GOAL 1
CLEAN AIR AND GLOBAL CLIMATE CHANGE

Protect and improve the air so it is healthy to breathe and risks to human health and the environment are reduced. Reduce greenhouse gas intensity by enhancing partnerships with businesses and other sectors.

Air quality in the United States has steadily improved, according to EPA's annual summary of air quality trends since the 1970s.[1] This trend toward cleaner air has occurred even as our economy has increased by 161 percent in gross domestic product, miles traveled by cars and trucks have increased by 149 percent, and energy consumption has increased by 42 percent. EPA continues to look for progressive solutions to remaining indoor and outdoor air pollution problems, which can cause breathing difficulties, long-term damage to respiratory and reproductive systems, cancer, and premature death.

Air pollution also can affect the environment by reducing visibility; damaging crops, forests, and buildings; acidifying lakes and streams; and stimulating the growth of algae in estuaries and the build-up, or bioaccumulation, of toxics in fish. Bioaccumulation poses particular risks to Native Americans and others who subsist on plants, fish, and game. Certain chemicals emitted into the air diminish the protective ozone layer in the upper atmosphere. Rapid development and urbanization in other countries is creating air pollution that threatens not only those countries but also the United States, since air pollution can travel great distances and across international boundaries.

EPA is addressing this broad range of problems strategically by applying a variety of approaches and appropriate tools. We have found that problems with broad national or global impact—emissions from powerplants and other large sources, pollution from motor vehicles and fuels, and stratospheric ozone depletion—are best handled primarily at the federal level. A national approach allows for the use of traditional regulatory tools where appropriate, and enables us to implement innovative, market-based techniques such as emissions trading, banking, averaging, and other national programs cost-effectively.

States, tribes, and local agencies can best address the regional and local problems that remain after federal measures have been fully applied. EPA works closely with public- and private-sector partners and stakeholders to develop the tools—such as monitoring, modeling, and emission inventories—that allow states, tribes, and localities to address these more localized problems. Many of these tools employ innovative techniques, such as voluntary programs for retrofitting diesel engines or community-based approaches to toxics, that are well-suited to the local nature of these problems.

Ongoing research continues to identify new air pollution issues, in areas from indoor air to radiation. We will work with our local, state, tribal, national, and international partners and stakeholders to achieve results through a suite of innovative approaches and programs that encourage cost-effective technologies and practices.

OBJECTIVES

Objective 1.1: Healthier Outdoor Air. Through 2010, working with partners, protect human health and the environment by attaining and maintaining health-based air-quality standards and reducing the risk from toxic air pollutants.

Sub-objective 1.1.1: More People Breathing Cleaner Air. By 2010, working with partners, improve air quality to healthy levels for 39 percent of the people who live in areas where the air does not meet new national standards for fine particles in 2001 and for 60 percent who live in areas not meeting new national standards for 8-hour ozone in 2001.[2,3] While some areas may not reach attainment of these new standards because of air pollutant concentrations that sometimes exceed the allowable levels, air quality will improve for an additional 27 percent of the people who live in areas not meeting new standards for 8-hour ozone in 2001. Maintain attainment status for the 123.7 million people who had healthy air for the criteria pollutants in 2001.

Strategic Targets:

- By 2010, reduce stationary source emissions of sulfur dioxide by 6.7 million tons from the 2000 level of 11.2 million tons, and by 2008, reduce stationary source emissions of nitrogen oxides by 3 million tons from the 2000 level of 5.1 million tons.[4]

- By 2010, reduce mobile source emissions of nitrogen oxides by 3.4 million tons from the 2000 level of 11.8 million tons; volatile organic compounds by 1.7 million tons from the 2000 level of 7.7 million tons; and fine particles by 122,400 tons from the 2000 level of 510,550 tons.[5]

Sub-objective 1.1.2: Reduced Risk from Toxic Air Pollutants. By 2010, working with partners, reduce air toxics emissions and implement area-specific approaches to reduce the risk to public health and the environment from toxic air pollutants.

Strategic Targets:

- By 2007, through maximum achievable control technology (MACT) standards, reduce air toxics emissions from major stationary sources by 1.7 million tons from the 1993 level of 2.7 million tons.[6]

- By 2010, through the President's Clear Skies legislation, reduce mercury emissions from electric-generating units by 22 tons from the 2000 level of 48 tons.

- By 2010, through federal standards, reduce air toxics emissions from mobile sources by 1.1 million tons from the 1996 level of 2.7 million tons.[7]

- By 2010, all of the 260,000 diesel school buses manufactured between model years 1991 and 2000 will be retrofitted either with better emission controls or equipment allowing use of cleaner fuels, and all 130,000 buses manufactured before 1991 but still in use in 2003 will be replaced.[8]

Means and Strategies for Achieving Objective 1.1

Our strategy for reducing outdoor air pollution combines national and local measures, reflecting different federal, state, tribal, and local government roles. EPA, states, and local agencies work together to meet clean air goals cost-effectively by employing various regulatory, market-based, and voluntary approaches and programs. States are primarily responsible for improving air quality and meeting national ambient air quality standards (NAAQS). States first develop emission inventories, operate and maintain air monitoring networks, and perform air quality modeling. They then develop state implementation plans (SIPs) that lay out the mobile and stationary source control strategies they will employ to improve air quality and meet NAAQS.

EPA assists states by providing technical guidance and financial assistance, issuing regulations, and implementing programs designed to reduce pollution from the most widespread and significant sources of air pollution: mobile sources, such as cars, trucks, buses, and construction equipment; and stationary sources, such as power plants, oil refineries, chemical plants, and dry cleaning operations. Interstate transport of pollutants—a problem no state can solve on its own—makes a major contribution to air pollution problems in the eastern United States. To address this issue, EPA requires control of upwind sources that contribute to downwind problems in other states.

EPA has a trust responsibility to protect air quality in Indian country, but authorized tribes may

choose to develop and implement their own air quality programs. EPA and tribes are working to increase the currently limited information on air quality on tribal lands, build tribal capacity to administer air programs in Indian country, and establish EPA and state mechanisms to work effectively with tribal governments on regulatory development and regional and national policy issues.

Over the next several years, we will focus on implementing the fine particulate and 8-hour ozone standards, reducing emissions from electric-generating units through the President's Clear Skies cap-and-trade legislation, and implementing EPA's air toxics program using progressive, market-oriented methods to gain improvements in air quality most cost-effectively. We will continue to work with multi-state planning groups to develop strategies for reducing regional haze and with individual states to develop implementation approaches to reduce emissions of particulate matter (PM) and ozone precursors. In addition, we will work with states to identify opportunities for better integrating ozone and PM efforts, such as improving emission inventories and comprehensive air quality modeling approaches, controlling sources of precursors common to both pollutants, and coordinating control strategy planning cycles.

Improving Air Quality

To help states meet the clean outdoor air objective, we will continue to develop federal programs for mobile and stationary sources aimed at achieving large, nationwide, cost-effective reductions in emission of PM and its contributors: sulfur dioxide (SO_2), nitrogen oxides (NO_x) and elemental and organic carbon; ozone-forming NO_x; and volatile organic compounds (VOCs).

The President's Clear Skies legislation is a cornerstone of our strategy. Clear Skies sets strict, mandatory emission caps on three air pollutants from power generators—SO_2, NO_x, and mercury. Clear Skies, combined with other control programs, will bring many counties into attainment with EPA's new health-based standards for ozone and fine particles. By 2020, Clear Skies, EPA's proposed rule to decrease emissions from heavy-duty nonroad diesel engines, and other existing state and federal control programs, such as pollution controls for cars, trucks, and industrial boilers, will together bring all but 18 counties nationwide (including only 8 counties in the East) into attainment with the fine particle standards and all but 27 counties nationwide (including only 20 counties in the East) into attainment with the ozone standards. (In comparison, current [1991-2001] data show that today 129 counties nationwide [114 in the East] exceed the fine particle standard and 290 counties nationwide [268 in the East] exceed the new ozone standard.) In terms of benefits, by 2010, improvements in air quality under Clear Skies will result in 7,900 fewer premature deaths and $54 billion in health benefits nationwide each year. By 2020, improvements in air quality will result in 14,100 fewer premature deaths and $110 billion in health benefits nationwide each year.[9]

Supporting our strategic goal of achieving progressive, cost-effective improvements in air

quality, Clear Skies will not significantly change national electricity prices. Power generators will continue to rely on diverse sources of fuel, including our abundant domestic coal resources. As the President's Clear Skies legislation moves forward in Congress, we will continue to implement the Acid Rain Program to reduce SO_2 and NO_x emissions and will address the interstate transport of ozone and NO_x through the NO_x Budget Trading Program under the NO_x SIP Call.

EPA is now implementing national programs that will dramatically reduce future emissions from a wide range of mobile sources, including cars, minivans, sport utility vehicles, trucks, buses, motorcycles, recreational vehicles, forklifts, generators, marine engines, locomotives, and lawn and garden equipment. To enhance compliance with recently promulgated heavy-duty vehicle standards, for example, we are developing rules for in-use emissions and on-board diagnostics. EPA estimates that, when fully implemented, the heavy-duty vehicle standards will prevent 8,300 premature deaths, more than 9,500 hospitalizations, and 1.5 million lost work days every year.[10] We are also developing a program to establish new standards for non-road diesel engines, including sulfur requirements for non-road diesel fuel, and we are planning to address emissions from locomotives and marine engines.

EPA is addressing diesel exhaust from on-road and non-road sectors not only by establishing new standards, but also through voluntary programs to reduce emissions from existing diesel engines in trucks, buses, and construction equipment. These programs will greatly reduce emission of air toxics, as well as criteria pollutants and their precursors, and meet our strategic goal of achieving air quality cost-effectively. For instance, EPA will expand its efforts to create voluntary diesel-retrofit projects to reduce PM from older, high-polluting trucks and buses. We will concentrate on areas with sensitive populations, and on raising public awareness of the problem of children riding in older, high-emitting diesel school buses. EPA will provide schools with grants for retrofitting and replacing diesel school buses and reducing idling. We will also work with the trucking and railroad industries to adopt pollution control and energy-saving technologies. To address emissions from trucks idling at truck stops and rest areas, EPA will continue to develop agreements with truck fleets, the truck-stop industry, manufacturers of idle-control technologies, and state and local governments to create incentives for implementing idle-control technologies.

We will continue to implement the reformulated gasoline program, while working to address issues associated with the use of oxygenates (e.g., methyl tertiary-butyl ether [MTBE] and ethanol). With our partners, we will create a compliance program to ensure that vehicles and engines are clean, and we will help states incorporate on-board diagnostic inspections into their vehicle inspection and maintenance programs. We will also continue to help states and local agencies implement the transportation conformity regulation, which ensures that federally funded or approved highway and transit activities are consistent with SIPs, and will propose and finalize changes to the regulation to address the revised ozone and PM standards. In addition, we will work to ensure the technical integrity of mobile source controls in SIPs. Finally, recognizing that efforts to reduce emissions need to be

accompanied by efforts to reduce the effects of unmanaged growth and development, EPA will work with state and local governments, assisting them in crafting comprehensive strategies that accommodate necessary growth and economic development while minimizing adverse effects on air quality and other quality-of-life factors.

Reducing Risks From Toxic Pollutants

The Clean Air Act requires EPA to regulate emission of 188 toxic air pollutants, including dioxin, asbestos, toluene, and such metals as cadmium, mercury, chromium, and lead compounds.[11] To further reduce exposure to air toxics, EPA will develop and issue federal standards for major stationary sources which, when implemented through state programs, will reduce toxic emissions by 1.7 million tons. In addition, we will conduct national, regional, and community-based efforts to reduce multimedia and cumulative risks. Characterizing emissions and the risks they pose on national and local scales, such as in Indian country, will require significant effort. We will need to update the science and to keep the public informed about these issues.

We will develop and refine tools, training, handbooks, and information to assist our partners in characterizing risks from air toxics, and we will work with them on strategies for making local decisions to reduce those risks. We are working with state and local agencies to design a national toxics monitoring network, and we will compile and analyze information from local assessments to better characterize risk and assess priorities.

Working with Tribes and Other Partners

EPA is committed to working with tribes on a government-to-government basis to develop the infrastructure and skills tribes need to assess, understand, and control air quality on their lands. We will increase air monitoring in Indian country, and, in consultation with tribes, we will establish needed federal regulatory authorities and help tribes develop and manage their own air programs in a manner consistent with EPA Indian Policy and tribal traditions and culture. We plan to complete a policy determining when Federal Implementation Plans are appropriate for bringing Clean Air Act programs to Indian country. We will support tribal air programs by providing technical support, assistance with data development, and training and outreach, and we will help tribes participate in discussions of national policy and operations and in regional planning and coordination activities. Where tribes choose not to develop their own programs, we will implement air quality programs directly.

As we develop and implement clean air strategies, we will work with other federal agencies to ensure a coordinated approach. Our federal partners include the Department of Agriculture (in the areas of animal feeding operations, agricultural burning, and controlled burning), the Department of Transportation (for transportation-related air quality issues), the

Department of Energy (for electric utilities, electricity generation, and energy efficiency issues), and the Department of Interior (concerning visibility in national parks and wilderness areas).

EPA will also work to address sources of air pollutants that lie outside our borders, but pose risks to public health and air quality within the United States. We will work with the National Oceanic and Atmospheric Administration, the National Aeronautics and Space Administration, and other agencies to improve our capability to detect, track, and forecast the effects of air pollutants from international sources. We will continue our efforts to address and reduce the risk from airborne persistent and bioaccumulative toxins (PBTs) transported across international boundaries. By engaging with the international scientific community, we hope to improve our understanding of international flows and our tools for analyzing and evaluating response policies. Working through bilateral agreements and multilateral international organizations (such as the United Nations Environment Programme and the Organisation for Economic Cooperation and Development), we will promote capacity building, technology transfer, and other strategies to reduce foreign sources of pollution. EPA will also help represent the United States in existing multilateral international agreements (such as the Convention on Long-Range Transboundary Air Pollution and the United Nations Stockholm Convention on Persistent Organic Pollutants) to control sources of internationally transported pollutants and protect U.S. interests. In North America, we will work with Canada and Mexico within such existing agreements as the U.S.-Mexico La Paz Agreement (http://air.utep.edu/bca/jac/agreement.html), the U.S.-Canada Air Quality Agreement (http://www.epa.gov/airmarkt/usca/agreement.html), and the North American Agreement on Environmental Cooperation (http://www.naaec.gc.ca/eng/agreement/agreement_e.htm), to control the cross-border flow of pollutants. We will also work with Canada, Mexico, and key stakeholders to identify and explore new approaches to managing air quality along our common borders.

Objective 1.2: Healthier Indoor Air. By 2008, 22.6 million more Americans than in 1994 will be experiencing healthier indoor air in homes, schools, and office buildings.[12]

Strategic Targets:

- By 2008, approximately 12.8 million additional people will be living in homes with healthier indoor air. These include people living in homes with radon-resistant features, children not being exposed to environmental tobacco smoke, and asthmatics with reduced exposure to indoor asthma triggers.

- By 2008, approximately 7.8 million additional students and staff will experience improved air quality in their schools.

- By 2008, approximately 2 million additional office workers will experience improved air quality in their workplaces.

Means and Strategies for Achieving Objective 1.2

Air within homes, schools, and workplaces can be more polluted than outdoor air in the largest and most industrialized cities.[13] And because people typically spend close to 90 percent of their time indoors,[14] many may have a greater exposure to indoor pollution than to outdoor air pollution. Relative risk reports issued by EPA,[15] the Science Advisory Board,[16] and several states[17] rank indoor air pollution among the top four environmental risks. Moreover, people who may spend the most time indoors, thus exposed to indoor air pollutants for long periods of time, are often those who may be most susceptible to their effects: the young, the elderly, and the chronically ill, especially those suffering from respiratory or cardiovascular disease.

To address indoor air quality issues, EPA develops and implements voluntary outreach and partnership programs that inform and educate the public about indoor air quality and actions that can reduce potential risks in homes, schools, and workplaces. Through these voluntary programs, EPA disseminates information and works with state, tribal, and local governments; industry and professional groups; and the public to promote actions to reduce exposures to possibly harmful levels of indoor air pollutants, including radon.

Educational literature, multimedia materials, media campaigns, hotlines, clearinghouse operations, and other outreach efforts provide the public, our partners, and the professional and research communities with information about indoor air health risks and actions that can reduce those risks. We also transfer technology by providing detailed guidance on indoor-air-related building design, operation, and maintenance practices to building owners, building managers, and school facility managers and easy-to-use tools to educators and school facility managers. Our partners—including health care providers who treat children with asthma; school personnel who manage school environments; county and local environmental health officials; and populations that might be disproportionately affected by indoor air pollution—have the expertise and/or credibility that allow EPA to reach a larger audience than we could on our own. To support these voluntary approaches, we will base our recommendations for reducing potential exposure to indoor contaminants on the most current science available.

EPA will also provide tribes with appropriate tools and assistance to address indoor air toxics, such as radon, environmental tobacco smoke, PM, and biological issues, such as mold contamination. We will work with other federal agencies to provide guidance and assistance on how to reduce the exposure levels of these contaminants in all Indian communities.

EPA will broaden awareness and increase action by working with national as well as local community-based organizations to design and implement programs that address critical indoor air quality problems, including radon, secondhand smoke, asthma, and mold contamination in homes, child care and school facilities, and other residential environments. Through our State Indoor Radon Grant Program, we will continue to help states that have not yet established the basic elements of an effective radon assessment and mitigation program, and will support innovation and expansion in states that already have programs. Other indoor environment programs will focus on expanding national awareness of asthma triggers through outreach to schools, child care centers, health care providers, and the general public.

Objective 1.3: Protect the Ozone Layer. By 2010, through worldwide action, ozone concentrations in the stratosphere will have stopped declining and slowly begun the process of recovery, and the risk to human health from overexposure to ultraviolet radiation, particularly among susceptible subpopulations, such as children, will be reduced.

Strategic Targets:

- By 2010, atmospheric concentrations of the ozone-depleting substances CFC-11 and CFC-12 will have peaked at no more than 300 and 570 parts per trillion respectively, while production of these chemicals will be allowed only for very limited essential uses.

- By 2010, all methyl bromide production and import, except for exemptions permitted by the Montreal Protocol, and 45 percent of all HCFC production and import, will be phased out, further accelerating the recovery of the stratospheric ozone layer.

Means and Strategies for Achieving Objective 1.3

Scientific evidence amassed over the past 25 years has shown that chlorofluorocarbons and hydrochlorofluorocarbons (refrigerants), halons, (fire-extinguishing agents), methyl bromide (a pesticide), and other halogenated chemicals used around the world are depleting the stratospheric ozone layer. As a result, more harmful ultraviolet (UV) radiation is reaching the earth,[18] increasing the risk of overexposure to radiation and consequent health effects, including skin cancer, cataracts, and other illnesses. More than a million new cases of skin cancer are diagnosed each year,[19] and more than half of all Americans develop cataracts by the time they are 80 years old.[20]

As a signatory to the *Montreal Protocol on Substances That Deplete the Ozone Layer* (Montreal Protocol),[21] the United States is obligated to regulate and enforce its terms domestically. In accordance with this international treaty and related Clean Air Act requirements,[22] EPA will continue to implement the domestic rule-making agenda for the reduction and control of ozone-depleting substances (ODS) and enforce rules controlling their production, import, and emission. This implementation includes combining market-based regulatory approaches with sector-specific technology guidelines and facilitating the development and commercialization of alternatives to methyl bromide and HCFCs. We will strengthen outreach efforts to ensure efficient and effective compliance, and continue to identify and promote safer alternatives to curtail ozone depletion. To help reduce international emissions, we will assist with the transfer of technology to developing countries and work with them to accelerate the phase-out of ozone-depleting compounds. EPA estimates that in the United States alone between 1990 and 2165, the worldwide phase-out of ODS will save 6.3 million lives from fatal cases of skin cancer, avoid 299 million cases of nonfatal skin cancers, and avoid 27.5 million cases of cataracts.[23]

Because the ozone layer is not expected to recover until the middle of this century at the earliest,[24] the public will continue to be exposed to higher levels of UV radiation than existed prior to the use and emission of ODS.[25] Recognizing this fact and the public's current sun-exposure practices, EPA will continue education and outreach efforts to encourage behavioral changes as the primary means of reducing UV-related health risks.

Objective 1.4: Radiation. Through 2008, working with partners, minimize unnecessary releases of radiation and be prepared to minimize impacts to human health and the environment should unwanted releases occur.

Sub-objective 1.4.1: Enhance Radiation Protection. Through 2008, protect public health and the environment from unwanted releases of EPA-regulated radioactive waste and minimize impacts to public health from radiation exposure. By 2008, increase the total number of drums of radioactive waste certified by EPA as properly disposed to 140,171 (420.5 million milli curies) from 47,171 (141.5 million milli curies) in 2003. (The estimated total drums to be deposited at the Waste Isolation Pilot Plant [WIPP] is 860,000 [2.6 billion milli curies] over the next 35 years.[26])

Sub-objective 1.4.2: Maintain Emergency Response Readiness. By 2008, ensure Agency readiness to inform the public about and protect them from airborne releases of radiation. By 2008, 80 percent of EPA's 300-person Radiation Emergency Response

Team will meet scenario-based response criteria, up from 50 percent in 2005. By 2008, EPA's National Radiation Monitoring System will cover 70 percent of the U.S. population. (2005 baseline: 37 percent of the U.S. population)

Means and Strategies for Achieving Objective 1.4

EPA continues to meet the statutory mandates for managing radiation waste and controlling radioactive emissions and to fulfill its responsibilities under Presidential decision directives for radiological emergency preparedness and response. These responsibilities form the core of our strategy to protect the public and the environment from unnecessary exposure to radiation. EPA works with states, tribes, and industry to develop innovative training, public information, and voluntary programs to minimize these exposures.

One of EPA's major responsibilities related to radiation is certifying that all radioactive waste shipped by the Department of Energy (DOE) to the WIPP is disposed of safely and according to EPA's standards. We inspect waste generator facilities and biennially evaluate DOE's compliance with applicable environmental laws and regulations. Every 5 years, EPA must recertify that the WIPP will comply with EPA's radioactive waste disposal regulations.

Mining and processing naturally occurring radioactive materials for use in medicine, power generation, consumer products, and industry inevitably generate emissions and waste. EPA provides guidance and training to other federal and state agencies in preparing for emergencies at U.S. nuclear plants, transportation accidents involving shipments of radioactive materials, and acts of nuclear terrorism. The Agency sets protective limits on radioactive emissions for all media—air, water, and soil—and develops guidance for cleaning up radioactively-contaminated Superfund sites. We will ensure that the Agency employs appropriate methods to manage radioactive releases and exposures. These include health-risk site assessments; risk modeling, cleanup, and waste management activities; voluntary programs to minimize exposure to radiation in commercial products and industrial applications; national radiation monitoring; radiological emergency response; and provision of federal guidance to our international, federal, state, and local partners.

EPA will continue to assist states in retrieving and disposing of radioactive sources that find their way into non-nuclear facilities, particularly scrap yards, steel mills, and municipal waste disposal facilities. We will also continue to work with the International Atomic Energy Agency and other federal agencies to prevent metals and finished products suspected of having radioactive contamination from entering the country. We will create partnerships with states, local agencies, and tribes to locate and secure lost, stolen, or abandoned radioactive sources within the United States and to develop voluntary programs with state and local agencies and industry to investigate

and promote pollution prevention and operational practices and technologies that reduce industrial radioactive releases.

EPA also operates the Environmental Radiation Ambient Monitoring System (ERAMS), the only national environmental radiation program that provides information about the wide-scale spread of radioactive material from nuclear or radiological incidents. Over the next several years, EPA will improve ERAMS by adding deployable monitoring instruments that can quickly be shipped to affected areas, by conducting real-time monitoring for contamination in air, and by replacing old equipment with state-of-the art air samplers.

Objective 1.5: Reduce Greenhouse Gas Intensity. Through EPA's voluntary climate protection programs, contribute 45 million metric tons of carbon equivalent (MMTCE) annually to the President's 18 percent greenhouse gas intensity improvement goal by 2012. (An additional 75 MMTCE to result from the sustained growth in the climate programs are reflected in the Administration's business-as-usual projection for greenhouse gas intensity improvement.[27])

Strategic Targets:

- Through EPA's ENERGY STAR® program, prevent 27 MMTCE in the buildings sector in 2012, in addition to the 20 MMTCE prevented annually in 2002.[28]
- Through EPA=s industrial sector programs, prevent 80 MMTCE in 2012, in addition to the 43 MMTCE prevented annually in 2002.[29]
- Through EPA=s transportation programs, prevent 13 MMTCE in 2012, in addition to the 2 MMTCE being prevented annually as of 2002.

Means and Strategies for Achieving Objective 1.5

This objective will accomplish the portion of the goal that addresses reducing greenhouse gas (GHG) intensity by enhancing partnerships with businesses and other sectors. In 2002, President Bush announced a U.S. climate policy to reduce the GHG intensity of the U.S. economy by 18 percent over the next decade. EPA's strategy for helping to improve GHG intensity is to enhance its partnerships with businesses and other sectors through programs that deliver multiple benefits in addition to reducing GHG intensity—from cleaner air to lower energy bills. At the core of these efforts are voluntary government-industry partnership programs designed to capitalize on the opportunities that consumers, businesses, and organizations have for making sound investments in efficient equipment, policies and

practices, and transportation choices.

EPA manages a number of voluntary climate efforts to improve information in the marketplace and more quickly deploy technology in the residential, commercial, and transportation sectors of the economy. The ENERGY STAR® partnership (http://www.energystar.gov/) has been successful in profitably avoiding GHG emissions. EPA will continue SmartWay Transport Partnership (http://www.epa.gov/smartway/) efforts with the trucking and railroad industries to reduce GHGs voluntarily through efficiency or energy-saving technologies and to promote cleaner vehicles and the adoption of pollution control and energy-saving technologies that reduce NO_x and PM emissions. EPA's Best Workplaces for Commuters**K** program (http://www.commuterchoice.gov/) will also continue developing innovative solutions to commuting challenges faced by U.S. employers and employees by promoting commuter benefits that reduce vehicle trips and miles traveled. Other activities at EPA will further advance fuel-efficient and clean automotive technology, thus saving energy and reducing GHG emissions.

EPA will continue to build on the success of the voluntary programs in the industrial sector, focusing on reducing carbon dioxide emissions and continuing successful initiatives to reduce methane emissions and emissions of the high-global-warming-potential gases. EPA's goals for these efforts are to cost-effectively return emissions of methane to 1990 levels or below by 2012; to cost-effectively limit emissions of the more potent GHGs (hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride); and to facilitate the use of clean energy technologies and promote renewable energy.

EPA will continue its efforts to provide state and local governments with technical, outreach, and education services about climate change impacts, mitigation and adaptation options, and related issues so that they may more effectively and comprehensively address their goals. Internationally, EPA will promote the voluntary use of low- and zero-GHG technologies.

Objective 1.6: Enhance Science and Research. Through 2010, provide and apply sound science to support EPA's goal of clean air by conducting leading-edge research and developing a better understanding and characterization of environmental outcomes under Goal 1.

> **Sub-objective 1.6.1: Provide Science to Support Air Programs.** Through 2010, use the best available scientific information, models, methods, and analyses to support air-program-related guidance and policy decisions.
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> **Sub-objective 1.6.2: Conduct Air Pollution Research.** Through 2010, provide methods, models, data, and assessment research associated with air pollutants. Focus criteria pollutant research on emissions, fate and transport, exposures, mechanisms of injury, and health effects

to support the periodic revision and implementation of National Ambient Air Quality Standards and to develop information and tools for understanding and characterizing environmental outcomes associated with criteria pollutants. Focus air toxics research on developing and improving air quality models and source receptor tools; cost-effective pollution prevention and other control options; and scientific information and tools for understanding and characterizing environmental outcomes associated with national, urban, and residual air toxic risks.

Means and Strategies for Achieving Objective 1.6

EPA's science and research efforts are designed to provide the best information available to support our policies and regulations. First, we identify the research necessary to develop the quality information and tools we need for decision-making, standard-setting, and implementation work. Once these scientific tools are in use, we can identify data gaps and determine our needs for further research.

Science to Support Air Programs

EPA will continue to use sound science to determine the relative risks that air pollution poses to human health and the environment; identify the best means to detect, abate, and avoid environmental problems associated with air pollutants; and evaluate the effectiveness of control programs in reducing exposure to harmful levels of air pollution. The Agency will base its efforts to reduce environmental risks on the best available scientific information and will continue to integrate critical scientific assessment with policy, regulatory, and nonregulatory activities.

Science activities related to air quality fall into three broad categories: (1) exposure and risk assessment, (2) program development and assessment, and (3) development and assessment of technology.

Risk Assessment

EPA conducts risk assessments on both criteria and hazardous air pollutants to support our air toxics program and to assist in estimating the risks associated with exposure to criteria pollutants, such as fine particulates. We also conduct radiation-risk assessments to evaluate health risks from radiation exposure; to determine appropriate levels for cleaning up contaminated sites; and to develop radiation protection and risk management policy, guidance, and rules.

Program Development and Assessment

Using mathematical models, EPA works with states and tribes to evaluate control options,

control plans, the impacts of alternative emission scenarios, and the effect of federal rules. EPA's Acid Rain Program uses deposition models to evaluate our allowance trading program and to support the National Acid Precipitation Assessment Program, which coordinates federal acid deposition research. In addition, we use mathematical models, ambient monitoring information, and other data to determine the effectiveness of control strategies.

Technology Development and Assessment

Developing and assessing innovations in environmental protection is another important aspect of EPA's clean air program. Through its clean automotive technology program, EPA will continue to develop advanced clean and fuel-efficient automotive technology. We will collaborate with industry to transfer the unique EPA-patented, highly efficient hybrid engine and powertrain components, originally developed for passenger cars, to meet the more demanding size, performance, durability, and towing requirements of sport utility and urban delivery vehicles, without compromising performance, safety, or reductions in emissions.

EPA is committed to common-sense, cost-effective solutions that result in cleaner air. To control air toxics reasonably and effectively, EPA will continue to evaluate control technologies to ensure that they are protective, cost-effective, and commercially viable.

Effectively using partnerships is a key aspect of our approach to sound science. Under a joint effort on air quality forecasting, for example, EPA and the U.S. Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) are combining their expertise in air quality, atmospheric measurements, and modeling to develop a consistent, national numerical air quality model for short-term air quality forecasts for ozone and PM. We are contributing our national collection, analysis, and distribution of ambient air quality (our AIRNow program) and emissions data; air quality modeling; and detailed research analysis of air quality impacts on human health. NOAA brings expertise in operational meteorological modeling, air quality research, and product development and distribution.

Air Pollution Research

To meet our objectives for clean outdoor and indoor air, EPA's Office of Research and Development (ORD) has developed multi-year plans for research on PM, tropospheric ozone (and other criteria pollutants), and air toxics that lay out long-term goals for the next 5 to 10 years and describe targets the Agency intends to meet to reduce scientific uncertainties.[30]

In addition to the research we are conducting to support our clean air objectives, EPA has also developed a multi-year plan for global change, which is discussed under Goal 4: Healthy Communities

and Ecosystems.

Particulate Matter

EPA's research on PM represents the largest portion of its clean air research program. Guided by expert advice from the National Research Council of the National Academy of Sciences and several other organizations outside the Agency, EPA is addressing its PM research goals by using in-house laboratory resources and partnering with numerous academic institutions, including five PM research centers around the Nation.

To achieve our objectives for healthier outdoor air, the PM research program provides health and exposure information needed to establish standards and develop tools, such as emissions measurement methods, air quality models, and ambient measurement methods, that allow states, local agencies, and tribes to achieve NAAQS cost-effectively. From FY 2003 to FY 2007, research will focus on developing data and tools needed for implementation of the current PM standard and for the next required review of the standard. Because there is a 5-year cycle for reviewing NAAQS, future research will focus on the information needed to determine whether standards should be retained or revised and to implement new or revised standards.

Tropospheric Ozone

The tropospheric ozone research program addresses not only ozone, but other criteria pollutants such as sulfur dioxide, nitrogen dioxide, carbon monoxide, and lead. Under this research program, EPA will develop scientific criteria documents that can be used to establish air quality standards that protect human health and the environment. The research also focuses on developing tools, such as improved emissions estimates and modeling capability, to help states, local agencies, and tribes meet the air quality standards.

Air Toxics

Air toxics research is designed to answer critical scientific questions that will result in more certain risk assessments and more effective risk management practices for stationary point, area, mobile, or indoor sources of air toxics. This research will help to reduce risks from toxic air pollutants by improving information on evaluating risks from air toxics and methods for reducing those risks. Currently, in-house laboratories and research centers conduct most of this research. In the future, EPA will consider the using extramural research grants to complement its intramural program.

EXTERNAL FACTORS

State implementation of delegated air programs, state and local implementation of federal regulations, and state and local agencies' implementation of their own air pollution control regulations and programs are necessary for achieving our objectives and sub-objectives for clean air. However, many states are currently facing reduced budgets and resource constraints that might impede their ability to carry out environmental protection programs.

Lawsuits and court action might require the Agency to adjust schedules and delay its accomplishment of certain goals and objectives. Achievement of the clean air objectives can also be affected by economic conditions and development patterns in the United States and the world and by choices made for energy and transportation policies.

Weather conditions and meteorological patterns have very important effects on air quality. For example, high temperatures and bright sunlight can increase the formation of ozone. Wind can carry air pollution from one area to another, while conditions of little or no wind can cause air pollutants to remain in an area and build up to unhealthy levels. These effects must be considered when developing and implementing plans and strategies to achieve and maintain clean air.

Finally, Objective 1.1 and Sub-objectives 1.1.1 and 1.1.2 assume enactment and implementation of the Clear Skies legislation proposed by the President in 2002. As this proposed legislation is still in the early stages of the legislative process, it is not possible to predict at this time what action the U.S. Congress will take.

Human Capital Focus For Achieving Goal 1

EPA's workforce planning, hiring, and training activities will emphasize:

- Risk assessment, environmental/risk modeling and monitoring, economic analysis, and standard-setting
- Communication and coalition-building
- Energy efficiency and clean-energy technology
- Waste management and cleanup, radiation monitoring, and radiological emergency response
- Toxicity mechanisms; chronic health effects; emissions measurement and estimation methods; exposure, dose, and response modeling; atmospheric modeling; monitoring methods; and control and prevention technologies.

Efficiency Measures For Goal 1

Efficiency measures relate results to the resources or time invested to achieve those results and augment effectiveness measures in evaluating performance. They help us integrate EPA's budget and performance—part of the President's Management Agenda—and demonstrate the cost-effectiveness and timeliness of program activities.

Under Goal 1, EPA is developing efficiency measures to track our progress in reducing the costs of developing acid rain and related market-based programs:

EPA is in the process of developing efficiency measures to evaluate progress in reducing transaction costs for Acid Rain and related market-based programs. These transaction cost efficiencies deal with e-Gov practices and minimizing emissions data reporting transaction costs. For example, the Agency plans by 2005 to reduce annual emissions and monitor certification data reporting costs by 50 percent from approximately $4,000 per unit in the baseline year of 2000.

Notes

1. U.S. Environmental Protection Agency. September 2002. *Latest Findings on National Air Quality: 2001 Status and Trends*. EPA 454/K-02-001. Washington, DC: GPO. Available online at http://www.epa.gov/air/aqtrnd01/: EPA Office of Air and Radiation Web Site. Date of Access: September 8, 2003.

2. Areas not meeting the new standards are EPA projections based on 1999-2001 air quality monitoring data, which is maintained in the *Air Quality Subsystem* (AQS). AQS contains ambient air pollution data collected by EPA and state, local, and tribal air pollution control agencies from thousands of monitoring stations. Information can be obtained from: U.S. Environmental Protection Agency, Technology Transfer Network, Air Quality System Web Site, http://www.epa.gov/ttn/airs/airsaqs/sysoverview.htm. Date of Access: September 8, 2003.

3. In 2001, the number of people living in areas not meeting new standards was 110,839,831 for 8-hour ozone and 65,119,817 for particulate matter $(PM)_{2.5}$. In 2010, the number of people living in areas meeting new standards is expected to be 66,339,377 for 8-hour ozone and 25,173,130 for $PM_{2.5}$.

4. U.S. Environmental Protection Agency, Office of Air and Radiation. July 2003. *Clear Skies Act Fact Sheet 2003.* Washington, DC: GPO. Available online at http://www.epa.gov/air/clearskies/fact2003.html. Date of Access: September 8, 2003.

5. Baseline is from: U.S. Environmental Protection Agency, Office of Air and Radiation. September 2002. *Final Regulatory Support Document: Control of Emissions from Unregulated Nonroad Engines.* EPA 420-R-02-022. Washington, DC: GPO. Available online at http://www.epa.gov/otaq/regs/nonroad/2002/r02022.pdf. Date of Access: September 8, 2003.

6. Baseline is from: U.S. Environmental Protection Agency, Office of Air and Radiation. May 2001. *1993 National Toxics Inventory: Baseline 1993 NTI Raw Data*. Washington, DC: GPO.

7. Baseline is from: U.S. Environmental Protection Agency, Office of Air and Radiation. *1996 National Toxics Inventory. 1996 Inventory Documentation and Data*. Washington, DC: GPO. Available online at http://www.epa.gov/ttn/chief/net/1996inventory.html. Date of Access: September 8, 2003.

8. Data on number of school buses manufactured taken from: Monahan, Patricia. February 2002. *Pollution Report Card: Grading America's School Bus Fleets*. Cambridge, MA: Union of Concerned Scientists.

9. U.S. Environmental Protection Agency, Office of Air and Radiation. July 2003. *2003 Technical Support Package for Clear Skies, Section B: 2003 Human Health and Environmental Benefits*. Washington, DC: GPO. Available online at http://www.epa.gov/air/clearskies/technical.html. Date of Access: September 8, 2003.

   An alternative methodology projects that by 2010, Clear Skies will prevent 4,700 premature deaths and deliver $10 billion in health benefits annually and, by 2020, prevent 8,400 premature deaths and deliver $21 billion in public health benefits annually.

10. U.S. Environmental Protection Agency, Office of Air and Radiation. December 2000. *Regulatory Announcement: Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements*. EPA 420-F-00-057. Washington, DC: GPO. Available online at http://www.epa.gov/otaq/regs/hd2007/frm/f00057.pdf. Date of Access: September 8, 2003.

11. Clean Air Act, Title I, Section 112. Available online at http://www.epa.gov/air/caa/caa112.txt: EPA Clean Air Act Web Site. Date of Access: September 8, 2003.

12. The 1994 baseline is assumed to be zero for purposes of tracking the results of EPA indoor air programs because the number of Americans experiencing healthier indoor air prior to 1994 is unknown.

13. U.S. Environmental Protection Agency. 1987. *The Total Exposure Assessment Methodology (TEAM) Study: Summary and Analysis: Volume I*. EPA 600-6-87-002a. Washington, DC: GPO.

14. U.S. Environmental Protection Agency. 1989. *Report to Congress on Indoor Air Quality, Volume II: Assessment and Control of Indoor Air Pollution*. EPA 400-1-89-001C. Washington, DC: GPO.

15. U.S. Environmental Protection Agency. 1987. *Unfinished Business: A Comparative Assessment of Environmental Problems*. EPA 230287025a. Washington, DC: GPO.

16. U.S. Environmental Protection Agency, Science Advisory Board. 1990. *Reducing Risk: Setting Priorities and Strategies for Environmental Protection*. EPA-SAB-EC-90-021. Washington, DC: GPO.

17. Florida Center for Public Management. September 1995. *Comparing Florida's Environmental Risks: Risks to Florida and Floridians*. Tallahassee. Available online at http://www.pepps.fsu.edu/FCER/final.pdf: Program for Environmental Policy and Planning Systems Web Site, Institute of Science and Public Affairs, Florida State University. Date of Access: September 8, 2003.

    California Comparative Risk Project. May 1994. *Toward the 21st Century: Planning for the Protection of California's Environment*. Berkeley: California Environmental Protection Agency, Office of Environmental Health Hazard Assessment. Available online at http://www.oehha.org/multimedia/comprisk.html. Date of Access: September 8, 2003.

18. United Nations Environment Programme. 2002. *Scientific Assessment of Ozone Depletion*. Available online at http://www.unep.org/ozone/sap2002.shtml: UNEP, The Ozone Secretariat Web Site. Date of Access: September 8, 2003.

19. American Cancer Society Inc. 2003. *Cancer Facts and Figures: 2003*. No. 5008.03. Available online at http://www.cancer.org/downloads/STT/CAFF2003PWSecured.pdf. Date of Access: September 8, 2003.

20. Prevent Blindness America. 2003. *Cataract Fact Sheet*, FS32. Available online at http://www.preventblindness.org/resources/factsheets/CataractsFS32.PDF. Date of Access: September 8, 2003.

21. United Nations Environment Programme. *The Montreal Protocol on Substances that Deplete the Ozone Layer, as adjusted Beijing 1999*. Nairobi, Kenya. Available online at http://www.unep.org/ozone/montreal.shtml: UNEP, The Ozone Secretariat Web Site. Date of Access: September 8, 2003.

22. Clean Air Act, Title VI. Available online at http://www.epa.gov/air/caa/title6.html: EPA Clean Air Act Web Site. Date of Access: September 8, 2003.

23. U.S. Environmental Protection Agency, Office of Air and Radiation. 1999. *The Benefits and Costs of the Clean Air Act 1990-2010, EPA Report to Congress*. EPA-410-R-99-001. Washington, DC: GPO. Available online at http://www.epa.gov/air/sect812/1990-2010/chap1130.pdf. Date of Access: September 8, 2003.

24. United Nations Environment Programme. 2002. *Scientific Assessment of Ozone Depletion*. Available online at http://www.unep.org/ozone/sap2002.shtml: UNEP, The Ozone Secretariat Web Site. Date of Access: September 8, 2003.

25. UV irradiance has increased since the early 1980s by 6 to 14 percent at more than 10 sites distributed over mid- and high latitudes of both hemispheres. Information from: United Nations Environment Programme. 2002. *Scientific Assessment of Ozone Depletion*. Available online at http://www.unep.org/ozone/sap2002.shtml: UNEP, The Ozone Secretariat Web Site. Date of Access: September 8, 2003.

26. U.S. Department of Energy. August 2002. *Transuranic Waste Performance Management Plan.* Carlsbad. Available online at http://www.wipp.carlsbad.nm.us/: DOE, Carlsbad Field Office, Waste Isolation Pilot Plant Web Site. Date of Access: September 8, 2003.

27. Overall, EPA's climate protection programs will prevent 185 MMTCE annually by 2012, up from 65 MMTCE in 2002. Of the additional 120 MMTCE that will be prevented annually by 2012, 75 MMTCE will result directly from the sustained growth in many of the climate programs and are reflected in the Administration's business-as-usual projection for GHG intensity improvement; 45 MMTCE will contribute to the attainment of the President's 18 percent GHG intensity improvement goal. The strategic targets outline the path for preventing the 120 MMTCE by 2012.

28. MMTCE being prevented annually in 2002 is an estimate based on an analysis of actions that EPA's program partners have taken through the end of 2002.

29. Target includes the Agency's work with state and local governments, and state and local governments' work with industry to prevent GHG emissions.

30. For more detailed information on ORD's multi-year plans, see: U.S. Environmental Protection Agency, Office of Research and Development. *Research Directions: Multi-Year Plans.* Washington, DC: EPA. Available online at http://www.epa.gov/osp/myp.htm. Date of Access: September 8, 2003.