United States Environmental Protection Agency

Toward a Cleaner Future

Office of Transportation and Air Quality
Progress Report 2005

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Executive Summary

Controlling pollution from mobile sources is vital to improving the quality of our air and protecting public health. The Clean Air Act of 1990 empowered the U.S. Environmental Protection Agency (EPA) to take a variety of actions that has achieved significant results. For example, EPA reduced the sulfur in gasoline and diesel fuels and established successively more stringent emission standards, both of which brought about cleaner and better performing vehicles and engines.

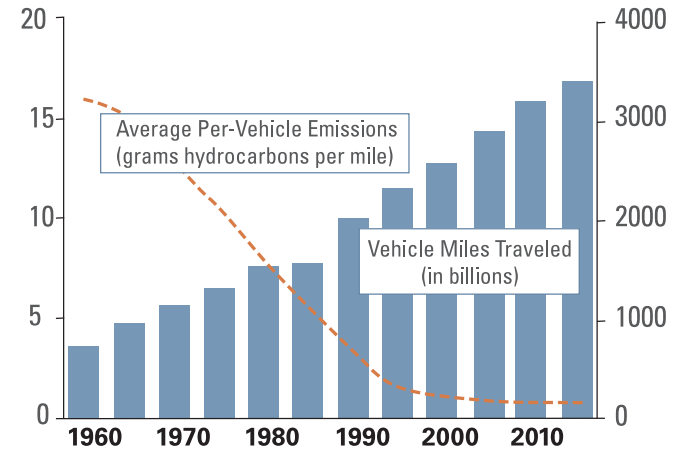
Several programs have resulted in substantial emission reductions and health benefits. In fact, the emission reductions resulting from the clean fuel and vehicle standards finalized over the past several years will prevent more than 24,000 premature deaths, 19,000 hospitalizations, and 3.2 million work days lost. When fully implemented in 2030, the annual net benefits of these programs will be approximately $175 billion, compared to $11 billion in costs.

This report presents the most recent developments in the EPA Office of Transportation and Air Quality's (OTAQ's) key program areas, as EPA continues to progress under the Clean Air Act. These accomplishments would not have been possible without our stakeholders' involvement and support. This report is a tribute to their concerted efforts on behalf of the environment.

Clean Cars and Fuels. One of OTAQ's top priorities is making sure that new cars, and the fuels they use,

are meeting what is known as the "Tier 2 vehicle standards." Starting in 2004, with plans to be fully implemented in 2009, EPA's Tier 2 Vehicle and Gasoline Sulfur Program represents a groundbreaking pollution control strategy for motor vehicles. This program will make new cars, sport utility vehicles (SUVs), pickup trucks, and vans 77 to 95 percent cleaner than 2003 models, while reducing sulfur levels in gasoline by 90 percent. Manufacturers are bringing to market the cleaner vehicles faster than required, with 35 percent of vehicles meeting the new standard in the first year.

Cars are getting cleaner, but people are driving more.



Clean Trucks, Buses, and Diesel Fuels. Heavy-duty trucks and buses are significant sources of air pollution. EPA's Clean Diesel Truck and Bus Program sets stringent emission standards for diesel engines and calls for the introduction of clean, ultra low-sulfur diesel fuel. Beginning in 2007, new highway diesel engines will be as much as 95 percent cleaner than current

Dramatic Emission Reductions

OTAQ's programs have resulted in dramatic emission reductions. Compared to 1995 baselines, these programs reduced pollutants by the following amounts in 2004:

- 1.85 million tons of volatile organic compounds
- 1.45 million tons of nitrogen oxides
- 25,000 tons of particulate matter
- 18,000 tons of fine particulate matter
- 11.3 million tons of carbon monoxide

models, and sulfur levels in fuel will be reduced by more than 97 percent, to 15 parts per million (ppm). OTAQ is working closely with engine manufacturers, trucking companies, and refiners to ensure the smooth implementation of these new standards.

Clean Nonroad Engines and Fuels. From large agricultural machines to residential leaf blowers, nonroad engines emit large quantities of harmful particulate matter and nitrogen oxides. OTAQ has developed a comprehensive set of fuel and engine requirements that will reduce sulfur in nonroad diesel by more than 99 percent by 2010. More stringent standards for locomotive, large marine diesel, and small gasoline (e.g., lawn and garden) engines are currently being developed. In addition, EPA has established standards for recreational and other nonroad engines, such as those found on motorcycles, all-terrain vehicles, and snowmobiles, that will reduce nitrogen oxides, particulate matter, hydrocarbons, and carbon monoxide by 20 to 99 percent, depending on the vehicle engine type.

Certification and Compliance. EPA's certification and compliance programs ensure that vehicles and engines are designed to meet emission standards when they first enter the market and that they continue to meet those standards throughout their useful life. OTAQ monitors the environmental performance of vehicles on the road and works with manufacturers to recall vehicles that fail to meet standards. In 2004, automotive manufacturers voluntarily recalled 2.7 million vehicles, representing 35 different emission-related problems. These recalls will prevent the release of thou-

sands of tons of pollutants into the air. OTAQ also now certifies 2,300 engine models, up from about 300 in the early 1990s.

The National Clean Diesel Campaign. In 2004, EPA crafted a comprehensive initiative to implement diesel regulations for future engines and address the emissions of the 11 million diesel engines in use today. With this campaign, EPA is targeting specific diesel applications. For example, under Clean School Bus USA, more than 15 million residents and 2 million children in 150 school districts now benefit from cleaner air due to cleaner buses.

Transportation and Global Climate Change. In addition to emissions that contribute to urban air pollution, the transportation sector accounts for 30 percent of U.S. greenhouse gas emissions. EPA is working on solutions. For example, OTAQ's automotive engineers are developing advanced technologies, such as clean diesel combustion and hydraulic hybrids, and working with commercial partners to bring these hybrids to market. In addition, OTAQ's voluntary initiatives are helping thousands of partners save billions of gallons of fuel—and thereby reduce carbon dioxide emissions—by implementing best shipping and delivery practices and by encouraging employers to offer outstanding commuter benefits.

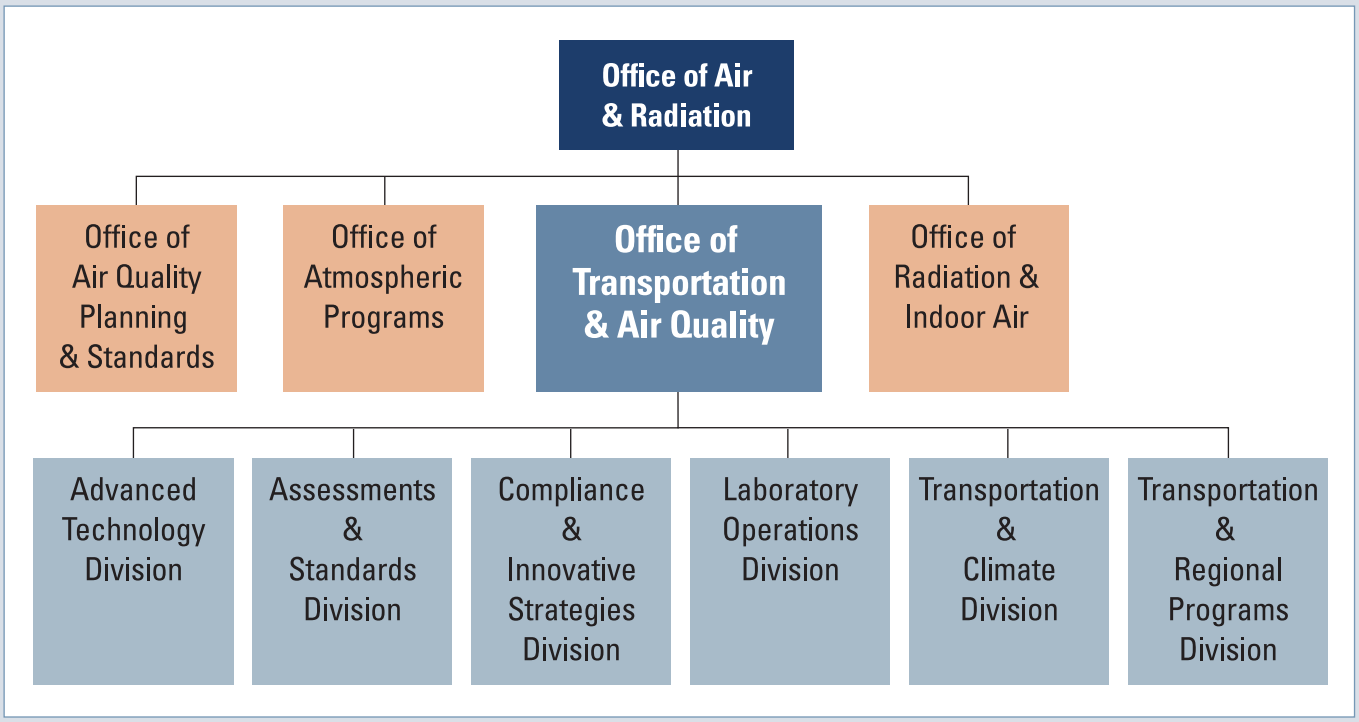
International Programs. Nearly every country in the world suffers from air pollution, and each year more and more of it is generated from the transportation sector. During the 2002 World Summit for Sustainable Development (WSSD) in Johannesburg, South Africa, EPA led the development of the Partnership for Clean Fuels and Vehicles (PCFV), which is made up of more than 70 members from around the world. As a leading and founding member of the PCFV, EPA participates in numerous international efforts to reduce air pollution from vehicles, such as helping countries remove lead from gasoline, reduce emissions from engines, and lower sulfur in fuels.

What Is OTAQ?

The Office of Transportation and Air Quality (OTAQ) is housed within EPA's Office of Air and Radiation. OTAQ's mission is to protect public health and the environment by reducing air pollution from motor vehicles, engines, and the fuels used to operate them and by encouraging business practices and travel choices that minimize emissions. OTAQ's programs address emissions from the range of mobile sources: cars, light trucks, large trucks, buses, nonroad recreational vehicles (e.g., dirt bikes and snowmobiles), farm and construction equipment, lawn and garden equipment, marine engines, aircraft, and locomotives.

OTAQ operates with an annual budget of more than $100 million and a staff of more than 350 technical, policy, and support personnel. Working out of EPA headquarters offices in Washington, DC, and the National Vehicle and Fuel Emissions Laboratory in Ann Arbor, Michigan, OTAQ's primary activities include:

- Assessing mobile source-related air quality problems and developing and using sophisticated modeling tools to develop solutions and measure results.
- Establishing national standards to reduce emissions from on-road and nonroad mobile sources of pollution.
- Implementing national mobile source standards through certification processes and in-use monitoring strategies.
- Coordinating transportation and air quality policies with state, local, and federal agencies.
- Developing fuel efficiency programs and technologies to reduce the emission of greenhouse gases from the transportation sector.
- Developing clean and efficient automotive technologies and transferring them to the marketplace.
- Operating state-of-the-art models to support national, state, and local emission inventories.
- Managing international activities that leverage U.S. clean air experience and export technology solutions to developing countries.



The National Vehicle and Fuel Emissions Laboratory

To carry out its mission, EPA established the National Vehicle and Fuel Emissions Laboratory in 1971 in Ann Arbor, Michigan—near the birthplace of the automobile industry and home to some of the world's most advanced vehicle manufacturing, testing, and research facilities. Since its founding, the Lab has been at the forefront of developing clean automotive technology and designing programs to reduce and prevent air pollution.

The Lab's original mission was to test cars, light trucks, and heavy-duty engines to make sure they met established emission and fuel economy standards before entering mass production. While this work remains a core function, the Lab is now recognized as a leader in advanced testing and automotive technology.

The Lab is also responsible for:

- Determining whether vehicles and engines comply with emission standards and fuel economy requirements.
- Testing fuels as well as highway and nonroad vehicles and engines to verify compliance with regulations designed to reduce emissions.
- Researching, evaluating, and developing advanced technologies for controlling emissions, as well as developing new strategies for improving fuel efficiency.

The Lab has recently undergone extensive modernization and is now home to some of the most sophisticated instrumentation systems for emissions measurement in the world. EPA can now test more types of vehicles and engines under a broader range of operating conditions than ever before. For example, the Lab has instruments capable of accurately measuring emissions from the newest, ultra low-emitting Tier 2 vehicles, along with post-2007 heavy-duty engines and hydrogen-fueled (fuel cell) vehicles. This facility also houses the first four-wheel drive dynamometer site in the nation, specifically designed for certification testing of a wide range of vehicles, including four-wheel drive vehicles, chassis-certified heavy-duty vehicles, and hybrids.

As new needs arise, the Lab will continue to maintain its position as a global leader in emissions testing and a resource to other nations as they develop stronger emission standards and associated testing requirements.

What is a Dynamometer?

A dynamometer functions as a treadmill for vehicles. Vehicles on a dynamometer run on rollers to simulate driving conditions so that technicians can measure tailpipe emissions.

Clean Cars and Fuels

Pairing Engine Technology Innovations with Cleaner Fuels for Optimal Results

For more than 30 years, EPA has been working to reduce emissions from passenger vehicles. These efforts were accelerated with the passage of the 1990 Clean Air Act Amendments. By the mid-1990s, EPA had set new emission standards for vehicles, developed a process to allow states to seek even further reductions, and implemented new controls on fuel quality. Together these actions dramatically reduced vehicle emissions and paved the way for the Agency to implement even more stringent regulations, known as the Tier 2 vehicle standards.

EPA's first action following the passage of the 1990 Clean Air Act Amendments was to implement the new tailpipe standards set by Congress. This regulation, called the Tier 1 standards, required auto manufacturers to meet new emission standards, which reduced overall nitrogen oxide emissions by up to 70 percent and particulate matter emissions by 54 to 69 percent, depending on the vehicle. Manufacturers began to meet these standards in 1994—the same year that EPA also phased in requirements that new cars be equipped with onboard diagnostic (OBD) systems to alert drivers to malfunctioning emission control equipment.

National Low Emission Vehicle Program

In 1997, EPA negotiated an agreement between states, auto manufacturers, and environmental groups to allow seven Northeast states to surpass the Tier 1 standards. Under the resulting voluntary agreement, called the National Low Emission Vehicle (NLEV) program, auto manufacturers voluntarily agreed to produce vehicles that were 70 percent cleaner than average Tier 1 cars.

Tier 1, NLEV, and RFG: An Emissions Success Story

As of 2003, these important programs together eliminated over 2.2 million tons and over 21,000 tons of harmful emissions of NOx and PM respectively each year.

The RFG program alone prevents 24,000 tons of toxic air pollutants, as well as 100,000 tons of other smog-forming air pollution, each year.

Cleaner Fuels

In the 1990 Clean Air Act Amendments, Congress included fuel along with vehicle technology as a potential source of emission reductions. In particular, Congress asked EPA to use fuels as an additional control strategy in areas with poor air quality or unique seasonal conditions. For example, carbon monoxide forms more easily in cold weather and at high altitudes, where diminished oxygen in the air results in less complete combustion. Denver pioneered a wintertime oxygenate program in the 1980s, requiring its gasoline to contain an oxygenated additive, such as ethanol. Significant reductions in carbon monoxide were achieved. This success was reflected in the 1990 Amendments with the requirement that carbon monoxide nonattainment areas implement similar programs.

Similarly, EPA's highly successful "reformulated" gasoline (RFG) program mandated cleaner-burning fuel for areas with the worst smog pollution. While initially mandated in nine metropolitan areas with the worst smog, 17 states and the District of Columbia currently use RFG, either to comply with the Clean Air Act or on a voluntary basis. Today, about 30 percent of the gasoline sold in the United States is reformulated, and, as a result, roughly 75 million Americans are breathing cleaner air.

The Tier 2 Program: A New Generation of Vehicle and Fuel Standards

The Tier 2 Vehicle and Gasoline Sulfur Program represents a new approach to EPA's pollution control strategies for motor vehicles. Tier 2 addresses fuels and engines as one interrelated system. This cost-effective approach was found to be so successful that EPA later applied it to the landmark Heavy-Duty Diesel and the Nonroad rules.

Tier 2 requires manufacturers to produce vehicles that emit significantly less harmful emissions than cars and light trucks produced even as recently as model year 2003. Because sulfur in gasoline, like lead, is a fuel contaminant that inhibits the function of advanced catalytic converters, Tier 2 also requires refiners to reduce sulfur levels by 90 percent.

Under Tier 2, vehicle regulations were applied equally for the first time—so that even the largest SUVs, pickup trucks, and vans must meet the same national emission standards as cars. Under Tier 2, vehicles and fuels are treated as a single system, so that the cleaner vehicles run on the cleaner fuels. These standards apply regardless of whether vehicles operate on gasoline, diesel fuel, or alternative fuels.

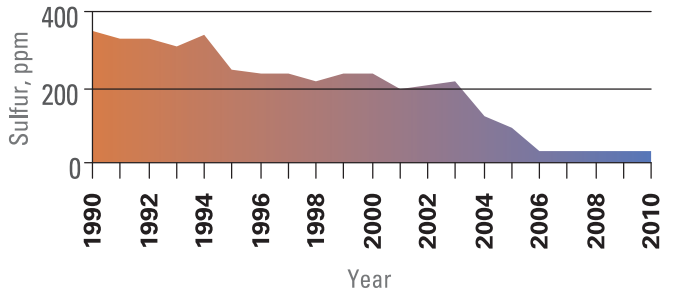
Tier 2's Lasting Public Health Effects

EPA estimates that a national fleet of Tier 2 vehicles will prevent annually:

- 683,000 missed workdays from pollution-related illnesses
- 4,300 premature deaths
- 10,000 cases of chronic and acute bronchitis
- Tens of thousands of respiratory problems

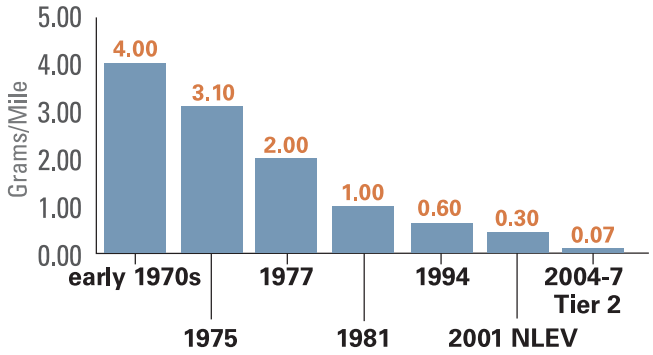
Tier 2's success was accomplished by fostering creative, effective partnerships to secure widespread support from a diverse group of stakeholders, including the automobile industry, the oil industry, states, and environmental groups. Because Tier 2 includes an incentive for companies to meet Tier 2 pollution reductions quickly and sooner than required, the auto industry began producing a significant number of very clean vehicles *earlier than required* by the program—despite the challenging technical requirements and implementation schedule. The refining industry is also successfully completing the process, reducing sulfur levels by 90 percent in U.S. gasoline.

Reductions in Gasoline Sulfur



The health, environmental, and economic benefits of the program are extraordinary. Cars, SUVs, pickup trucks, and vans manufactured under today's Tier 2 standards are 77 to 95 percent *cleaner* than 2003 cars and trucks. As more of these cleaner vehicles enter the national fleet, harmful emissions will continue to drop. While Tier 2 will cost consumers about $70 to $250 more per compliant vehicle (depending on size), the new standards will deliver more than $25 billion per year in air quality and health improvements.

How Have Auto NO_x Emissions Standards Changed Over Time?



Protecting Fuel Quality

In addition to setting fuel standards, EPA is also responsible for protecting overall fuel quality by regulating the use of additives and detergents. Manufacturers must register both fuels and additives prior to their introduction into commerce. Registration involves providing a chemical description of the fuel or additive along with certain health effects data. OTAQ uses the information to identify fuels and additives whose emissions might pose an unreasonable risk to public health, thus meriting further investigation and/or regulatory action. In the case of detergent additives, EPA ensures that these additives keep fuel injectors and intake valves clean, which ultimately improves the combustion process and reduces emissions. Currently, EPA has approximately 360 fuels and 5,500 additives registered. The registration of detergents alone reduces 600,000 tons of carbon monoxide, hydrocarbons, and nitrogen oxide emissions each year.

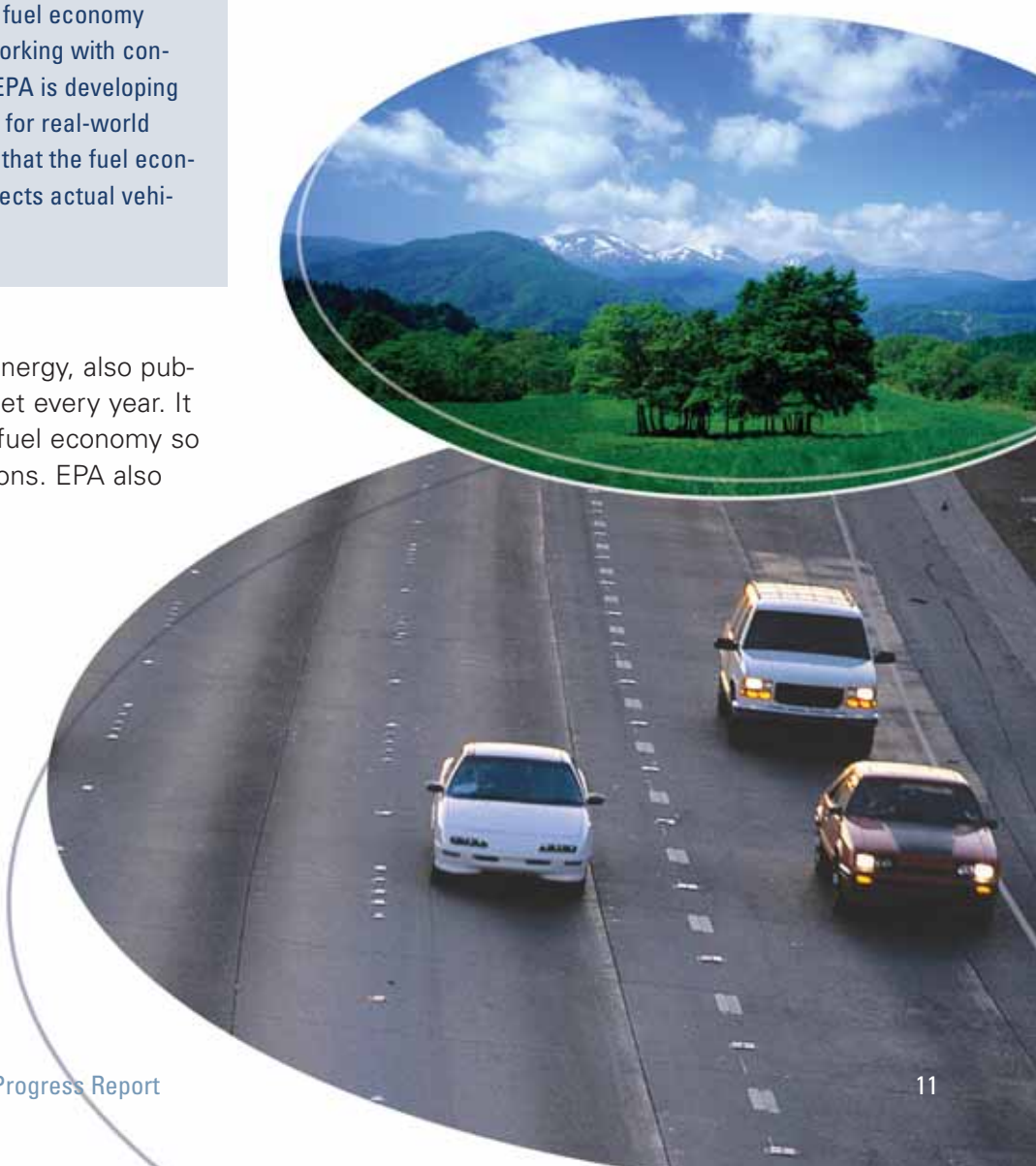
Empowering the Public

EPA also provides consumers with environmental information about vehicles so they can make informed decisions when buying a vehicle. For example, OTAQ developed and maintains the *Green Vehicle Guide* (www.epa.gov/greenvehicles). This Web-based tool helps consumers find the cleanest, most fuel-efficient vehicle that meets their needs. Users can select a specific vehicle to see its performance on a scale of 0 to 10, with 10 being the best, and compare it to others. Today, the Green Vehicle Guide is one of OTAQ's most visited Web sites. Over the past year, the site has received an average of nearly 1 million hits per month.

Improving Fuel Economy Estimates

EPA is revising the way it calculates the fuel economy estimates posted on all new vehicles. Working with consumer groups and auto manufacturers, EPA is developing new procedures that will better account for real-world driving conditions. The goal is to ensure that the fuel economy information for all new vehicles reflects actual vehicle performance on the road.

EPA, along with the Department of Energy, also publishes the *Fuel Economy Guide* booklet every year. It contains information about vehicles' fuel economy so consumers can make clear comparisons. EPA also maintains the nation's most extensive database on vehicle fuel economy. The annual Fuel Economy Trends report, which EPA has issued every year since 1975, includes detailed information on each manufacturer's fuel economy and summarizes key trends in automotive technology.

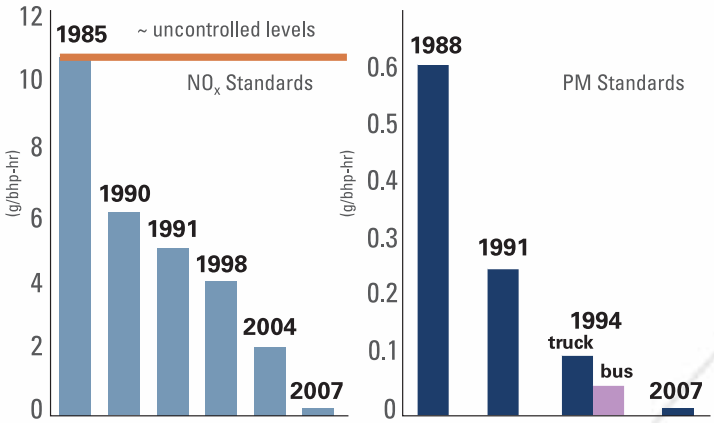


Clean Trucks, Buses, and Diesel Fuels

Cleaning Up America's Transportation Workhorses

The nation's more than 2 million heavy-duty trucks and buses play an essential role in the U.S. economy and transportation network. They are also a major source of nitrogen oxides and particulate matter. These emissions create significant health problems for millions of Americans. For this reason, one of OTAQ's major goals is to clean up heavy-duty vehicles and the fuels that power them.

Since the 1990 Clean Air Act Amendments, OTAQ has taken several critical steps to reduce pollution from heavy-duty vehicles. For example, in 1993, a 500 parts per million (ppm) limit on sulfur in diesel fuel took effect. As of 2004, truck and bus manufacturers were required to meet more stringent emission standards—an action that will reduce particulate matter by 55,000 tons per year. The standards required gasoline trucks to be 78 percent cleaner and diesel trucks to be more than 40 percent cleaner than existing models. These standards represented a more than 40 percent reduction in emissions of nitrogen oxides, as well as reductions in hydrocarbons, from diesel trucks and buses. These standards laid the groundwork for the comprehensive 2007 Clean Diesel Truck and Bus Program.



The 2007 Clean Diesel Truck and Bus Program

The 2007 Clean Diesel Truck and Bus Program is EPA's latest and most ambitious strategy to reduce emissions from heavy-duty vehicles. This program pairs engine technology changes with fuel changes to achieve significant reductions at the least cost to society.

Under the new standards, fuel sulfur will be cut from the current level of 500 ppm to 15 ppm—a 97 percent reduction. This step will enable advanced emission control technologies to be installed that virtually eliminate particulate matter and nitrogen oxide emissions from diesel engines. These standards were successfully developed in partnership with oil and engine companies, state and local governments, and the public health and environmental community.

The combination of cleaner vehicles and cleaner fuels will result in dramatic environmental improvements. By 2030, EPA expects annual reductions of 2.6 million tons of nitrogen oxides, 115,000 tons of hydrocarbons, and nearly 17,000 tons of air toxics. EPA's new program will result in particulate matter and nitrogen oxide emission levels that are 90 percent and 95 percent below today's levels, respectively. These enormous air quality improvements will translate into significant health benefits for the American public.

New Standards Yield Many Benefits

The 2007 Clean Truck and Bus Program's standards will mean huge reductions in ozone and ambient particulate matter, which are major air pollutants. In 2030, these reductions will prevent annually:

- 8,300 premature deaths
- More than 9,500 hospitalizations
- 1.5 million work days lost

The total health benefits are worth more than $70 billion each year, with costs of only $4 billion.

Clean Nonroad (Off-Highway) Engines and Fuels

Achieving Reductions from Nonroad Mobile Sources, Large and Small

From lawnmowers and boats to tractors and quarry trucks, nonroad vehicles, sometimes referred to as "off-highway" vehicles, are America's work engines and play engines. But like trucks and buses, nonroad diesel engines are also a significant source of harmful particulate matter and nitrogen oxides, which contribute to ground-level ozone (smog) and other pervasive air quality problems. These pollutants can travel hundreds of miles so that a rural farm tractor can contribute to poor air quality in a distant city or national park. Worse, these machines often operate in close proximity to construction workers, farm families, and nearby residents, emitting pollutants directly into people's breathing space.

In the 1990 Clean Air Act Amendments, Congress directed EPA to study emissions from all nonroad engines and vehicles, and to set emission standards if

these sources were found to cause or significantly contribute to air pollution. In the early 1990s, EPA focused on completing this emission study and building consensus around the need for pollution controls.

The Agency then set to work developing the first-ever emission standards for nonroad engines. Because of the wide variety of nonroad engines, EPA has had to tailor its rulemakings to both engine size and purpose. OTAQ also issued these regulations in a series of steps, or "tiers," in order to take advantage of advancements in control technology. For example, between 1995 and 1999, OTAQ issued a series of regulations affecting lawn and garden equipment. A later rulemaking set standards for recreational vehicles (e.g., snowmobiles and all-terrain vehicles) and certain industrial equipment. Today, there are emission standards affecting virtually every type of nonroad engine—from chainsaws and snowmobiles to yachts and backhoes.

Large Benefits from a "Small" Source

Together, EPA's rules affecting lawn and garden equipment, fork lifts, and recreational vehicles will cut particulate matter and nitrogen oxide emissions by about 500,000 tons per year. The recreational vehicle regulation alone will bring about an estimated $8 billion in annual health benefits by 2030.

Large Nonroad Engines

Pollution emitted by large nonroad diesel vehicles such as bulldozers, locomotives, and marine vessels has been a particular concern to the Agency. These highly durable engines can operate for decades and emit large amounts of nitrogen oxides, particulate matter, and air toxics, each of which contributes to serious public health problems. Over the last several years, OTAQ has developed a series of regulations to reduce emissions from these engines. These efforts were advanced significantly in 2004 with the completion of the Clean Air Nonroad Diesel Program. This landmark program achieves dramatic reductions from large nonroad engines used in most construction, industrial, and agricultural equipment and sets the stage for comparable reductions from locomotives and marine vessels.

Cleaning Up America's Workhorses

Like EPA's regulation affecting heavy-duty trucks and buses, the Clean Air Nonroad Diesel Program integrates engine and fuel controls as a system to gain the greatest emission reductions. Engine standards take effect for most new engines in 2008 and final standards phase in starting in 2011, coinciding with the availability of the clean fuel. These standards will reduce particulate matter and nitrogen oxide emissions by 90 percent.

In addition, new fuel requirements decrease the allowable levels of sulfur in fuel used in nonroad diesel engines, locomotives, and marine vessels by more than 99 percent. These fuel improvements will create immediate and significant environmental and public health benefits by reducing particulate matter from engines in the existing fleet of nonroad equipment. They also make it possible for engine manufacturers to use advanced emission control technologies, similar to those upcoming for highway diesel trucks and buses.

EPA's Clean Air Nonroad Diesel Program: A 40:1 Benefit-Cost Ratio

The long-term annual health benefits of this important program include the prevention of approximately:

- 6,000 children's asthma-related emergency room visits
- 8,900 hospitalizations
- 12,000 premature deaths
- 15,000 heart attacks
- 280,000 cases of respiratory symptoms in children
- 1 million lost work days

When fully implemented, the annual monetized health and welfare benefits of this program will exceed $80 billion, compared to implementation costs of $2 billion.

The Clean Air Nonroad Diesel Program marks the first time a major mobile source regulation was not legally challenged in court. This is a tribute to OTAQ's extensive collaboration with the nonroad industry, environmental and public health groups, and state governments. These groups committed to help EPA design a solution that was good for the environment and good for business.

Keeping Locomotives on Track for Reductions

About 25,000 diesel-electric locomotives currently operate in the United States, and in general they produce extremely high levels of pollution. Because a typical locomotive lasts 40 years or more, the turnover to new locomotive models takes decades. In 1997,

OTAQ established standards requiring that current locomotives be made cleaner when they are remanufactured to "as new" condition—a step that will cut nitrogen oxide emissions for much of the existing locomotive fleet by 33 percent between 2007 and 2009. This rule also set the first emission standards for newly manufactured locomotives.

In May 2004, EPA announced its intent to propose even more stringent locomotive engine emission standards. These standards would require the use of advanced emission-control technologies similar to those required by the Clean Air Nonroad Diesel Program. The availability of clean nonroad diesel fuel required under the new nonroad fuel standards will enable the use of this technology on locomotive engines.

Managing Marine Vessels

Unlike land-based diesel vehicles, many large marine vessels travel the globe. For this reason, EPA has used two separate processes to achieve reductions.

For large ocean-going vessels, EPA has worked with the International Maritime Organization (IMO) to set emission standards. The IMO was established in 1948 under the United Nations to address safety, navigation, and pollution prevention for ships engaged in international trade. Current EPA standards are equivalent to the levels determined by the IMO. OTAQ is also considering a second tier of standards that would reflect additional reductions that can be achieved through engine-based controls.

For smaller vessels, EPA has adopted regulations similar to land-based nonroad and locomotive engines. The current standards take effect starting between 2004 and 2007, depending on the size of the engine, and will reduce nitrogen oxide emissions by about one-third and particulate matter emissions by about 25 percent. As with locomotives, EPA has announced its intention to propose more stringent emission standards for all new commercial, recreational, and auxiliary marine diesel engines, except the very large engines used for propulsion on deep-sea vessels.

Certification and Compliance

Keeping Vehicles Clean

Implementing regulatory programs is an important part of EPA's overall air quality strategy. OTAQ not only works to ensure that vehicles are designed to meet emission standards when they first enter the market, but also that they continue to meet those standards throughout their useful life—which, for most passenger vehicles, is more than 100,000 miles.

Because the vast majority of cars and trucks on the road today are not new, and therefore do not meet EPA's Tier 2 standards, OTAQ expends significant effort to ensure that vehicles are in compliance with the emission standards.

To help vehicles stay clean, EPA works with state agencies to implement inspection and maintenance (I/M) programs in areas with serious air pollution problems to ensure that emission control systems continue to operate optimally. Still in place today, I/M programs identify and clean up the most polluting vehicles by alerting motorists when repairs are needed.

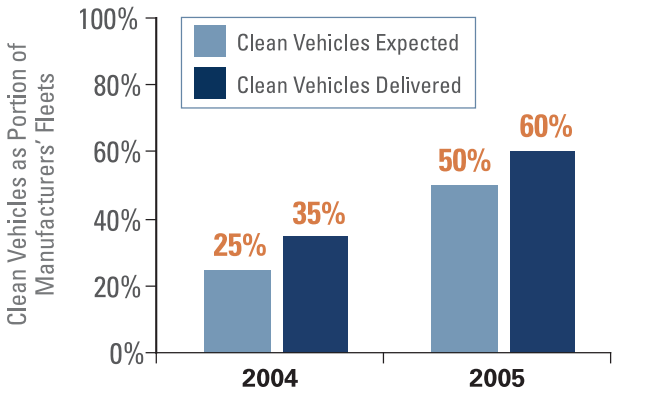
Keeping New Cars Clean in 2004

- Manufacturers conducted approximately 2,000 emissions tests to show that their new vehicles meet the emission standards.
- EPA conducted random and selective test audits on more than 150 car models and found 15 that had emissions problems. Manufacturers corrected these problems before the vehicles were mass-produced.
- Manufacturers voluntarily recalled 2.7 million vehicles due to 35 emission-related problems. These recalls will prevent the release of thousands of tons of pollutants into the air.

Testing Emissions *Before* Mass Production

Before vehicles are mass-produced, EPA requires auto manufacturers to test prototype vehicles to ensure they will minimize emissions throughout their useful life. EPA audits these tests to confirm that they are accurate and reliable. If the tests reveal a problem, the manufacturer must fix it and demonstrate that the modified prototype will pass the test before mass production can begin. After completing the tests and other analyses, prototypes that pass receive a certificate of conformity from EPA, which enables the manufacturer to sell vehicles of similar design in the United States. This program prevents pollution by ensuring that all new cars are designed to meet emission requirements before they are even produced and sold.

Tier 2 Clean Vehicles Hit the Roads Sooner Than Expected



Post-Production Emissions Monitoring

Once vehicles are on the road, EPA requires manufacturers to report any emission-related defect that is found on 25 or more vehicles for any given model year. OTAQ reviews these defect reports to assess the seriousness of the defect and the manufacturer's solutions. These reports are one of the most useful tools to help identify potential problems with vehicles warranting further attention.

Both OTAQ and manufacturers test customer-owned vehicles for emission problems. In addition to random selections, OTAQ selects vehicles for testing by taking into account information gleaned through its pre-production audits, manufacturer defect reports, and consumer tips. In response to data collected from these tests, virtually all of the emissions-related vehicle recalls over the past decade have come from voluntary actions by manufacturers.

Engine Testing and Monitoring

OTAQ also works closely with diesel truck, bus, and other engine manufacturers to ensure that these engines meet emission standards and stay clean throughout their useful lives. Similar to the vehicle certification process, engine manufacturers perform emission tests on their engines and submit certification data to EPA for review. OTAQ then analyzes the emissions data and assesses whether the engine is clean enough to meet the required specifications. If an engine meets the standards, OTAQ issues a certificate of conformity, which enables the engine to be sold within the United States. In 2004, OTAQ issued a record number—approx-

imately 1,800—certificates of conformity for heavy duty and nonroad engines, including marine engines and lawnmowers. In addition, OTAQ performs several hundred emissions tests each year on heavy-duty diesel trucks and equipment in normal operating conditions to see how performance and emissions are affected.

Marathon Tests

OTAQ tests engines in a variety of conditions and settings to gain a better understanding of how a variety of factors affect an engine's emissions performance. In 2004, OTAQ conducted eight "marathon tests," so called because of the extreme distances covered. These tests totaled more than 4,000 miles and provided about 75 hours worth of test data. Results from these tests help OTAQ determine how factors such as altitude, temperature, terrain, and driving habits affect an engine's emissions while the vehicle is in use.

Starting in 2007, EPA will require a manufacturer-run emissions testing program for heavy-duty diesel trucks. Under this program, heavy-duty truck manufacturers will start conducting their own tests using a Portable Emissions Measurement System in 2005 as part of a pilot program, complementing EPA's own testing. The program will expand nationwide with 2007 model year diesel trucks. This cooperative effort among EPA, the state of California, and industry represents a significant advance in helping to ensure that the benefits of more stringent emission standards are realized under real-world driving conditions.

Portable Emissions Measurement System (PEMS)

PEMS, a breakthrough technology that OTAQ helped develop, consists of miniaturized versions of the same analyzers that OTAQ uses in labs. These portable systems are installed in selected vehicles driven under real-world conditions and collect a wide variety of information, including:

- Emissions concentrations of nitrogen oxides, carbon dioxide, and non-methane hydrocarbons.
- Exhaust mass flow rate so that grams of emissions can be calculated.
- GPS information so that grams-per-mile emissions can be calculated.
- Engine electronic control module information so that grams-per-brake horsepower-hour emissions can be calculated.
- Ambient weather information.

This information is used to build and verify OTAQ's emissions inventory models, confirm in-use compliance of vehicles and engines, and determine real-world fuel economy. The success of PEMS in vehicles has led experts to consider adapting it for emissions testing of large engines such as locomotive and marine engines, which are difficult to test in a lab.

The National Clean Diesel Campaign

Cleaning Up Today's Diesel Engines

Reducing emissions from diesel engines is one of the most important air quality challenges facing the country. Even with EPA's new heavy-duty highway engine standards, over the next 20 years millions of diesel engines already in use will continue to emit large amounts of nitrogen oxides and particulate matter, both of which contribute to serious public health problems. These problems are manifested by thousands of instances of premature mortality, hundreds of thousands of asthma attacks, millions of lost work days, and numerous other health impacts.

In order to maximize reductions from all diesel engines, EPA launched a comprehensive initiative called the National Clean Diesel Campaign. The Campaign uses a multi-pronged approach. First, the Campaign is committed to the successful implementation of the 2007 Clean Diesel Truck and Bus Program and the Clean Air Nonroad Diesel Program. Second, EPA will develop new emissions requirements for locomotives and marine diesels, including large commercial marine engines. Lastly, to address engines already in use today that are not subject to the new regulations, the Campaign is promoting

the reduction of emissions through a variety of cost-effective and innovative strategies, including switching to cleaner fuels and "retrofitting" engines through the addition of control devices. The Energy Policy Act of 2005 also includes grant provisions and other incentives to help facilitate voluntary clean diesel actions nationwide.

Sector-Based Voluntary Programs Leading the Way

The National Clean Diesel Campaign is focused on leveraging local, state, and federal resources to install cost-effective retrofit technologies on diesel engines, adopt best practices, develop demonstration projects, and track and report results. More than 500 partners are involved in approximately 220 voluntary projects nationwide.

The partnerships are organized around sectors that provide the best opportunity to obtain significant reductions, produce emissions with immediate impacts on public health, or comprise a relatively large portion of the country's diesel emissions inventory.

Distribution of National Clean Diesel Campaign Projects in 2004

Clean Ports USA Demonstrates Success

The Port of Houston Authority, the Port of Tacoma, and Massachusetts Port Authority have received EPA grant funding to demonstrate how retrofitting trucks, yard equipment, straddle carriers, and rubber-tired gantry cranes with diesel oxidation catalysts and using ultra low-sulfur diesel and emulsified diesel fuel at terminals reduces local air pollution.

The National Clean Diesel Campaign partnerships include:

- **Clean School Bus USA.** Partners with school transportation officials and local and state governments to reduce diesel pollution from the nation's school bus fleets.
- **Clean Ports USA.** Helps reduce diesel emissions at U.S. ports.
- **Clean Construction USA.** Encourages the use of retrofit technologies and engine replacement in construction equipment at major construction projects in areas that do not meet the national air quality standards.
- **Clean Agriculture USA.** Joins with the farming community, government agencies, and nongovernmental organizations to promote clean diesel strategies, including biofuels and renewable fuels across the country.
- **SmartWay Transport.** Partners with both shippers and carrier fleets to create highly fuel-efficient, low-emissions trucks that deliver freight in the United States. Companies involved with the program include Federal Express, UPS, IKEA, and The Home Depot.

Regional Efforts

A critical component of the National Clean Diesel Campaign is to promote regional initiatives that use a proactive, incentive-based approach to achieve results. Regional partners agree to collectively leverage additional funds and take a local approach to reducing harmful emissions. One of the first such efforts is the West Coast Diesel Emissions Reductions Collaborative, in which a number of partners are working together to reduce air pollution emissions from diesel engines along the West Coast. In addition to EPA, partners include:

- U.S. Department of Agriculture/Natural Resource Conservation Service
- U.S. Department of Energy
- U.S. Department of Transportation
- State, local, non-profit, and private sector partners from California, Alaska, Washington, and Oregon
- Canada and Mexico

Other regional collaboratives are working to reduce diesel emissions in their respective regions. For example, the Midwest Diesel Initiative is a new public-private effort to reduce diesel emissions along major transportation corridors and in various sectors, including trucking, locomotive, construction, and ports, with emphasis on urban areas. The Northeast Diesel Collaborative encourages participants to engage in projects that will reduce transportation-related air pollution to help address high asthma rates.

Transportation and Global Climate Change

Tackling Challenges with Technical Innovations and Partnerships

While the transportation sector is crucial to the nation's economy and personal mobility, it is also a significant source of greenhouse gas emissions. In 2002, almost one-third of all greenhouse gases released in the United States came from the transportation sector, mostly from carbon dioxide released through the combustion of diesel and gasoline fuels.

OTAQ is working both to improve the Agency's knowledge about the transportation sector's contribution to greenhouse gas emissions and to reduce the amount of greenhouse intensity of this sector. These efforts are focused in three areas:

- Developing new automotive technologies that improve fuel efficiency.
- Reducing nationwide fuel consumption through voluntary programs that encourage Americans to drive wisely and trucking companies to enhance the fuel efficiency of their fleets.

- Developing inventories and models to help track emissions and evaluate the potential costs and benefits of reducing the greenhouse gas intensity of the transportation sector.

These efforts are an important part of the Administration's broader strategy to reduce greenhouse gas emissions through voluntary programs and investments in emerging technologies.

Developing Clean Automotive Technology

Engineers at OTAQ's National Vehicle and Fuel Emissions Lab are working to develop a new generation of clean, efficient vehicles. To date, EPA has received 29 advanced patents in the fields of engine design and automotive technology and has 19 more patents pending. To transfer this technology to the marketplace as quickly as possible, OTAQ has developed formal partnerships with private companies like Ford Motor Company and Eaton Corporation to help test and commercialize EPA's technologies. Currently, OTAQ is focused on developing two promising technologies—hydraulic hybrids and clean diesel engines.

Hydraulic Hybrid Vehicle Research

OTAQ's automotive engineers are leading the nation in the development of hydraulic hybrid vehicles. This technology uses a hydraulic energy storage and propulsion system to capture and store energy normally wasted in vehicle braking. This energy is used to help propel the vehicle during the next acceleration.

OTAQ has focused its efforts on improving two kinds of hydraulic hybrids: "mild" and "full." A mild hydraulic hybrid uses hydraulic components that are "added on" to a conventional vehicle engine system and do not fundamentally change the way the vehicle is powered. A full hydraulic hybrid completely integrates the hydraulic components into the powertrain system and can thus maximize the full potential of the energy storage and propulsion systems of the technology.

Using mild hydraulic hybrid technology, OTAQ recently built a delivery truck that operates at 25 to 30 percent more miles per gallon than a comparable standard delivery truck. OTAQ is now building a full hydraulic hybrid delivery truck with UPS and other partners to allow a fuller demonstration and evaluation of the technology. This vehicle is expected to attain 60 to 70 percent more miles to the gallon than comparable delivery trucks. OTAQ also built the world's first full hydraulic hybrid SUV, which averages 55 percent more miles per gallon than its conventional counterparts.

Clean Diesel Combustion Engine

Clean diesel vehicles, together with hybrids, offer promising near-term improvements in fuel economy and greenhouse gas reductions. OTAQ is working with International Truck & Engine Corporation and Ford Motor Company to develop an extremely efficient, clean, and cost-effective diesel combustion engine for cars, SUVs, and light pickup trucks. In 2004, OTAQ developed a clean diesel combustion engine and deployed it successfully in a minivan. This is a promising technology for reducing nitrogen oxides—without the need for any exhaust treatment for nitrogen oxides. Results so far

Fuel Efficiency Facts

- Since 1997 fuel economy for passenger vehicles has been relatively constant, ranging from 20.6 to 21 miles per gallon (mpg).
- Model year 2005 vehicles are estimated to average 21 mpg. This is 0.2 mpg higher than 2004, but 5 percent below the fleet-average fuel economy peak value of 22.1 mpg achieved in 1987.
- This year, cars and light trucks are each projected to account for 50 percent of vehicle sales.

also indicate that clean diesel combustion engines can maintain the excellent fuel economy, performance, and reliability of conventional diesel engines.

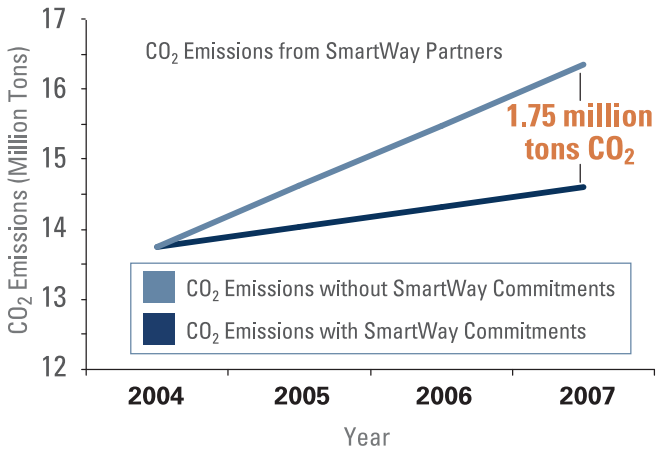
Reducing Fuel Consumption and Emissions

Reducing fuel consumption is a win-win situation for business, private individuals, and the environment. Fewer gallons of fuel burned means reduced greenhouse gas emissions, lower fuel costs, and less dependence on imported oil. OTAQ's voluntary programs help reduce fuel consumption in two key sectors—freight transport and workplace commuting.

SmartWay Transport®

Announced in February 2004, SmartWay is a voluntary partnership between various freight-industry sectors and EPA that establishes market-based incentives for fuel efficiency improvements and greenhouse gas emission reductions. By 2012, this initiative aims to eliminate 33 million to 66 million metric tons of carbon dioxide emissions and up to 200,000 tons of nitrogen oxide emissions per year. At the same time, the initiative will result in fuel savings of up to 150 million barrels of oil annually. Approximately 160 shipping, truck, and rail companies are enrolled in the program—representing more than 255,000 trucks.

SmartWay Partners are on track to eliminate 1.75 million tons of carbon dioxide annually by 2007.



As a partner, each company creates an action plan detailing the technologies and policy measures it will use to reduce fuel consumption, greenhouse gas emissions, and air pollution. These measures include reducing truck idling, employing advanced aerodynamic features on the tractors and trailers of their trucks, replacing traditional tires with next-generation super single tires, and increasing the amount of freight delivered by rail. As SmartWay partners work towards achieving these environmental goals, they are also improving their corporate bottom line. Most of the innovative technologies and strategies implemented in SmartWay will quickly pay for themselves in just a few years and continue to save these companies money for years to come.

Reducing Unnecessary Idling

Reducing unnecessary idling is a major component of EPA's SmartWay program. As a part of their daily routine, countless drivers sit and idle their vehicles, wasting valuable fuel and money and polluting the air. SmartWay partners are adopting innovative idle reduction technologies, taking advantage of proven systems that provide drivers with power, heat, and air conditioning without using the engine.

To date, there are 50 stationary anti-idling projects, and mobile technology has been installed on nearly 20,000 trucks. These efforts will save nearly 40 million gallons of diesel fuel every year and reduce more than 440,000 tons of carbon dioxide, 7,000 tons of nitrogen oxides, and nearly 200 tons of particulate matter annually.

Best Workplaces for Commuters℠ Tackle the Daily Commute

In addition to being stressful for workers, the daily commute represents another significant source of emissions. In 2002 alone, 5.7 billion gallons of fuel were wasted in traffic congestion—more than 500 times the amount of oil spilled by the Exxon Valdez—unnecessarily releasing 50 million tons of carbon dioxide into the atmosphere.

In response, EPA is working with employers across the country to reverse the trend of longer, single-occupancy vehicle commuting. OTAQ has created a list of the Best Workplaces for Commuters to formally recognize employers that offer outstanding commuter benefits—from providing free transit passes to offering the flexibility of working from home. More than 1,100 employers representing more than 2 million workers have made the list so far. In 2004, these exemplary commuter benefits prevented the release of more than 900,000 metric tons of carbon dioxide into the air. Each year, these employers also reduce the need for roughly 275,000 parking spaces, reduce the number of miles driven by more than 2 billion, and save more than 100 million gallons of gasoline.

Making an Impact with the FORTUNE 500

In September 2004, EPA released the inaugural list of Best Workplaces for Commuters from the FORTUNE 500 companies. The announcement was big news: more than 240 media outlets across the country provided positive media exposure and recognition in 340 stories to these commuter-friendly companies. In October 2005, a second list of nearly 90 FORTUNE 500 companies was released. These companies include many household names, such as Intel, Microsoft, Boeing, and Nike, and their efforts are helping to reduce annual gasoline usage by 30 million gallons.

Developing New Tools and Models

The third component of OTAQ's climate-related work is to provide information on the impact of the transportation sector to total greenhouse gas emissions and to help evaluate the potential of technology advancements and alternative fuels to help reduce emissions from this sector. These efforts involve a range of activities, including:

- Calculating greenhouse gas emissions from the transportation sector for inclusion in EPA's Inventory of *U.S. Greenhouse Gas Emissions and Sinks*. This information provides a common and consistent basis for policy analysis, and supports the development of cost-effective greenhouse gas mitigation strategies.
- Evaluating economic models to ensure that these models incorporate the most recent transportation-related information and accurately evaluate the interaction between transportation and other sectors of the economy.
- Assessing the potential of vehicle technologies, including advanced gasoline, diesel, and gasoline hybrids, to significantly and cost-effectively improve vehicle fuel economy and reduce U.S. dependence on foreign oil. This work also considers potential savings to consumers in the form of reduced fuel and operating costs. EPA is also examining the greenhouse gas and criteria pollutant impacts of various renewable fuels.

International Programs

Working with the World

Nearly every country in the world suffers from air pollution, and each year more and more of it is generated from cars, trucks, and other mobile sources. Huge growth in population and the number of vehicles on the road is the new norm in most large cities in developing countries. While these vehicles have led to greater mobility, they have also created severe air pollution problems. And, like so many other environmental problems, air pollution doesn't stop at borders.

Working in conjunction with other offices at EPA and in the federal government, OTAQ has been engaged in international sustainable transportation efforts to reduce air pollution. Building on its successes in the United States, OTAQ offers technical and policy assistance, shares its 30 years of experience, and sponsors clean fuel and vehicle projects with partners in four continents. Bilateral discussions and cooperation between the United States and other countries are an important part of this effort.

A Global Player

EPA is an active participant in several key international environmental efforts including the United Nations' World Forum for Harmonization of Vehicle Regulations and the Partnership for Clean Fuels and Vehicles. At the UN's World Forum, OTAQ has played a leadership role in

Air Quality and Health Across the Globe

- 85 percent of the largest cities in developing countries have unacceptable air quality. Many cities in Asia, such as Bangkok, are faced with levels of suspended particulate matter that are at least twice as high as international health guidelines recommend. The primary reasons: an abundance of vehicles without modern emission control standards and the low quality of available fuel.

- In China, the vehicle population doubled between 2002 and 2004 and contributes 79 percent of the country's air pollution. About 1,000 vehicles a day are added in Beijing alone.

- In Santiago, Chile, the transportation sector is the primary source of air pollution, contributing 92 percent of the city's carbon monoxide emissions, 71 percent of nitrogen oxide emissions, and 46 percent of volatile organic compounds.

- In Mexico City, the transportation sector is responsible for nearly all carbon monoxide emissions, more than 80 percent of nitrogen oxides, and 40 percent of volatile organic compounds.

the development of global technical regulations. This work is initially focusing on harmonizing test procedures for diesel engines and motorcycles. When adopted, these environmentally beneficial procedures will improve compliance determinations worldwide and allow developing countries to move more quickly to state-of-the-art emission standards, bypassing the years of development experienced in the United States and elsewhere. It will also reduce the costs of compliance for engine manufacturers.

The Partnership for Clean Fuels and Vehicles (PCFV) was developed as one of the Bush Administration's initiatives adopted at the World Summit on Sustainable Development in Johannesburg, South Africa in 2002. Through the PCFV, OTAQ works collaboratively with other countries, industry, and public health organizations to eliminate lead in fuels and reduce sulfur in gasoline and diesel fuels, leading to the introduction of clean vehicles and engines. The partnership helps establish demonstration projects that show how installing emission control equipment on diesel buses and trucks, along with using low-sulfur fuels, can reduce local air pollution cost-effectively. For example, in Mexico City, a group has installed emissions-reducing equipment on 30 buses and trucks, which run on clean low-sulfur diesel imported from Texas.

China and OTAQ: A Working Partnership

As in many other countries, the large increase of vehicles in China's major cities has brought severe air pollution. In response, OTAQ and China's State Environmental Protection Administration are working to improve fuel quality, enable cleaner new vehicles, and increase the compliance of vehicles that are on the road now. For example, OTAQ and China are working together to reduce sulfur in fuels and launch a retrofit demonstration project in Beijing. These projects are integral to Beijing's Environmental Protection Bureau's goal of significantly reducing air pollution before the 2008 Olympic Games.

OTAQ has attracted many partners to work on these projects, including Harvard's John F. Kennedy School of Government, Tsinghua University in Beijing, Energy Foundation China, Corning, Cummins, GM, and Ford. These partners are offering their expertise, consultation, equipment donations, funding, and other assistance. OTAQ anticipates that other groups will join in these efforts as well.

Looking Forward

Toward a Cleaner Future

There is no question that significant progress has been made in reducing the transportation sector's impact on the environment. Tens of millions of tons of pollutants have already been reduced, with tens of millions of tons more reductions expected in the years to come. Cars, trucks, buses, and the full range of nonroad engines, such as construction and farm equipment, are cleaner than they have ever been, and there are regulations and standards in place to keep these sources clean well into the future. However, the nation still has notable challenges in meeting the health-based air quality standards, with more than 100 million people living in areas that are not attaining clean air quality levels.

Therefore, OTAQ will continue its efforts to reduce the transportation sector's impact on the environment. By setting and implementing cost-effective standards, establishing policies to address greenhouse gas emissions, developing and bringing innovative clean technologies to market, and expanding voluntary emission reductions programs, EPA will reduce harmful emissions and protect public health and the global environment.

Future challenges for OTAQ include:

- Successfully implementing the ultra low-sulfur diesel fuel program, the 2007 Clean Diesel Truck and Bus Program, and the Clean Air Nonroad Diesel Program.

- Develop proposals for a new generation of locomotive and large marine engine standards, as well as small-spark ignition engine standards.
- Address air toxic emissions from mobile sources.
- Implement provisions of the 2005 Energy Policy Act and the Transportation Act (SAFETEA-LU).
- Expand the National Clean Diesel Campaign.
- Move clean automotive technologies from the lab to the road.
- Develop, strengthen, and expand EPA's innovative, market-based approaches to reduce fuel consumption and greenhouse gas emissions.
- Export EPA's experience and U.S. technology to developing countries.
- Update models and other tools that provide assistance to state, local, and tribal governments in their efforts to achieve air quality goals.

With the demand for transportation and related services growing every year, OTAQ's work has never been more important. We look forward to reporting on these and other accomplishments in the next progress report.

Clean Transportation Milestones

1966

Congress requires minimal emission controls on all model year 1968 and later cars.

1970

EPA is established by a Presidential Executive Order.

Congress adopts the first major Clean Air Act, and gives the new Agency broad responsibility for regulating motor vehicle pollution. The law calls for 90 percent reductions in auto emissions and the phaseout of lead from gasoline.

Approximately 89 million passenger cars are driven on 1.7 million paved roads in the United States.

1971

The National Vehicle and Fuel Emissions Laboratory opens.

1974

Congress adopts the Energy Policy Conservation Act, which establishes fuel economy standards for cars.

1975

The first catalytic converters appear in vehicles. Unleaded gasoline is available in the United States for the first time.

1980

Between 1976 and 1980, as the amount of lead in gasoline dropped by 50 percent, blood-lead levels in children dropped 37 percent.

1981

New cars meet the amended Clean Air Act standards for the first time. Sophisticated three-way catalysts with on-board computers and oxygen sensors appear in most new cars.

1983

Inspection and maintenance programs are established in 64 cities, requiring passenger vehicles to undergo periodic testing for malfunctioning emission control systems.

1985

EPA establishes stringent emission standards for diesel-powered trucks and buses to take effect between 1991 and 1994.

1990

Congress amends the Clean Air Act to require passenger vehicles to meet further reductions in hydrocarbons, carbon monoxide, nitrogen oxides, and particulate matter emissions. Areas with severe ozone problems are required to use reformulated gasoline.

1991

EPA sets more stringent hydrocarbon and nitrogen oxide tailpipe standards for passenger vehicles. These standards, known as the Tier 1 standards, take effect beginning with 1994 models. U.S. blood-lead levels decrease 78 percent compared to 1978.

1993

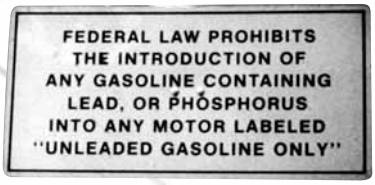
EPA requires the sulfur content of highway diesel fuel be reduced from 2,000 parts per million (ppm) to 500 ppm.

1994

Manufacturers of nonroad engines, including construction, agricultural, airport, and industrial equipment, are required to reduce emissions for the first time.

1996

The Clean Air Act's ban on leaded gasoline officially takes effect.



1997

EPA establishes standards for nitrogen oxides, hydrocarbon, carbon monoxide, particulate matter, and smoke for new and re-manufactured diesel-powered locomotives and locomotive engines.

EPA finalizes the National Low Emission Vehicle program, which achieves substantial air pollution reductions while providing the auto industry flexibility to meet new requirements in the most efficient manner.

1998

OTAQ requires further emission reductions from new nonroad diesel engines.

1999

OTAQ finalizes Tier 2 regulations for passenger cars, SUVs, and light-duty trucks, lowering gasoline sulfur levels by 90 percent.

OTAQ requires new large marine diesel engines (e.g., fishing, tug, and tow boats) to reduce nitrogen oxides and particulate matter emissions. Similar standards are applied to recreational marine engines in 2002.

2000

OTAQ's Clean Diesel Trucks and Buses Rule requires 90 percent emission reductions from engines and cuts sulfur levels in highway diesel fuel by 97 percent (to 15 ppm).

OTAQ launches the Voluntary Diesel Retrofit Program to encourage fleet owners to install pollution-reducing devices and use cleaner-burning fuel in current fleet of diesel vehicles.

2001

OTAQ's Best Workplaces for Commuters℠ program is launched, formally recognizing employers who provide outstanding commuter benefits to their employees.

BEST Workplaces for Commuters℠

2002

The first restrictions on gasoline toxics take effect. Traffic congestion costs U.S. travelers a combined 3.5 billion hours of delay.

2003

OTAQ establishes the Clean School Bus USA Program to reduce children's exposure to diesel exhaust by encouraging idling reduction and cleaner school buses.

The first hydrogen fuel cell vehicle receives OTAQ's approval for mass production.

Approximately 135 million passenger cars are driving on 2.6 million miles of paved roads in the United States.

2004

EPA's landmark Clean Air Nonroad Diesel Rule takes effect, requiring 90 percent reductions in emissions from nonroad diesel equipment and reducing sulfur levels in nonroad diesel fuel by 99 percent.

2005

OTAQ launches the National Clean Diesel Campaign to reduce emissions from existing and future diesel engines.

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