkers to Nature

- Preserve and provide access to green space close to where people live, work and play

<u>Air Program Response/Environmental Goals</u>:

2013: Promulgate and fully implement a Best Available Retrofit Technology (BART) regulation that addresses haze and other pollution for older stationary sources.

2018: Meet regional haze reasonable progress goals as established through MANE-VU under the Clean Air Act.

<u>Strategies Under Consideration:</u>

1. Best Available Retrofit Technology (BART) - Establish protocols for the implementation of pollution control technologies on older non-electric generating units.

2. CAIR (adopted)

3. Low sulfur fuel adoption consistent with MANE-VU statements and goals.

7.0 Energy Issues, Renewable Energy, Energy Efficiency

Oil, gas and solution salt mining wells are economically important in New York State with more than 75,000 wells drilled in the state since the late 1800's; about 14,000 of these are still active and new drilling continues. Extraction of oil and gas contributes half a billion dollars to the state's economy each year. Wells are also drilled in New York for underground gas storage, geothermal heating/cooling, stratigraphic exploration and brine disposal.

The Department's Division of Mineral Resources administers regulations and a permitting program to mitigate to the greatest extent possible any potential environmental impact of drilling and well operation. The Division strives to work cooperatively with all customers and stakeholders to achieve the mission of ensuring the environmentally sound, economic development of New York's non-renewable energy and mineral resources for the benefit of current and future generations.

By embracing renewable energy along with energy conservation practices, New Yorkers can significantly reduce dependency on foreign oil, create jobs, ensure a reliable energy supply, reduce air pollution and cut greenhouse gas emissions. New York State has great potential to generate power from renewable sources such as the sun, wind, water, and biomass (plant material and waste).

The 2002 New York State Energy Plan placed a priority on increased energy diversity and use of renewable energy sources. In 2004, New York State implemented a Renewable Portfolio Standard to promote the research, development and use of alternative energy. Under the current standard, the goal is to increase the proportion of renewable electricity used by New Yorkers from the 2004 baseline of 19.3% to at least 25% by the year 2013. Renewable energy sources include wind, hydroelectric, solar and biofuels.

Wind energy development is an important component of New York's clean renewable energy initiative as well as the state's ability to achieve the Renewable Portfolio Standard of 25% of energy to be produced from renewable sources by the year 2013.

In January 2009, Governor Paterson proposed increasing the Renewable Portfolio Standard from 25 percent to 30 percent and set a goal of decreasing electricity usage by 15 percent from forecasted levels by 2015.

8.0 Ecosystem Health

In the early 1970's, acid deposition was identified as a serious ecological threat to New York State's waters and forests. The primary emissions responsible for acid deposition are sulfur dioxide (SO_2) and oxides of nitrogen (NO_x) from the combustion of fossil fuels which are transformed and transported downwind before they are deposited. Acid deposition is of particular concern to New York State because of important and sensitive ecosystems which lie immediately downwind of the largest mid-western utilities burning fossil fuels and emitting SO_2 and NO_x emissions in North America.

An ecosystem is considered sensitive to acid deposition when it lacks adequate soil buffering capacity to counter the acids deposited to it. While many areas of New York State are not sensitive to acidity because of limestone deposits or soils which neutralize the acid, the Adirondacks, Catskills, Hudson Highlands, Rensselaer Plateau and parts of Long Island are particularly sensitive to acid deposition. The soil and bedrock in these areas are not able to counteract the acid in the rain and snow.

In the Adirondack region, acidic deposition has affected hundreds of lakes and thousands of miles of headwater streams. The diversity of life in these acidic waters has been greatly reduced. Fish populations have been lost, and loons and otters have moved to other lakes where they can find food. Acid rain weakens the trees and causes them to be more susceptible to pest and disease. Some of our Adirondack Mountain tops are void of trees partly because of the exposure to lower pH from acid precipitation and clouds.

Acid deposition also damages building materials by eroding the ornamental facades, statuary and other vulnerable edifices that are an important part of our heritage. In addition to being the main ingredient in acid rain formation, SO_2 also leads to sulfate formation; acidic particles that can cause respiratory problems in humans.

9.0 Human Health Impacts

Environmental Public Health Tracking (EPHT) focuses on our ability to learn more about important patterns and trends in environmental health. By reviewing how hazards, exposures, and diseases change over time or across regions of the state, questions can be generated about whether those trends are meaningful. These questions, or their answers, may direct future research, public health interventions, or other activities that might prevent or control environmentally related health problems. Exploring these trends also might help us to improve the types of data collected, how data are managed and how we share data with other agencies and data users.

Both the New York State Department of Health (NYSDOH) and the Department are responsible for managing and developing environmental and public health information systems. NYSDOH is building a surveillance system that will provide data about environmental hazards, exposures and health effects throughout New York State over time. Methods are being developed that can be used to automate the secure exchange of data. The surveillance system will be used to examine environmental and health data sets and to identify unusual geographic patterns and time trends.

NYSDOH is conducting several projects that test our ability to link environmental and health data sets and to identify unusual geographic patterns, clusters, or trends over time. Some of these projects were designed to help address an important State Health Department goal: enhancing our capability to track the public health significance of environmental exposures (air pollution and drinking water contaminants) to children. With these projects, we hope to learn more about how to link environmental and health data to explore possible relationships between environmental hazards and health effects. What we learn will help to improve our ability to track other environmental exposures and possibly related health outcomes, and will also prompt additional investigations to explore the findings in more detail.

One part of the “Asthma and Air Quality” project explores trends for measured and estimated levels of air pollutants within air quality regions of NY State and childhood hospitalizations for asthma. The project also includes a series of epidemiological investigations examining the relationship between air pollution and asthma and other respiratory diseases. The investigations use different measures of air quality, such as 8-hour daily maximum ozone levels or daily average levels of small particulate matter. One investigation is examining the daily childhood hospital admissions in New York State and ozone levels for 1991-2001. Another investigation focuses on the chronic effects of ozone on the first hospital admission for respiratory disease for children born in New York State from 1995 through 1998. The studies use analytic and statistical methods that can take into account other factors, such as seasonal patterns, meteorological conditions, population density, or lag time between exposure and effect.

The October 2007 "New York State Asthma Surveillance Summary Report" concludes that in 2005, asthma affected over 1.1 million New York State (NYS) adults and 370,000 children. During 2003-2005, an average of 300 deaths per year occurred due to asthma in NYS, which was lower compared to 2001-2003. This represented an age-adjusted rate of 15 deaths per one million residents. There was an average of approximately 42,400 asthma hospitalizations for NYS residents in 2003-2005, for an age related rate of 22 per 10,000 residents. This represents a 3 to 7 percent reduction compared to the 1999-2001 period. During 2003-2005, an average of 14,700 asthma hospitalizations were for NYS children between the ages of 0 to 14 years; the crude rate was 39 per 10,000 residents. Medicaid enrollees accounted for 45% and Medicare enrollees an additional 20% of all asthma hospitalizations.

The "Air Quality and Birth Outcomes" project is a series of epidemiological investigations of the relationship between air pollution and reproductive outcomes conducted in conjunction with the University at Albany School of Public Health. In one investigation, birth weight and prematurity among infants born in New York State between 1995 and 2001 are being examined in relation to levels of ozone and particulate matter of less than 10 microns. The study methods take into account other maternal factors that have been reported to be associated with low birth weight or prematurity, such as early prenatal care. Another investigation will focus on infant mortality and air pollution.

NYSDOH is also working with the US Centers of Disease Control and Prevention and EPA, as well as Maine and Wisconsin, on an EPHT project called PHASE (Public Health Air Surveillance Evaluation). Different approaches to characterizing air quality are being evaluated for how well they allow researchers to estimate individual exposures to ozone or particulate matter less then 2.5 microns. Each of the air quality characterizations have been temporally and spatially linked with hospitalization data for asthma and myocardial infarction, which is one form of cardiovascular disease, to better understand their strengths and limitations. Of particular interest is the usefulness of each method for conducting routine surveillance and epidemiological analyses. More in-depth investigation is planned for the relationship between air quality and hospitalization for myocardial infarction.

EPHT is a multidisciplinary partnership program. Teams have been formed that include epidemiologists, toxicologists, information technology specialists, environmental scientists, statisticians, educators, and others from NYSDOH, the Department, and the University at Albany's School of Public Health. CDC and other federal agencies such as the EPA are providing data, technical guidance, and assistance. These partnerships are key to the success of the EPHT program.

A number of key people are also participating in a planning consortium that provides advice and recommendations about the design and execution of the

EPHT program. This consortium includes individuals representing community and advocacy groups, as well as academics, and professionals with a wide range of experience and expertise. It has provided input on many of the technical aspects of the program. Members also provide advice on strategies for outreach and communication. (Source: http://www.health.state.ny.us/statistics/environmental/public_health_tracking/epht.htm)

10.0 Environmental Justice

Environmental justice is defined as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income when developing, implementing and enforcing environmental laws, regulations and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear more than its share of negative environmental impacts.

Environmental Justice issues concern the potential for higher environmental exposures and related human health problems in lower income and minority communities. These focus on quality-of-life issues such as pollution from clustered industrial facilities, traffic, landfills, transfer stations, and lack of open space and waterfront access. The rates of some diseases and health conditions are also higher in low-income and minority communities, which can be subject to other factors that can affect health, such as poor housing conditions and limited access to doctors and health clinics. Growing evidence suggests that environmental factors can influence certain diseases, such as asthma.

The Department established its Environmental Justice Program in 1999, to address the environmental concerns of low-income and minority communities. In 2003, the Department released its Environmental Justice Policy. One of its key objectives is to promote more involvement of low-income and minority communities in the Departments permitting and project review processes.

Governor Paterson's Environmental Justice Interagency Task Force was created in June 2008 and the First Agency meeting was held on June 6, 2008. The first Stakeholder's meeting was held July 9, 2008. Five Working Groups, including an Air Quality Workgroup, have been created to discuss general statewide topics of concern and agency specific Environmental Justice issues and recommendations.

In September 2008, the Air Quality Workgroup produced a list of public comments and recommendations that, among other things, specifically related to Air Quality, Global Warming and Energy. They are:

Air Quality

1. State Implementation Plan

   a. The state should consider developing a State Implementation Plan for air toxics (hazardous air pollutants).

   b. The state should look at the effects of criteria pollutants (i.e., carbon dioxides, nitrogen oxides, sulfur oxides, and particulate matter) aggregately, as opposed to individually. Each year the state should

focus on a polluter category (e.g., specific industry or harbor traffic) and mandate a reduction in emissions with the goal of zero impact to EJ communities.

2. Consolidate the review and development of National Ambient Air Quality Standards for criteria pollutants, as opposed to current system where standards are created separately for each criteria pollutant.

3. Major roadway expansion projects should include the impacts of existing facilities and mobile source contributions to air quality (e.g., widening of the Major Deegan Expressway).

4. Address noise pollution in EJ communities. There should be more enforcement of noise regulations in residential areas addressing noise from commercial vehicle use of loud air brakes, engines and horns.

5. Critical thresholds should be set for communities within an airshed that violates air quality standards. As a result tougher SIP requirements and tougher facility requirements should be put in place wherever critical thresholds have been set. Set critical thresholds for facilities when agencies are assessing the environmental significance of a facility application as required under the State Environmental Quality Review Act (SEQR). These thresholds should be implemented in areas of the state that are in non-attainment status for National Ambient Air Quality Standards (NAAQS). Minor projects, such as distributed diesel generators designed to provide power during peak periods and outages, also should be included.

6. Reduce current levels of air pollution in Environmental Justice (EJ) communities and ensure that these communities not be overburden by siting of new facilities or by increased releases from existing sources (e.g., increase mobile sources). Require new facilities in the EJ communities to demonstrate in the EIS application that they are not contributing to the air and noise quality problem. Additionally, these facilities should also be required to show what steps they are taking, to constantly upgrade their facilities as new emission control technologies or methods are introduced in the market.

7. Mobile sources summary of recommendations:

   a. Develop and/or locate better emission control strategies

   b. Provide funds earmarked for retrofitting vehicles with emission control devices and job training on retrofitting for EJ community members (NYSDOL's model of "pathways out of poverty")

   c. Require all public and private diesel vehicle fleets to be retrofitted with pollution reduction equipment (e.g., diesel catalyst).

   d. Consider removal of buses and trucks at a designated mileage threshold and mandatory pollution controls on older vehicles.

   e. When diesel engines are rebuilt, consider requiring pollution control devices.

   f. The priority for retrofitting of diesel vehicles should occur for trucks traveling in or through EJ communities and vessels and boats navigating in waters adjacent to EJ communities. A similar type program should be developed for businesses and the program should prioritize emission reduction strategies for businesses in EJ communities.

   g. Evaluate shipping and receiving transportation and other harbor activities in EJ communities and develop strategies for reducing truck traffic in these areas. In particular, the increase in harbor traffic along the North Shore of Staten Island and corresponding increase in truck traffic should be evaluated and emission impacts should be reduced. All harbor traffic, regardless of vessel size, should be regulated. To reduce emissions from idling diesel engines, energy alternatives should be identified for docked boats.

   h. An agreement should be made between US and all foreign countries that would require shipping vessels from other countries to comply with US emission reduction strategies if they desire to participate in US commerce. These non-US owned

vessels may be the largest contributor to harbor pollution.

i. Fines levied on harbor pollution should be set aside for funding alternate clean energy sources for fueling vessel. Additionally some of this money should be earmarked for providing affordable devices to small and medium size businesses engaged in harbor transport. The goal of the program would be to increase the number of vessels and boats retrofitted with emission control strategies. This program could be extended to foreign vessels on the condition the retrofit takes place in US and US certification and emission inspection is conducted.

j. Outdated vessels and boats that can not be retrofitted should be removed from service and recycled for other uses.

k. For emission source inventory purposes, bus depots and other similar sources where mobile sources congregate (e.g., airports, marine ports, cement companies, road salt companies, sewer treatment plants, waste transfer stations,
boat dry docks) should be treated as stationary sources, since the congregation of many mobile sources creates what might be considered a large point source release.

l. Enforce New York State's anti-idling law in EJ communities. The anti-idling law should be extended other forms of transportation such as airplanes waiting for extended periods on runways and vessels and boats.

m. Promote rideshare programs and mass transit alternatives. Create incentives to promote these efforts.

8. When funds are collected due to enforcement activities, strategies should be developed that require the spending of the money in the area where the offense occurred and spending should target pollution reduction strategies.

9. The Department should take a more proactive role in pollution control strategies and investigate strategies implemented in other areas of the country and other countries.

10. Develop an emission inventory of smaller sources (i.e., area sources).

11. Recommend evaluating minimally regulated activities in rural areas (e.g., the increased use of outdoor wood boilers residential and school setting and increased use of wood for heating)

12. Conduct air quality monitoring, with monitors placed at breathing height, around facilities that are problem polluters.

13. Research new technologies that result in low pollutant emissions from the use of energy sources.

14. Protection of an individual's right to conduct their own air quality monitoring for example by using 'bucket' sampling as promoted by the Bucket Brigade.

15. Develop public service announcements promoting behavioral changes that lead to a reduction in air quality impacts (such as using mass transit or ride sharing, reducing appliance use during peak electrical demand periods)

Global Warming and Energy Strategies

1. Evaluate how carbon reduction strategies will disproportionately impact EJ communities and consider programs to alleviate additional burden (e.g., increase in fuel costs) to these communities.

2. Funds collected from the Regional Greenhouse Gas Initiative should be used to conduct air monitoring in EJ communities, additional compliance activities in EJ communities and to mitigate high energy costs for the poor.

3. Develop an advisory board to assist permit applicants on how they could improve their application to make it more environmentally beneficial ('greener').

4. Modernize the energy infrastructure to allow transmission of renewable source energy (e.g., energy derived from wind farms) from rural locations to urban areas.

5. Create incentives to site clean energy in the New York metropolitan area. Develop programs that promote creation of energy by small businesses and that would allow them to be small generators to a limited extent, in particular during peak electrical demand periods.

6. Recommendation was made to support efforts to reduce urban island heat effect.

The Division of Air Resources is currently developing a responsiveness summary to the public comments and recommendations. Updates can be found at http://www.dec.ny.gov/public/47153.html .

Furthermore, NYSDOH has been participating on the Environmental Justice Program's Health Outcome Data Work Group, which identified reliable sources of health data and ways that the Department could use these data in the permitting and project review process. The Health Outcome Data Work Group's Report recommends identifying data for diseases and health conditions of concern in low-income and minority communities, such as asthma hospitalizations and percentage of infants born with low birth weight.

The Work Group Report further recommends that health data be considered by the Department along with other factors when reviewing a permit for a facility that falls under the policy and would affect a low income or minority community.

NYSDOH is working with the Department to implement the report recommendations and on other projects to address environmental justice issues.

11.0 Current Process for Implementing Air Quality Management

The process for promulgating regulations in New York State is governed by the State Administrative Procedure Act (SAPA), some specific statutory requirements, and by Executive Order #20, which requires review of proposed and revised rules by the Governor's Office of Regulatory Reform (GORR). The Department must file all regulations through the Department of State (DOS) prior to adoption. DOS is responsible for public notice of all proposed regulations in the weekly State Register, which contains notices of newly proposed rules and proposed revisions to existing rules, and later provides notice that a new or amended rule has been adopted.

The rulemaking process begins with approval from the executive office. A Rulemaking Initiation Memorandum (RIM) discusses the relevant issue, a discussion of the need for a regulatory response, and the Departments proposed action. Once the RIM has been approved by the Department's Commissioner, a scoping meeting is held with appropriate members of the Department and GORR in order to inform all involved parties of the proposed rule.

At this time, rule writing begins by drafting the actual written text, or Express Terms, of the new or revised rule. This represents what is eventually published under Title 6 of the New York Codes, Rules and Regulations (6 NYCRR). A number of support documents are drafted in conjunction with the Express Terms, to be submitted to GORR for review and approval. These documents, the contents of which are regulated by SAPA, include:

- Regulatory Impact Statement (RIS) – A general overview of the regulation detailing, among other things, the statutory authority, need for and justification of the proposal, expected cost and recordkeeping/reporting impacts, and compliance schedule.

- Regulatory Flexibility Analysis for Small Businesses and Local Governments (RFA) – Consideration of, and steps taken by the Department to minimize any negative impacts on small businesses (independently owned businesses wholly within New York State of 100 employees or fewer) or local governments. This includes an explanation of what opportunities were provided to these entities to participate in the rulemaking process.

- Rural Area Flexibility Analysis (RAFA) – Defined as counties with populations of fewer than 200,000 people and towns in non-rural counties where population density is less than 150 people per square mile, this must state any impacts or requirements imposed upon rural areas. This must also express opportunities provided for rural citizens, businesses or organizations to participate in the rulemaking.

- Job Impact Statement (JIS) – Necessary for all regulations affecting 100 or more jobs and employment opportunities, this document details the number and categories of jobs affected, regions of the state suffering a disproportionate impact, and measures taken to minimize any impact on jobs and employment opportunities.

Also drafted at this time are three documents required under the State Environmental Quality Review Act. These SEQR forms are submitted with the above support documents for review and approval by GORR:

- Environmental Assessment Form (EAF) – A description of the proposed rule and evaluation of any land use and other short-term, long-term, or cumulative environmental impacts.

- Coastal Assessment Form (CAF) – An analysis of what affects the rulemaking may have on the land or waters of New York State's coastal areas.

- Determination of Significance – Submitted in the form of a Negative Declaration when no significant adverse environmental impacts are expected, or a Positive Declaration, when there is evidence that some harmful impacts may occur.

Once the above documents have been approved by GORR, a public hearing is to be held in order to provide an opportunity for the public to express concerns over the rulemaking. A Notice of Public Hearing must be published in the Environmental Notice Bulletin 30 days prior to the hearing. Such notice many also be published in newspapers local to the regulation's affected area. Public comments are gathered during the hearing and for a minimum of 5 days afterwards.

Once all comments have been received, the regulation and SAPA/SEQR documents are revised as needed, and a meeting is scheduled with the Environmental Board. Under the Environmental Conservation Law (ECL), approval must be granted by the Environmental Board for all regulations that establish environmental standards or criteria. After a technical briefing and presentation to the Environmental Board, approval is granted, and the regulation can be finalized. Internal approval from the Commissioner is granted through the signing of a Certificate of Adoption. A Notice of Adoption is published in the State Register, and the regulation becomes effective 30 days after filing with DOS.

12.0 Stakeholders

- All Residents of New York State
- All Businesses in New York State

- New York State Department of Environmental Conservation
  - Division of Air Resources
  - Climate Change Office
  - Division Of Solid and Hazardous Waste
  - Division of Water
  - Division of Lands and Forests

- Other New York State Departments
  - Transportation
  - Health
  - Agriculture and Markets
  - Public Service
  - Energy Research and Development Authority
  - Adirondack Park Agency
  - New York Power Authority (NYPA)
  - Long Island Power Authority (LIPA)

- Local Governments
  - County
  - City

Metropolitan Planning Organizations

13.0 Other Planning Efforts

13.1 PlaNYC

PlaNYC is a compilation of initiatives intended to make the City of New York "the model for cities in the 21st Century." PlaNYC is a holistic vision that focuses on five key elements of the city's environment – land air, water, energy and transportation recognizing that choices in one area have unavoidable impacts on the other areas. The air quality goal of PlaNYC is to "achieve the cleanest air quality of any big U. S. city." We laud the City of New York for this ambitious goal and will partner with the City to help it achieve this goal. While much of PlaNYC has an outlook beyond the attainment date of this plan (2012) and is focused on pollutants that are not causing ozone, many initiatives within PlaNYC will help reduce emissions of NO_x and VOCs in time to assist with the 2012 attainment of the ozone NAAQS. It should be noted that the Department is not committing to adopting any of these measures as part of the SIP, but is instead providing these programs as information to further its weight-of-evidence demonstration. If the Department chooses to include these measures in a future SIP revision, it will first evaluate each measure resulting from this initiative individually to determine if it is appropriate to be included in the SIP. The Department will need to consider among other things whether the measure is quantifiable, enforceable, and include emissions reductions that are additional to other adopted SIP measures.

The PlaNYC measures include:

- Improving the fuel efficiency of private cars by waiving New York City's sales tax on the cleanest, most efficient vehicles and working with the Metropolitan Transportation agency (MTA), the Port Authority, and the New York State Department of Transportation (NYSDOT) to promote hybrid and other clean vehicles. Pilot new technologies and fuels, including hydrogen and plug-in hybrid vehicles.

- Reducing emissions from taxis and other for-hire vehicles by reducing idling and increasing fleet efficiency. This will be accomplished by working with the Taxi and Limousine Commission, the industry and other stakeholders.

- Retrofit ferries and mandate the use of cleaner fuels. Retrofit the Staten Island Ferry fleet to reduce emissions. Work with private ferries to reduce their emissions.

- Replace, retrofit and refuel diesel trucks. Introduce biodiesel into the City's truck fleet, go beyond compliance with local laws, and further reduce emissions. Accelerate emissions reductions of private fleets through existing Congestion Mitigation and Air Quality (CMAQ) programs. Work with stakeholders and the State to create incentives for the adoption of vehicle emission control and efficiency strategies.

- Improve compliance of existing anti-idling laws through targeted educational campaign.

- Reduce emissions from buildings by improving energy efficiency, decreasing fuel consumption, promoting the use of cleaner burning heating fuels, and facilitating the repowering, replacement and retirement of out-of-date equipment at older power plants.

- Implement more efficient construction management practices. Accelerate adoption of technologies to reduce construction related emissions.

- Partner with Port Authority to reduce emissions from port marine vehicles, port facilities and airports.

- Reduce emissions from boilers in 100 city public schools.

- Reforest 2,000 acres of parkland. Increase tree planting on lots. Through MillionTreesNYC, plant and care for one million new trees across the City's five boroughs over the next decade.

With approval from the City of New York, the Department plans to include PlaNYC in the air quality management plan as an appendix.

13.2 Governor Paterson's "45 by 15" Initiative

On January 7, 2009, Governor Paterson announced one of the most ambitious clean energy goals in America. By 2015, New York will meet 45 percent of its electricity needs through improved energy efficiency and clean renewable energy. We call this our "45 by 15" program. The Department is not committing to the inclusion of any of these measures as part of the SIP at this time. The Department will evaluate each measure resulting from this initiative individually to determine if it is appropriate to be included in the SIP. The Department will need to consider among other things whether the measure is quantifiable, enforceable, and include emissions reductions that are additional to other adopted SIP measures.

14.0 Regional and neighboring state issues

[Reserved]

15.0 NESCAUM PROJECT OVERVIEW

NESCAUM and the Department are working collaboratively to develop and use analytical tools and to identify potential policy barriers to undertaking multi-pollutant planning.

The NESCAUM project will tailor and iteratively improve the inputs to the Multi-pollutant Policy Analysis Framework (MPAF), a regional scale integrated framework developed by NESCAUM. The improved framework will enable policy analysts at the Department to perform multi-pollutant assessments of various potential control strategies to simultaneously address multiple climate and air quality goals.

The framework integrates and makes use of several energy, economic, and air quality tools and databases, including: the Market Allocation (MARKAL), NE-MARKAL; Regional Economic Model, Inc (REMI); Sparse Matrix Operator Kernel Emissions (SMOKE) Modeling System; Community Multi-scale Air Quality (CMAQ) model; and the Environmental Benefits Mapping and Analysis (BenMAP) program.

15.1 MAJOR TASKS

15.1.1 Integrate key regional public health, environmental, and economic targets for air quality and climate goals.

Traditionally, New York has responded to air quality and climate concerns on a pollutant or program specific basis. New York recognizes the importance of moving to a more integrated, multi-pollutant approach.

The Department reviewed pending Clean Air Act requirements, state and regional environmental goals and targets, and major NYS energy efficiency (EE) and renewable energy (RE) policy initiatives affecting emissions. The targets include New York's State Implementation Plan (SIP) requirements for attaining the ozone and $PM_{2.5}$ NAAQS; climate action plans; regional haze reasonable progress goals; and critical loads for sensitive ecosystems for mercury and acid deposition. To date, emission reduction targets have been identified that will be used as indicators for a broad range of air quality goals. The goals, which have been identified earlier in this conceptual model, will be represented in the analytic framework as a set of emission constraints that evolve over time to achieve the approximate reductions in NO_x, SO_2, Hg, CO_2, and primary fine particulate ($PM_{2.5}$) emissions needed to achieve the state's climate and air

quality goals. This set of constraints must also conform to existing state and federal requirements and deadlines.

15.1.2 Identify key regional strategies for achieving air and climate program goals.

The Department has identified and prioritized a comprehensive list of regional and New York-specific policy approaches and control strategies to achieve the environmental goals described above. The model will only be able to identify appropriate solutions and options to achieve environmental goals to the extent that these opportunities are represented accurately in the model. The goal of this exercise has been to identify the multitude of policy approaches that are feasible for New York so that they can be incorporated into the model structure.

15.1.3 Represent goals and strategies in the regional Multi-pollutant Policy Analysis Framework (MPAF) modeling system.

NESCAUM and the Department are working together to identify appropriate data. NESCAUM will then refine and constrain the modeling framework so that it characterizes technology options, costs, and associated emissions in a manner that enables various policy options and solutions to be identified by the NE-MARKAL model. All targets and programmatic conditions will be translated into a set of input constraints for the NE-MARKAL model, a key input for scenario analysis.

NESCAUM will then translate the strategies and approaches into appropriate representations within the NE-MARKAL model. This will allow us to tailor and improve a set of reference scenario assumptions that will serve as an appropriate basis for policy analysis of control scenarios. The outcome of this exercise will be a reference scenario that accurately reflects a plausible future for New York and the region (N.B.: This differs significantly from a forecast. The objective of this exercise is to enable policy analysis, not to forecast actual energy usage).

15.1.4 Analyze solutions, trade-offs, and cross-sector interactions

NESCAUM will conduct a series of scenario analyses using the program options and strategies introduced to the NE-MARKAL model. The results of these analyses will inform clean air and energy policy decisions in New York State. MPAF will generate least-cost solutions that achieve multi-pollutant targets as well as their environmental, public health, and welfare impacts. The

analysis will provide for a better understanding of potential trade-offs between strategies (e.g., greater penetration of diesel technologies may benefit climate at the expense of $PM_{2.5}$, or may satisfy both at greater expense). It is critically important that NESCAUM and the Department work closely together as we run policy scenarios and refine input assumptions to more accurately reflect interaction between programs to ensure realistic model response.

Several emissions projection scenarios will then be mapped from the NE-MARKAL model into the air quality modeling and public health assessment frameworks (i.e., CMAQ and BenMAP) in order to estimate environmental and public health benefits. Investment patterns and fuel expenditures will be mapped from the NE-MARKAL model into a regional economic model (i.e., REMI™) to project economic impacts.

15.2 Technical Approach

A key tool for this project is the NE-MARKAL model. With it, we will conduct scenario analyses to reconcile the multiple strategies identified in section 3 with each other, taking into consideration cross-pollutant and cross-sectoral interactions and tradeoffs. This 12-state, regionally-representative, least-cost optimized linear programming model is designed to identify the least expensive technology evolution that satisfies the multiple policy and environmental constraints that are placed on the system. The model will be constrained according to the environmental targets from and by the technology options that are made available to the model, a priori. Our goal, therefore, is to ensure that *all* technology options that could potentially play a role in achieving any of the strategies is well characterized and available to the model. The model will then be able to select from those options in order to create a future energy system for the Department that satisfies the projected demand. Department staff will review the results and identify major sensitivities of the system, and make changes accordingly (i.e., to reflect political reality).

Once a reasonable alternative future technology evolution is identified through NE-MARKAL, the resulting projections of emissions and costs (or savings) will be mapped into emissions pre-processing software (SMOKE) and a regional economic model (REMI™) for further analyses. Processed emissions data will allow for regional air quality simulations and the mapped economic inputs will allow for a broader macroeconomic analysis of the changes in energy-sector investments and potential fuel savings.

15.3 PROPOSED SCENARIO ANALYSES FOR THE PROJECT

Given that the framework assesses all strategies simultaneously, the analytical goal is to identify and probe the key factors to which the optimization is most sensitive. Creating scenarios around these key factors will provide the greatest insight into the implications of alternative projections and will serve decision-makers as they consider policy recommendations in the face of uncertainty. For example, cost of fuel and rate of technology development are obviously key factors that will have a huge impact on the feasibility of various strategies that are described earlier. An additional factor that is likely to drive the choice of control measure in this analysis is the level of desired greenhouse gas (GHG) reduction. The 30 percent carbon equivalent reduction identified for 2030 is very likely to be the binding constraint on the system that will drive technological change the most. We therefore recommend at this time that three primary sets of scenarios be constructed. These scenarios will assess the implications of alternative technology deployment relative to an agreed-upon reference scenario that represents the "business as usual" approach to technology evolution. The three scenario groupings are as follows:

1. Moderate technology versus high technology deployment – in this set of scenarios, we would examine the effects that advanced technology deployment will play in enabling a rapid reduction in carbon, criteria pollutant, and toxic emissions at a reasonable cost. A moderate technology case may include advanced technology deployment consistent with past historical practice. A high technology case would include more rapid introduction of key enabling technologies such as Nanosolar® printable solar cells or fuel-cell vehicles powered by hydrogen production facilities utilizing carbon sequestration.

2. Moderate fuel price versus high fuel price – in this set of scenarios, we would look at the price sensitivity of the solutions with respect to the unknown future cost of oil, gas, and coal. It is likely that this scenario would be the driving influence on the previous set of scenarios. We may therefore opt to explore a combined set of "high fuel price/high technology deployment" and "low fuel price/low technology deployment" scenarios.

3. Carbon plus criteria pollutant constrained versus criteria pollutant constrained only – this set of scenarios would examine the extent to which GHG targets alone are driving the degree of technology change and costs. By examining the system with and without the GHG constraint, we will be able to examine the extent to which this factor is the key constraint on the system.

15.4 NEXT STEPS AFTER EMPLOYING MARKAL

Regional Air Quality and CMAQ

Once the data needs have been addressed, the scenarios have been defined, and the simulations conducted, results can then be mapped into the SMOKE emissions processing tool to feed EPA's CMAQ regional air quality model. This step allows for the potential strategies that constitute an air quality management plan to be examined from an environmental perspective. The goal of employing these strategies is to achieve target ambient concentrations of GHGs and criteria air pollutants (e.g., ozone, particulate matter), to achieve nutrient balance for acidifying agents, and to reduce toxic chemicals in the environment. The CMAQ model will be uses as the tool to demonstrate whether the environmental targets would be met, based on the NE-MARKAL projections. While it is recognized that future year ambient air quality monitoring provides the ideal metric, given the scope of this project, success will be defined through a model demonstration that indicates that the environmental goals are achievable.

The initial mapping of various sectors of the NE-MARKAL model by state is important to quality assure the inventory assumptions. NESCAUM does not anticipate being able to simulate 100 percent of New York's emissions inventory, but it is anticipated that energy infrastructure included in the power generation, transportation, industrial, residential and commercial sectors will account for over 90% of many of the key pollutants. For those areas of the emissions inventory that are driven by energy technologies included in the model, there will is a projection tool to examine inventory changes over the coming 30 years.

The U.S. EPA's nine-region MARKAL model (US9r) is currently available and will be used to complement NESCAUM's NE-MARKAL framework for regions outside the geographical domain of the framework, but within the eastern U.S. CMAQ domain.

Simulations based on the reference scenario representations of a future time period (e.g., 2020, or 2029) will each be compared to at least one future policy scenario that represents the implementation of a suite of strategies. If the result of the annual simulation for these future years does not yield the necessary level of environmental protections, some iteration may be required to ensure that the final set of scenarios reflect political realities and achieve the bulk of emissions reductions necessary to meet the environmental targets. It is expected that some additional pollutant-specific strategies will be needed to fully meet the targets.

BenMAP

The ambient concentration data produced by the regional CMAQ platform described above will be used to drive the Environmental Benefits Mapping and Analysis Program (BenMAP), a Windows-based program developed jointly by the U.S. EPA and Abt Associates Inc. (USEPA, 2006b). BenMAP was created to estimate health impacts and associated economic values associated with changes in ambient air pollution. NESCAUM will use outputs from the CMAQ model to create air quality grids to estimate average exposure to particulate matter and ozone of people living in the northeast U.S. Included in the BenMAP package are databases of concentration-response functions and economic valuations of health impacts. By selecting appropriate health endpoints for the Northeast's population considered here and appropriate epidemiological studies (for incidence rates), NESCAUM can estimate improvements in mortality and morbidity for each endpoint by scenario. The health valuation functions available for different health endpoints within the tool will be used to derive a key regional economic feedback, described in the next section.

REMI™

NESCAUM will map the estimated public health benefits developed by BenMAP into the regional economic assessment by associating those benefits with appropriate economic sectors using the 12-state Regional Economic Models, Inc. (REMI™).[1] This model will therefore link to the NE-MARKAL results to generate estimates of economic impacts to the region associated with implementing the various climate and air quality strategies. REMI Policy Insight® is a peer-reviewed model for evaluating the effects of policy initiatives and similar changes on the economies of local regions. NESCAUM will use REMI™ to generate estimates of changes in regional employment, income (i.e., gross state product), and output resulting from policies and/or other changes that we first evaluate using the MARKAL framework. It is important that policymakers are able to consider economic impacts, even when proposed measures have the potential to deliver clear, unequivocal climate and air quality benefits.

[1] The REMI Policy Insight® model is a product developed by Regional Economic Models, Incorporated of Amherst, MA. NESCAUM retains a license to a 12-state version of REMI that depicts the regional economy of the six New England states and the six Mid-Atlantic states.

16.0 CoST PROJECT OVERVIEW

EPA's Health and Environmental Impacts Division (HEID) developed a software tool that can be used to estimate the emission reductions from emission control strategies. The main purpose of the tool is to support national and regional-scale multi-pollutant analyses, such as the National Ambient Air Quality Standards. The software is an engineering cost tool for creating controlled inventories and is not intended to model emissions trading strategies, nor is it an economic impact tool. It will also support multi-pollutant analyses, including criteria pollutants and precursors, HAPs, and climate change gases.

EPA designing CoST to include information that identifies the types of emission sources (e.g., source categories, production equipment) to which each control measure can be applied. Once a control strategy is selected for analysis, a controlled inventory can be generated from this information, which can be input to SMOKE or for other purposes.

The Department, which received the CoST model in September 2009, plans to utilize this software to assess the impact and cost of various control strategy analyses and will allow comparison across multiple pollutants and objectives. This model will be used to complement the NESCAUM project.