

CLEARING THE AIR ON CLEAN AIR

FOR THE GREATER HOUSTON REGION





HOUSTON



Photos courtesy of Greater Houston Convention and Visitors Bureau

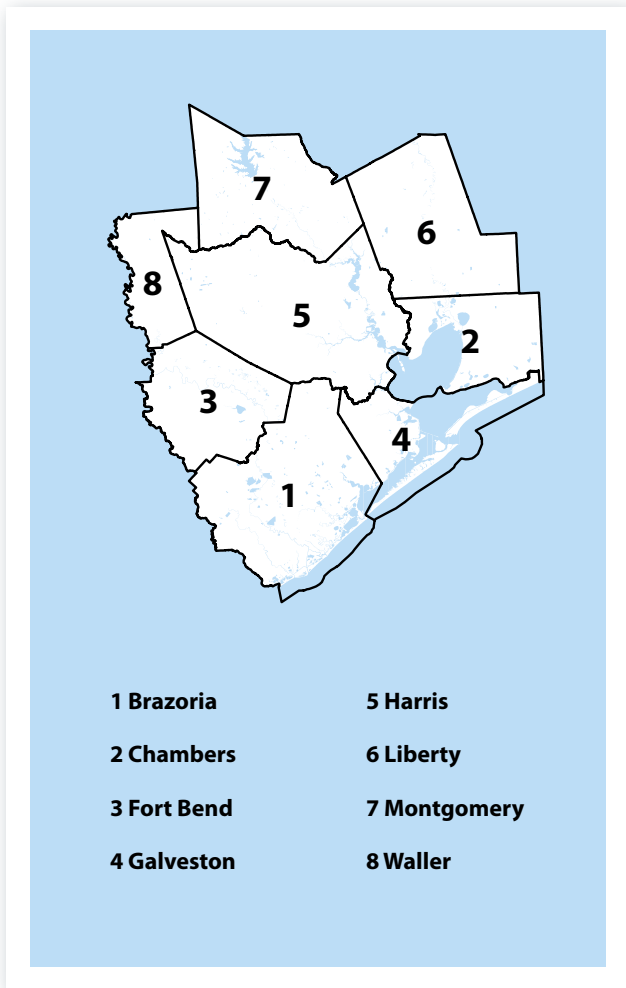
CLEARING THE AIR ON CLEAN AIR

Clean air – it’s something everyone agrees is important to protect public health. Improving air quality while accommodating economic growth continues to be a challenge for cities across the nation. Today, Houston is meeting that challenge. Through the leadership of its business community, local leaders and citizens, the region is working to achieve air quality goals and experiencing dynamic growth.

The Houston-Galveston-Brazoria (HGB) region is in compliance with five of the six *national ambient air quality standards* and has been working steadily to achieve the one-hour ozone standard by the *Clean Air Act* deadline of 2007. A new, more stringent eight-hour ozone standard takes effect in June 2005, and the eight-county region, along with 466 other counties in the United States will need to continue to work to meet that standard by 2010. The foundation of all air quality regulations is the protection of public health and welfare. As a consequence of this foundation, attainment of the ozone standard is designed to be set at a level to protect the public’s health and welfare. Consequently, failure to meet clean air deadlines impacts the health of the region’s residents, the economy and many lifestyle choices.

Great strides have already been made. The Greater Houston Partnership has led the effort through formation of organizations such as the Business Coalition for Clean Air, the Texas Environmental Research Consortium and the Texas Clean Air Working Group. These organizations have worked to develop a consensus on air quality goals and strategies, improve air quality science, and implement effective reduction programs without jeopardizing jobs or economic progress. Business sectors and individual companies have pursued new technologies and programs that make them, and the region, leaders in innovative approaches to cleaning the air.

This brochure highlights some of the ongoing success stories leading to cleaner air in the Houston region.



JUST THE FACTS

Why is growth important to our region?

Growth is vital to cities and regions. Regional economic growth brings more jobs, more opportunity and greater diversity. It can produce higher incomes, upward economic mobility and enhanced urban amenities. The alternative to growth is decay. Cities that fail to attract and foster growth - that are losing jobs, suffering declining property values, and perhaps seeing a decline in population - cannot improve the quality of life for their residents.



WHAT IS OZONE?

Ozone is an odorless, colorless gas made up of three oxygen atoms. It exists in the Earth's upper atmosphere and at ground level. Ozone can be helpful or harmful, depending upon where it is located. Ozone that occurs naturally in the Earth's upper atmosphere — 10 to 30 miles above the Earth's surface — forms a protective layer that shields the planet from the sun's dangerous ultraviolet rays.

Ozone also is formed in the Earth's lower atmosphere, near ground level. Ozone is not directly emitted, but is formed in the atmosphere from the interaction of building blocks, or precursors, chemicals and sunlight. The two ozone precursors are *nitrogen oxides (NOx)* and *volatile organic compounds (VOCs)*. NOx and VOCs are emitted from sources such as cars, power plants, industrial facilities, lawn and garden equipment, planes, ships, locomotives, and naturally occurring sources such as trees and swamps. Ozone is one of the most difficult air pollutants to control because each region has a different set of emissions sources and unique weather patterns.

Ideal weather conditions for ground-level ozone formation include days with light or no winds, few clouds and high

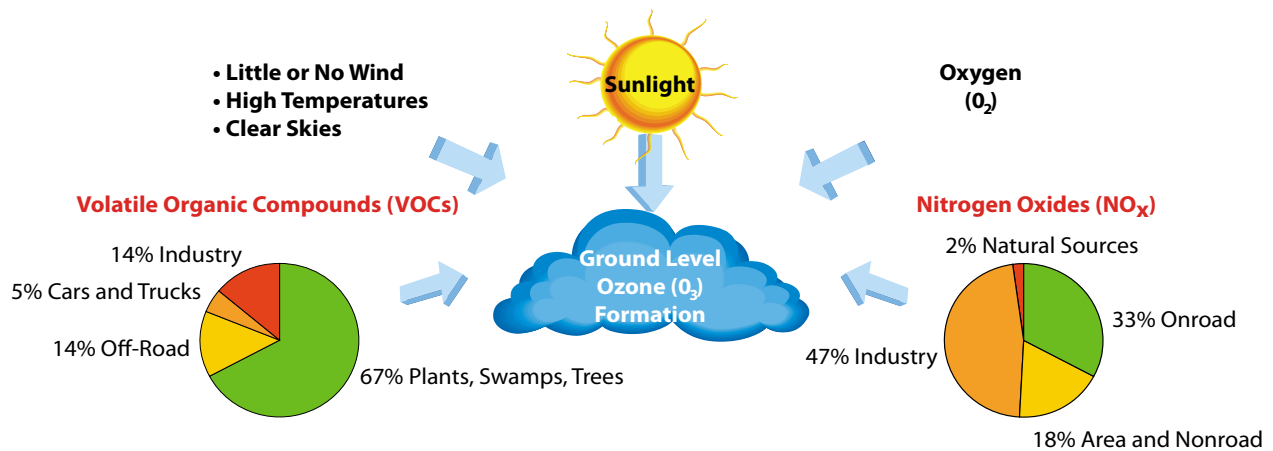
temperatures. The Houston-Galveston-Brazoria region faces a unique challenge in reducing ozone since our weather patterns, particularly in August and September, are often ideal for ozone formation.

Why are We Working to Reduce Ozone?

At ground level, ozone can have adverse health effects. It can be a strong respiratory irritant and can cause lasting lung tissue damage at higher concentrations. Ozone can cause throat irritation, coughing, wheezing, and shortness of breath or chest pains when inhaling deeply outdoors. Children, the elderly, those with respiratory problems and athletes are the most sensitive to ozone's effects.

GROUND LEVEL OZONE FORMATION

States use a federally mandated process to develop a plan to comply with the national ozone standard. The process usually takes about six years from first monitoring high levels of ozone to fully implementing controls.



Source: HGA Attainment Demonstration, August 2000 (TCEQ)

JUST THE FACTS

The Houston region's natural weather patterns have a great effect on ozone concentrations. During years when there are a large number of sunny days with stagnant winds and/or winds that recirculate ozone precursors throughout the region, the eight-county area experiences higher ozone levels and exceeds federal standards more often.

AIR QUALITY PLAN DEVELOPMENT PROCESS

- Monitor Ozone Exceedances
- Inventory All Sources of Emissions
- Develop a Computer Model For Regional Ozone
- Model Control Strategies to Determine Most Effective
- Adopt and Implement Best Strategies
- Monitor Ozone in Attainment

CAN CLEAN AIR AND ECONOMIC GROWTH COEXIST?

Our Region has Grown...

Long gone are the days when Houston was just a small community of 6,642 acres along Buffalo Bayou.

Today Houston is the fourth-largest city, with the third most populous county in the United States, and the Houston Metropolitan Statistical Area ranks eighth in population. Dynamic growth has blurred the boundaries between cities, communities and counties. Between 2000 and 2030, the Houston area is expected to rank fifth among the nation's metro areas in population growth, having added more people than currently live in Baltimore.

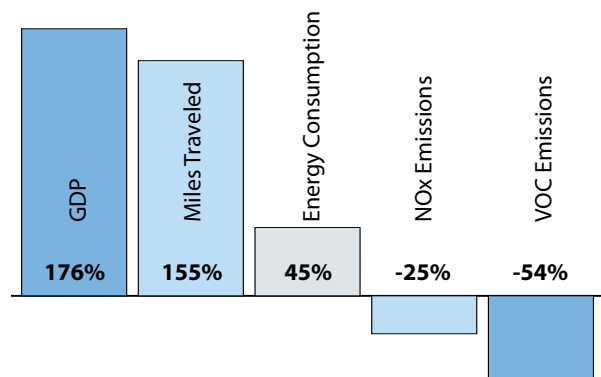
That increase in population means the region will continue to grow, adding more cars and trucks and generating an expected 93 million more vehicle miles traveled each day by 2030. For instance, Fort Bend County alone is the fastest growing county in the United States. Additional people and businesses also create a need for more electricity, fuels for home heating, lawn and garden equipment, construction equipment, and other goods and services that can produce ozone-forming emissions.

...And Air Quality has Improved

Houston along with many other cities has been able to achieve a remarkable goal already - despite its phenomenal growth, the region has been able to steadily reduce ozone exceedance days. The number of days when ozone levels have exceeded the ozone standard has been reduced by 54 percent since 1980. During that same 25-year period, the HGB region developed plans, implemented controls and was able to attain the *particulate matter* and *sulfur dioxide* standards that were previously exceeded. Finally, the Houston region is the largest metropolitan area in the nation that attains the new federal standard for *fine particulate matter*.

DECREASE IN EMISSIONS 1970-2003

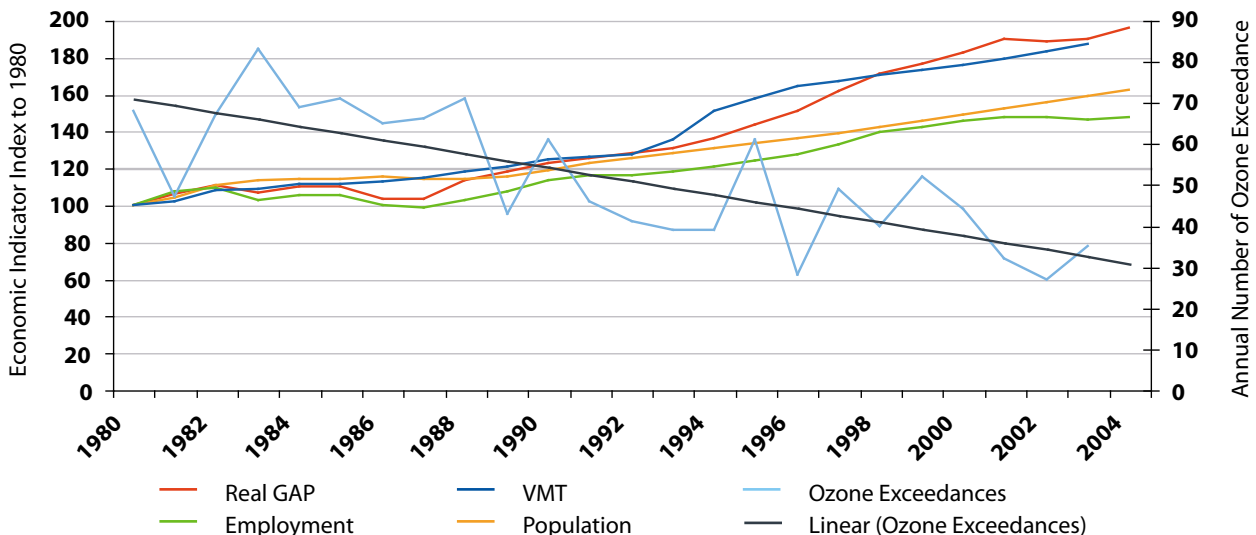
Although the nation's gross domestic product, vehicles miles traveled and energy consumption have increased, the nation still reported an overall decrease in NOx and VOC emissions.



Source: The Ozone Report: Measuring Progress through 2003 (EPA)

HOUSTON GROWS AND OZONE EXCEEDANCES DECREASE

Since 1980 key measures of economic growth - gross area product (GAP), vehicle miles traveled (VMT), population, and employment - have increased significantly. At the same time, the number of ozone exceedances has decreased by an average of 54 percent.



Sources: The Perryman Group, Fall 2004 (GAP, Pop, Empl); Texas Dept. of Transportation (VMT; some years interpolated)

WHAT IS BEING DONE TO REDUCE OZONE?

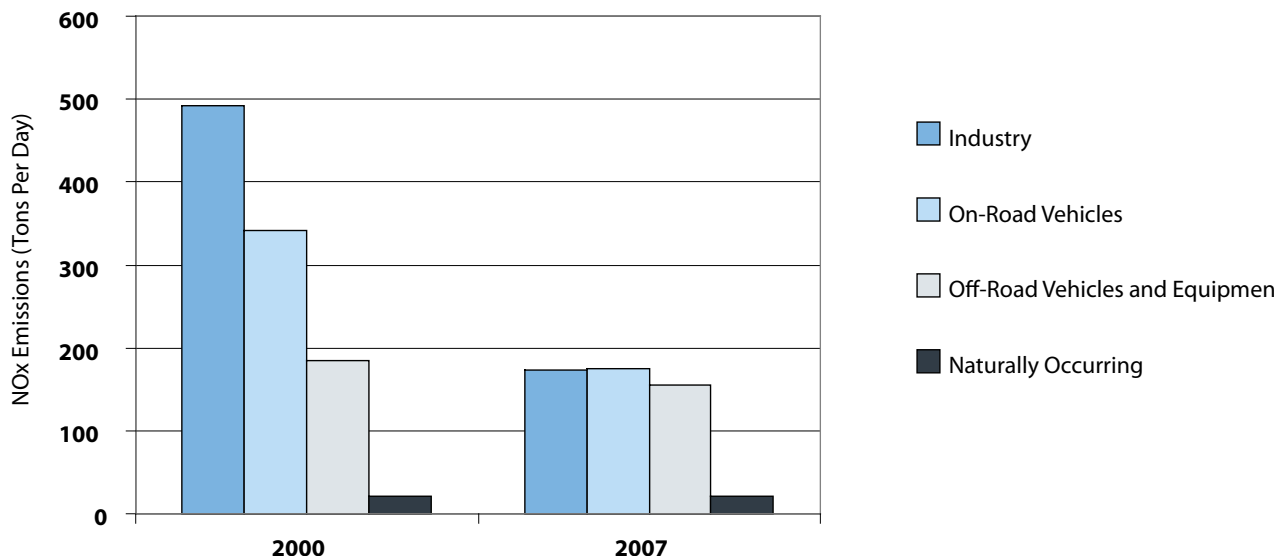
Our region still faces a substantial challenge in reducing one-hour and eight-hour levels of ozone. Over the past four years, the Texas Commission on Environmental Quality (TCEQ) has issued three air quality plans for the region, which contain numerous new *control strategies* designed to bring the area into attainment of the one-hour standard. The plans reflect the best scientific understanding of the nature of ozone formation and control in our region, and they contain some of the most aggressive and innovative control strategies in the nation.

Since 1990 alone, more than 60 new federal, state and local control strategies have been enacted in our region to help achieve the one-hour ozone standard. Some of the most significant programs in recent years include:

- A technology-based suite of controls on more than 20 different types of businesses and industrial processes.
- The Texas Emission Reduction Plan (TERP), which provides approximately \$160 million annually in funds to assist owners of higher-emitting vehicles and equipment to purchase or retrofit their equipment to reduce emissions. This funding also supports new technology, research and development and air quality research through the Texas Environmental Research Consortium.
- Requirements to reduce NO_x by 80 percent from industry and electric utilities
- Cleaner burning gasoline and diesel for vehicles and equipment.
- Auto, truck and equipment emission standards.
- Voluntary agreements by airlines and the Port of Houston to reduce emissions from certain types of equipment and vessels.
- A reduction of more than 64 percent from industrial sources of *highly-reactive volatile organic compounds (HRVOC)*, which contribute to forming the highest levels of ozone.
- Increased monitoring of HRVOCs to help determine the exact mix of emissions from industrial sources.
- Vehicle Inspection and Maintenance, a tailpipe testing program to help ensure that vehicles with excessive ozone-forming emissions are identified and fixed.

NO_x EMISSIONS IN THE HGB IN 2000 (BEFORE CURRENT PLAN RULES) AND AFTER CONTROL IN 2007

The TCEQ's current plan achieves a significant reduction in NO_x by 2007. The most dramatic reductions occur in the industrial sector. The plan also contains a 64 percent reduction in HRVOCs from the industrial sector.



Source: Houston Galveston-Brazoria Ozone Nonattainment Area Revision to the State Implementation Plan adopted by the TCEQ Dec. 1, 2004. www.tceq.state.tx.us

WHY HAVE WE SUCCEEDED SO FAR?

Several features of the current clean air plan ensure that it will be effective in reducing ozone levels while still allowing economic growth in the region. Among the most innovative elements of the plan are the following programs.



Assistance and Incentives for Developing New Technology

The Greater Houston Partnership believes that developing and increasing the use of emissions reduction technology is the best way to improve air quality in our region. Toward that end, the business community has worked diligently to develop and help fund two programs in our state: Texas Emissions Reduction Plan and the New Technology Research and Development Program (NTRDP). Texas Emissions Reduction Plan provides funding to business or fleet owners to help replace or retrofit older, higher-emitting vehicles and equipment. The NTRDP awards grants to support development of emissions-reducing technologies.

Voluntary Agreements

Houston area airlines and the tug, barge and marine towing operators have entered into voluntary agreements with state and local governmental entities to reduce emissions at their facilities. For example, Continental Airlines committed to reduce 75 percent of its NOx emissions from ground support equipment (luggage, airplane towing, servicing and other vehicles) by 2007. Through the Texas Waterway Operators Association, 23 tug, barge and towing companies also agreed to reduce emissions.



Cutting-Edge Science

Understanding the underlying science behind our region's complex ozone problem is key to making the most effective and least costly emissions reductions. One of the most important national scientific breakthroughs of the past four years was understanding the role that highly-reactive volatile organic compounds play in causing the Houston Galveston Brazoria region's highest levels of ozone. As a result, the TCEQ has developed both an hourly and an annual limit on the industrial emissions of these compounds. The State of Texas anticipates that these new rules will play a key role in achieving the ozone standard.

Aggressive and Flexible Rules for Industry Sources

States and the Environmental Protection Agency (EPA) now often set aggressive targets for facilities or business sectors and allow companies themselves to determine how they can best meet them. Facilities that reduce beyond the mandated targets can sell excess emission reduction credits to companies that find it too difficult or costly to meet the targets themselves. In this way, the total amount of emissions is limited to the necessary level, but individual businesses make operational and economic decisions about how to meet them.

EPA RECOGNIZES THE HOUSTON REGION'S EFFORTS:

In March 2003, then EPA Administrator Christine Todd Whitman welcomed participants to a Technological Innovations and Regulatory Flexibility Conference jointly sponsored by the Greater Houston Partnership and the EPA. In her remarks, Whitman praised the Houston State Implementation Plan approach, saying that it reflected a "true partnership." She went on to say that:

"Houston's plan makes extensive use of voluntary measures such as negotiating NOx reduction agreements with owners and operators of tugs and towboats, ferry boats, locomotives,

and airlines and airports. They also agreed to use certain emerging technologies to cut NOx emissions from diesel engines at the Port of Houston. Coupled with these voluntary measures are some powerful economic incentives, including credits for the purchase of cleaner vehicles and for upgrading diesel engines with improved pollution control technology. Now, when it comes to meeting the one-hour ozone standard, Houston is well on its way."

Remarks of Governor Christine Todd Whitman,
Administrator of the U.S. EPA March 13, 2003

SUCCESS STORIES: LEADERS COMMITTED TO IMPROVING AIR QUALITY

On the next few pages are stories of individual companies, business sectors and government agencies that have found ways to comply with or even go beyond the control strategies. These companies use innovative technologies, new methods and commitment to achieve better environmental performance and reduce costs.



JUST ONE POWER COMPANY REDUCED EMISSIONS BY 50,000 TONS PER YEAR

10

Texas Genco is one of the largest wholesale electric power generating companies in the United States, with more than 10,000 megawatts of generation capacity. Texas Genco has one of the most diversified generation portfolios in Texas, using natural gas, coal, oil, lignite and uranium fuels. The company owns and operates 45 generating units at 7 electric power generating facilities, including 6 generating stations in the Houston-Galveston-Brazoria area.



FUEL-EFFICIENT STRATEGIES HAVE A SIGNIFICANT IMPACT FOR INDUSTRY

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Calpine Corporation is an independent power producer that operates 92 power plants in 21 states across the country, including seven gas-fired power plants in the Houston region. These plants produce electricity and steam for industrial customers, and generate electricity for retail electric providers. Their total output is approximately 4,500 megawatts.



SWITCH TO CLEAN DIESEL PROVES EFFICIENT AND ENVIRONMENTALLY FRIENDLY

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Houston-based Silver Eagle Distributors is the second-largest distributor of Anheuser-Busch beer products in the United States. It operates more than 600 vehicles and pieces of equipment, including a fleet of more than 150 diesel-powered tractors that consume more than 1 million gallons of diesel fuel annually.



REDUCING LOCOMOTIVE EMISSIONS SAVES MONEY AND CLEANS THE AIR

13

Burlington Northern Santa Fe (BNSF) was created in 1995 from the merger of Burlington Northern Incorporated and Santa Fe Pacific Corporation. The company, headquartered in Fort Worth, employs about 38,000 people and operates one of the largest railroad networks in North America, with 33,000 route miles covering 28 states and two Canadian provinces. In the Houston region, BNSF has a seven-train yard, with 21 locomotives. In addition, nine trains originate in the Houston-Galveston area and travel hundreds of miles to various locations.



ADVANCED CARGO HANDLING REDUCES EMISSIONS AND SETS INDUSTRY STANDARDS

14

The Port of Houston Authority (PHA) owns and operates the public facilities located along a 25-mile-long complex of diversified public and private facilities designed for handling general cargo, containers, grain and other dry bulk materials, project and heavy-lift cargo, and other types of cargo. Each year, more than 6,600 vessels call at the Port, which ranks first in the United States in foreign waterborne tonnage, second in overall total tonnage and sixth in the world overall.



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The Challenge

The HGB air quality plan calls for a reduction of approximately 88 percent of NOx emissions from electric power generators, which is among the most stringent level of reductions for any industrial category anywhere in the nation. After performing a control technology selection and costs study, Texas Genco moved forward with a plan to achieve an approximate 88 percent reduction on an annual basis.

The Solution

To reach that NOx reduction goal, Texas Genco made a capital investment in excess of \$600 million through 2004 to install selective catalytic reduction (SCR) technology, a type of exhaust gas treatment for certain industrial processes, and combustion controls on coal-and gas-fired boilers and gas turbines.

The Outcome

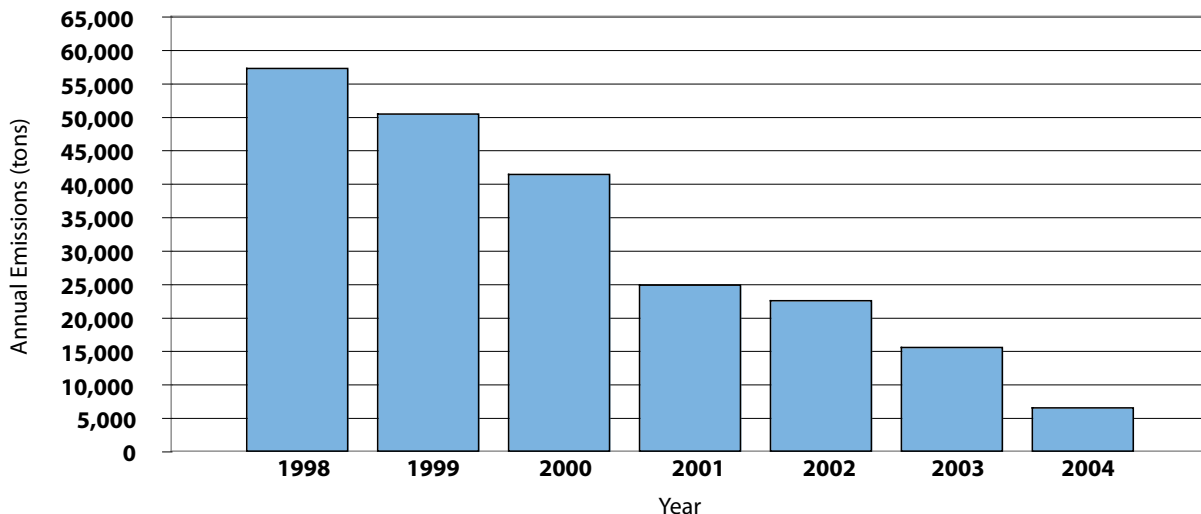
As a result of emissions controls instituted by Texas Genco between 1998 and 2004, Texas Genco has reduced NOx emissions from its coal and gas units 88 percent. By 2004, its overall annual emissions reductions had reached 40,000 tons per year. The Texas Genco system operates with one of the lowest NOx production rates in the United States. With all four SCRs operational by spring 2004, the W.A. Parish coal units are now among the lowest NOx-emitting coal units in the nation.



Texas Genco's W.A. Parish coal-fired power plant, a four-unit, 2,620-megawatt facility located in Fort Bend County, is among coal plants with the lowest NOx emissions in the nation. Photo courtesy of Texas Genco.

TEXAS GENCO'S HOUSTON AREA NOx EMISSIONS

Chart shows how total NOx emissions from Texas Genco facilities in the HGB region have declined over time with the implementation of various new controls.



FUEL-EFFICIENT STRATEGIES HAVE A SIGNIFICANT IMPACT FOR INDUSTRY

Calpine Corporation is an independent power producer that operates 92 power plants in 21 states across the country, including seven gas-fired power plants in the Houston region. These plants produce electricity and steam for industrial customers, and generate electricity for retail electric providers. Their total output is approximately 4,500 megawatts.



Photo courtesy of Calpine Corporation

The Challenge

Newer sources in the Houston region are held to stringent emission standards, which require that power producers operate as efficiently as possible. Calpine's "host facilities," mainly chemical plants and refineries, require steam and electricity to be produced in an environmentally friendly and cost-efficient way.

The Solution

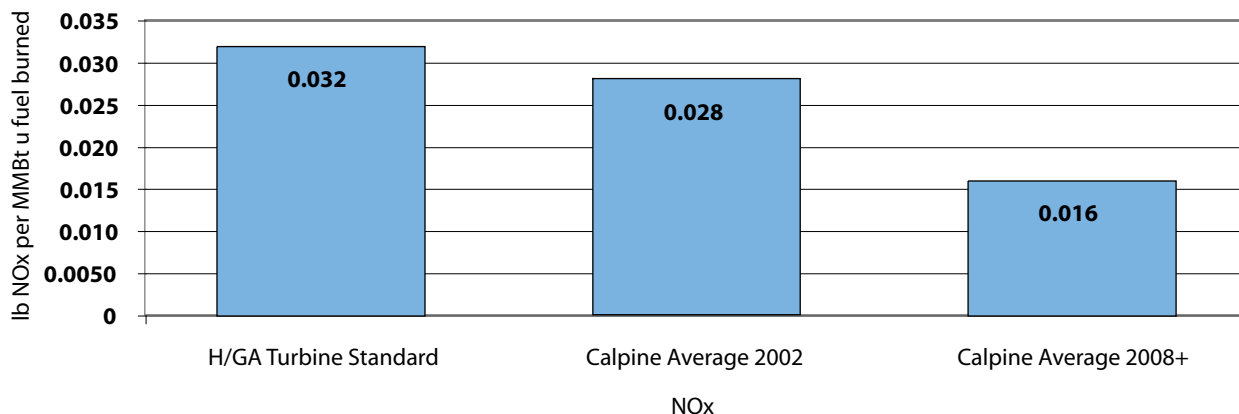
Calpine uses natural gas-fired, combined-cycle turbine technology, which is more fuel-efficient than traditional single-cycle turbines. More steam and electricity can be generated using less fuel. Calpine has permanently retired many older, less fuel-efficient steam boilers at its host facilities, thus reducing the total emissions from generation of needed power and steam. In addition, some of Calpine's facilities now use waste gas from the host facilities as fuel, which eliminates the need for disposal.

The Outcome

Reductions in NOx emissions from Calpine's Houston area host facilities total approximately 3,600 tons. In addition, Calpine has targeted approximately 1,200 tons of future NOx reductions through process and efficiency improvements. The environmentally friendly technology employed by Calpine reduces emissions and creates low-cost steam and electricity that will help keep the region attractive to new industries and businesses for years to come.

NOx STANDARD COMPARISON

Chart shows the projected decrease in NOx emissions in pounds per million British thermal units (BTU) of fuel burned at Calpine plants compared to a standard turbine plant, versus Calpine's facilities in 2002 and expected average emissions in 2008 as a result of more efficient fuel strategies.



SWITCH TO CLEAN DIESEL PROVES EFFICIENT AND ENVIRONMENTALLY FRIENDLY



Houston-based Silver Eagle Distributors is the second-largest distributor of Anheuser-Busch beer products in the United States. It operates more than 600 vehicles and pieces of equipment, including a fleet of more than 150 diesel-powered tractors that consume more than 1 million gallons of diesel fuel annually.

The Challenge

Silver Eagle wanted to reduce diesel emissions from its fleet as part of a commitment to the health and safety of its workers and the public. Silver Eagle has been actively involved in the study and application of various alternative fuel technologies for several years.

The Solution

Silver Eagle elected to convert 42 of its 163 trucks to “green-diesel technology.” This new technology uses a diesel particulate filter coated with a catalyst and low-sulfur fuel in combination with an engine performance design that significantly lowers the emissions and odor of diesel-powered buses and trucks. Silver Eagle plans to outfit its entire fleet with emission-reduction equipment by 2007, when new federal regulations on heavy-duty diesel engines take effect.

The Outcome

These trucks will reduce NOx emissions by 8.9 tons annually, with an annual fuel savings of \$686 per truck. Silver Eagle was recognized by the Houston-Galveston Area Council as the first privately owned fleet in Texas to convert to clean-diesel technology.



Photos courtesy of Silver Eagle Distributors/F. Carter Smith

REDUCING LOCOMOTIVE EMISSIONS SAVES MONEY AND CLEANS THE AIR



Burlington Northern Santa Fe (BNSF) was created in 1995 from the merger of Burlington Northern Incorporated and Santa Fe Pacific Corporation. The company, headquartered in Fort Worth, employs about 38,000 people and operates one of the largest railroad networks in North America, with 33,000 route miles covering 28 states and two Canadian provinces. In the Houston region, BNSF has a seven-train yard, with 21 locomotives. In addition, nine trains originate in the Houston-Galveston area and travel hundreds of miles to various locations.

The Challenge

Locomotives are considered an environmentally efficient way to move goods, yet they are still contributors to air pollution. Even though locomotive engines being produced today must meet emissions standards set in 1997, they continue to emit relatively large amounts of NOx.

The Solution

BNSF recognized the importance of improving air quality while maintaining a strong and viable railroad community and chose a variety of efforts to reduce locomotive emissions in the area and save on fuel costs at the same time. Among current fuel-saving and emissions-reduction measures impacting Houston are efforts to:

- Reduce locomotive idling
- Improve fuel injectors and maintenance procedures
- Install low-torque bearings
- Improve aerodynamic drag
- Reduce unloaded car weights
- Use more fuel-efficient and lower-emission locomotives
- Relocate some facilities
- Improve wheel and rail lubrication
- Control train power levels and train speed

The Outcome

BNSF partnered on a demonstration project with Texas Emission on Environmental Quality and the Southwest Research Institute to evaluate a new system to reduce fuel consumption and significantly reduce idle time of locomotive engines. The new system has received a Clean Air Excellence Award from the EPA and a Texas Environmental Excellence Award from TCEQ.



Photo courtesy of BNSF

BNSF's efforts to reduce locomotive emissions will result in a fuel saving of 23,000 gallons of fuel per locomotive per year. NOx reductions as a result of the technology being implemented in the Houston-Galveston region are expected to reach 4.9 tons per year.



ADVANCED CARGO HANDLING REDUCES EMISSIONS AND SETS INDUSTRY STANDARDS

The Port of Houston Authority (PHA) owns and operates the public facilities located along a 25-mile-long complex of diversified public and private facilities designed for handling general cargo, containers, grain and other dry bulk materials, project and heavy-lift cargo, and other types of cargo. Each year, more than 6,600 vessels call at the Port, which ranks first in the United States in foreign waterborne tonnage, second in overall total tonnage and sixth in the world overall.

The Challenge

The PHA has been actively involved in the development of the Houston-Galveston area State Implementation Program since 1998. However, neither the PHA nor the TCEQ were convinced estimates for air emissions from port sources were accurate. The TCEQ had no inventory for cargo-handling equipment, and ship *emission inventories* were conducted using extremely broad and highly uncertain assumptions.

The Solution

With assistance from the TCEQ, the PHA developed accurate, concise emissions inventories. The PHA also became the first entity in the area to test innovative technologies in place for off-road diesel engines. This was accomplished because the PHA made a concerted effort to focus on reductions of NOx, VOCs and particulate matter.

The Outcome

The PHA's demonstration ultimately led to the use of a specific diesel emulsion fuel, PuriNOx, in cargo-handling equipment at the Barbours Cut Container Terminal. The PHA continues to conduct demonstration testing on a variety of technologies for reductions in NOx and particulate matter emissions from diesel engines in cargo-handling equipment. As an example, use of the diesel emulsion promises a 25 percent reduction in NOx and a 30 to 50 percent reduction in particulate matter. After four years, the PHA has demonstrated that alternative fuels for off-road vehicles are a successful component in the balancing of environmental and business goals.



Photo courtesy of Port of Houston Authority

The Port of Houston is the sixth-largest port in the world. The Port used innovative testing protocols to identify emission sources and switched to use of specific diesel-emission fuels in its cargo-handling equipment to reduce emissions.



Photo courtesy of Port of Houston Authority

HOUSTON AREA INDUSTRIAL EMISSIONS REDUCTION PROGRAMS

The HGB area's electric generating, fuels refining and petrochemical industry is one of the largest in the world. It provides 22.8 percent of all refined petroleum products in the United States and nearly 40 percent of the nation's base petrochemicals manufacturing capacity.

The Challenge

Stringent reductions in NOx and highly-reactive volatile organic compound from industrial facilities are required by the Clean Air Plan for the HGB nonattainment area. These reductions must occur while the fuels refining industry delivers cleaner-burning gasoline nationwide and prepares to deliver cleaner-burning diesel in 2006. At the same time, industry must engineer and install a comprehensive new HRVOC monitoring system at its facilities.

The Solution

Industry has launched a number of mandatory and voluntary programs to meet its emissions reduction targets, produce cleaner fuels for the nation and lead the effort on improved source and regional monitoring.

Outcome

The programs being implemented by the industrial community include:

Emission Reductions:

NOx emissions from industry are being reduced by approximately 80 percent.

In 2001, the fuels refining and petrochemical industry members of the East Harris County Manufacturers Association (EHCMA) began a multi-year effort to reduce VOC emissions associated with short-term events, such as scheduled startup, shutdown and maintenance activities, plus unscheduled emissions events.

In addition, emissions also are being reduced by terminating manufacturing operations. In some manufacturing locations, owners have found it most economic to shutdown Houston area facilities and either exit businesses or manufacture products in other more cost-efficient facilities.

Improved Monitoring:

The industrial community continues to invest in monitoring, both at individual facilities and within the region. An improved leak monitoring and repair program for HRVOC *fugitive sources* began in early 2004. The Ambient Air Monitoring Network in Houston added seven new VOC monitoring stations in the Houston area in the summer 2004. State-of-the-art monitoring for NOx emissions from large sources will be installed by April 2005. Finally, continuous emissions monitoring for *flare* and *cooling tower* sources of HRVOC will be in place by the end of 2005.

New Technology:

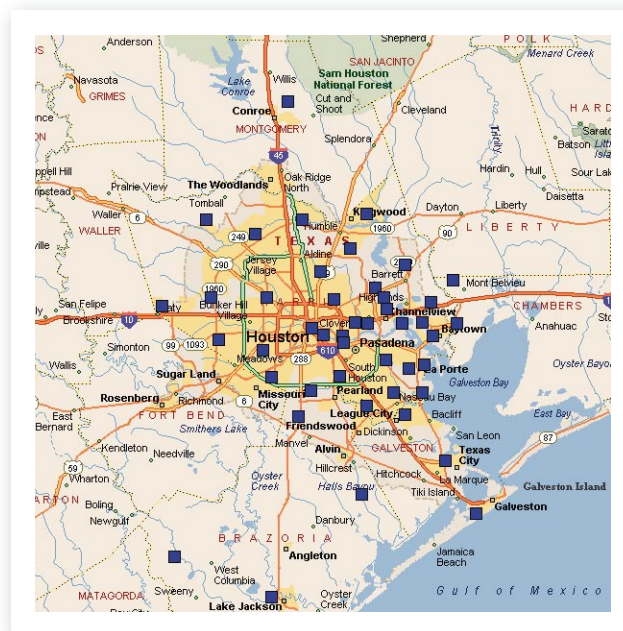
Significant new combustion technology has been developed by a consortium, including the Department of Energy, Callidus, Arthur D. Little and ExxonMobil. These advances are rapidly being put into place in many hundreds of process heaters and boilers in the Houston area.

Cleaner Burning Fuels:

The 11 refineries in the Houston area are participating in a federal program to produce cleaner-burning gasoline and diesel fuel for vehicles nationwide. These federal fuel program benefits begin with cleaner gasoline production in 2004 and cleaner diesel in 2006. In addition, some Texas refineries are producing and supplying a specialty diesel fuel in limited volumes in Texas.

OZONE MONITORING IN HGB REGION

See page 22 for larger map of area ozone monitors



Source: Map Courtesy of Houston Regional Monitoring Corporation.

JUST THE FACTS

Ozone Monitoring

The Houston area ozone monitoring network includes 45 ozone monitors operated by the Texas Commission on Environmental Quality, Harris County, City of Houston and industry-sponsored networks. The Los Angeles area, with roughly twice our population, operates 37 monitors.

GOVERNMENT ENTITIES INVEST IN AIR QUALITY

Elected officials across the region and state have contributed to improving Houston's air quality in a variety of ways from supporting increased funding to improve air quality science to reducing emissions in city or county fleets.

The City of Houston, pursuant to its Emission Reduction Plan, has been aggressively identifying and using technologies to reduce and remove emissions from its operations. The City has made the plan available for use as a template by municipalities and other entities on the City of Houston web site, <http://www.ci.houston.tx.us/citygovt/mayor/cleanair.pdf>

In 2000, the City implemented a diesel demonstration project to analyze technologies suitable for use on its large fleet of diesel vehicles and equipment. As a result, the City is installing emission controls on 96 of its heaviest-usage garbage trucks and excavators, reducing NOx by up to 80 percent and particulate emissions by up to 90 percent. The project also led to the creation of a partnership between the City and the University of Houston to build a laboratory in Houston to monitor the effectiveness of these, and other emission controls, and to assess other equipment and technologies suitable for retrofit. Once these applications are identified, emission controls will be installed on these vehicles as well.



Photo courtesy of University of Houston/Jeff Shaw

Steve Jeane, lab technician, and Rachel Muncrief, a chemical engineering graduate student, work in the “command center” at the Diesel Vehicle Research and Testing Facility at the University of Houston.

CITY OF HOUSTON



To date the City has utilized a variety of means and technologies to reduce its contribution to the region's air emissions. These include:

- Purchasing 99 hybrid-electric vehicles, with the intent to increase this number in 2005.
- Using low emission, ultra-low sulfur diesel fuel in its fleet operations.
- Implementing Urban Heat Island strategies such as tree planting and cool roofing to remove emissions or to mitigate the environmental triggers which result in the creation of NOx.
- Buying the cleanest-available technology such as electric forklifts instead of propane or gasoline units.
- Reducing the number of miles driven by using "Blackberry" technology to communicate citizen requests and receive inspection reports from employees in the field instead of having them commute to a distant office.
- Providing bus passes to more than 1,000 of its employees.

HARRIS COUNTY



Harris County has undertaken an aggressive program to reduce energy consumption and improve air quality through:

- Initiating EPA's Green Lights and Building Star Programs in 1997;
- Conducting an audit of 135 county facilities that identified energy efficiency improvements that initiated facility upgrades to include energy management systems, occupancy sensors, energy-efficient motors, new chillers, new technology components for lighting and other energy measures;
- Construction of a new central plant facility that provides chilled water and steam heat to eight downtown buildings, which resulted in lower utility consumption and cost savings, reduced maintenance time and expense, greater occupant comfort, and increased facility value and cleaner air through reduced electricity demand; and
- Founding member and continues to participate in the Public Power Pool, an electricity aggregation group.

Based on Harris County's electricity costs per total facility square foot in 1998, the savings to taxpayers from the former have totaled \$4.2 million per year or \$21 million from 1999 through 2003. During the same period, the County's facilities' square footage increased 75 percent while the electricity cost per square foot decreased 39 percent.

In June 2004, Harris County was recognized by the State Comptrollers Office, the State Energy Conservation Office and the Texas Energy Partnership for the County's efforts in energy efficiency and improving air quality in the State of Texas.

GIVING COMMUTERS NEW CHOICES IMPROVES AIR QUALITY

Driving in the Houston area produces an estimated 89.65 million vehicle miles per day traveled. Those million miles traveled result in emissions released into the air.

The Challenge

One of the most significant challenges faced in improving Houston's air quality is to engage the individual motorist in the problem and the solution. Because so many trips involve work/home commuting, helping employers encourage that effort is a key component of the solution.

The Solution

In 2003, business interests and local governmental entities launched the Houston/Galveston version of "Best Workplaces for Commuters," a competition endorsed by the EPA as a way for companies to demonstrate their ongoing commitment to improve quality of life for employees by offering commuter benefits, while contributing to improved air quality throughout the region.

Employers may qualify either through a review of their existing commuter benefits or by receiving assistance to implement commuter benefits. To qualify for the designation, a company must offer:

- At least one primary commuter benefit, including a \$30-minimum monthly transit/vanpool pass subsidy to employees, monetary compensation to employees as a trade-out for free or subsidized parking, or a teleworking program that reduces 6 percent of monthly commute trips.
- Up to three supporting benefits depending on employer size, which can range from participating in a regional transportation or air quality program to providing shuttles from transit stations.
- A central point of contact within the company that actively informs employees of available commuter benefits.

The Outcome

The "Best Workplaces for Commuters" program is coordinated by the Commute Solutions program of the Houston-Galveston Area Council. Thus far, 46 employers ranging from business to local government entities and the nonprofit sector have earned the title. For more information go to www.commutesolutions-hou.org

JUST THE FACTS

One of the most effective ways to reduce air pollution is to drive smart and drive less.

Source: Your Guide To Clean Air: How You Can Help Improve Air Quality in North Texas, North Texas Clean Air Coalition, prepared in 2000 in cooperation with the Texas Department of Transportation, U.S. Department of Transportation, Federal Highway Administration and Federal Transit Administration.



WHAT DOES THE FUTURE HOLD?

Protection of public health and welfare is the foundation of all air quality regulation. The Greater Houston Partnership and its members support our region's ongoing efforts to improve air quality while maintaining economic growth.

On Dec. 1, 2004, the TCEQ adopted the Mid-Course Review State Implementation Plan for the region. This plan represents the culmination of years of scientific and technical analysis and contains the control strategies that are needed to bring the region into attainment of the one-hour ozone standard. As important as this milestone is, there is still considerable work facing the region.

TCEQ has already begun planning for achieving the new eight-hour ozone standard for the region. Early indications are that it will take large amounts of new emission reductions to meet the standard. Reductions from the on-road and nonroad mobile source sectors will be increasingly important. Over the past three years, the EPA has finalized a number of important new rules to reduce VOC and NOx emissions from these sources - cars, trucks, locomotives, construction equipment, fuels and others. Most of the emission reductions from these rules will be phased in over the next few years as existing vehicles and equipment age and are replaced

by newer models. The Harris Galveston Brazoria region has been assigned an attainment date of 2010 for the new standard, and only about 30 percent of the eventual emission reductions will have occurred by that time. The region will have to adopt substantial new rules to achieve the needed reductions. The Greater Houston Partnership believes that the emission reductions from the federal rules and the attainment dates will need to be harmonized to allow these cost-effective reductions to take place.

The Greater Houston Partnership also supports continued funding for the Texas Emissions Reduction Plan and scientific and technical research programs. These programs help ensure that we are pursuing the most effective ozone control strategies possible for our region, and that new technologies are developed to achieve those reductions cost-effectively.

By working together, the Greater Houston Partnership believes that local leaders, businesses and citizens can have a tremendous impact on air quality, ensuring that the Houston-Galveston-Brazoria region continues to be a great place to live, work, learn and play.



Photo courtesy of Mike Mallory

GLOSSARY

Attainment area — A geographic area in which levels of a criteria air pollutant meet the health-based standard (national ambient air quality standard, or NAAQS) for the pollutant. An area may have an acceptable level for one criteria air pollutant but may have unacceptable levels for others. Thus, an area could be both in attainment and nonattainment at the same time. Attainment areas are defined using federal pollutant limits set by EPA.

Carbon monoxide (CO) — A colorless, odorless, poisonous gas produced by incomplete burning of carbon-based fuels, including gasoline, oil and wood. Carbon monoxide is also produced from incomplete combustion of many natural and synthetic products. For instance, cigarette smoke contains carbon monoxide. When carbon monoxide gets into the body, the carbon monoxide combines with chemicals in the blood and prevents the blood from bringing oxygen to cells, tissues and organs. Carbon monoxide exposures are especially harmful to people with heart, lung and circulatory system diseases.

Clean Air Act — The original Clean Air Act was passed in 1963, but the national air pollution control program is actually based on the 1970 version of the law. The 1990 Clean Air Act Amendments are the most far-reaching revisions of the 1970 law. The Clean Air Act is the statute that defines the national air pollution control program. Among other things, it sets standards for air quality, spells out the relationship between the states, local areas and the federal government, and tells each what their responsibility is to clean up various kinds of air pollution.

Combustion — Burning. Many important pollutants such as sulfur dioxide, nitrogen oxides and particulates are combustion products and often products of the burning of fuels such as coal, oil, gas and wood. Fuel combustion predominantly supplies the energy for our society

Control strategy, Control measure, Control technology — Equipment, processes or actions used to reduce air pollution. The extent of pollution reduction varies among technologies and measures.

Cooling tower — A water cooling system used in industry or other applications to cool a fluid by partial evaporation before reusing it as a coolant. A cooling tower works by passing water over a number of tubes or fins that act as a heat-transfer surface.

Criteria air pollutants — A group of very common air pollutants regulated by EPA on the basis of criteria (information on health and/or environmental effects of pollution). Criteria air pollutants are widely distributed all over the country.

Emission — The release of pollutants into the air from a source. We say sources emit pollutants.

Emissions Inventory — An annual emissions survey required by TCEQ. Industrial sites such as chemical plants, refineries, manufacturing facilities, and power plants must submit emissions inventories, which report total annual emissions of pollutants from emission sources.

Fine Particulate Matter — Particles that are less than 2.5 microns in diameter.

Flare — An open flame used to burn off unwanted natural gas and other industrial emissions. Most flares in use in the HGB area destroy about 98-99 percent of the gas and emissions that are routed to them.

Fugitive emission — Any volatile organic compound entering the atmosphere that could not reasonably pass through a stack, chimney, vent or other functionally equivalent opening designed to direct or control its flow.

Highly reactive volatile organic compounds (HRVOCs) — HRVOCs are a subset of volatile organic compounds (defined below). These compounds are the most reactive of the VOCs. They are able to form more ozone, and faster, in reactions with nitrogen oxides than other VOCs. In the HGB region, HRVOCs are responsible for some of the highest ozone readings and are the subject of a major new control program by the TCEQ.

Inspection and maintenance program (I/M program) — Auto inspection programs are required for some nonattainment areas. These periodic inspections, usually done once a year or once every two years, check whether a car is being maintained to keep emissions down and whether emissions control systems are working properly. Vehicles that do not pass inspection must be repaired.

Mobile sources — Moving objects that release pollution. Mobile sources include cars, trucks, buses, planes, trains, motorcycles and gasoline-powered lawn mowers. Mobile sources are divided into two groups: on-road vehicles, which includes cars, trucks and buses; and nonroad vehicles, which includes trains, planes and lawn mowers.

Monitoring — Measurement of air pollution is referred to as monitoring. EPA, state and local agencies measure the types and amounts of pollutants in community air. The 1990 Clean Air Act requires states to monitor community air in polluted areas to check whether the areas are being cleaned up according to schedules set out in the law. Certain large emission sources also are required to perform enhanced emission source monitoring to provide an accurate picture of their emissions.

National ambient air quality standards (NAAQS) — Standards established by EPA to regulate the criteria pollutants (see above). NAAQS have been set for ozone, particulate matter, sulfur dioxide, nitrogen dioxide, lead and carbon monoxide.

Nitrogen oxides (NOx) — A group of compounds, including nitrogen dioxide, a criteria air pollutant. Nitrogen oxides are produced from burning fuels, including gasoline and coal. Nitrogen oxides are ozone building blocks, which react with VOCs to form smog. Nitrogen oxides also are major components of acid rain.

Nonattainment area — A geographic area in which the level of a criteria air pollutant is higher than the level allowed by the federal standards. A single geographic area may have acceptable levels of one criteria air pollutant but unacceptable levels of one or more other criteria air pollutants; thus, an area can be both in attainment and nonattainment at the same time.

Ozone — A criteria air pollutant. Ozone is a gas which is a variety of oxygen. The typical oxygen gas found in the air consists of two oxygen atoms stuck together. Ozone consists of three oxygen atoms stuck together to form an ozone molecule. Smog's main component is ozone; this ground-level ozone is a product of reactions among chemicals produced by burning coal, gasoline and other fuels as well as chemicals found in products, including solvents, paints, hairsprays, etc.

Particulates, Particulate matter — A criteria air pollutant. Particulate matter includes dust, soot and other tiny bits of solid materials that are released into and move around in the air. Particulates are produced by many sources, including the burning of diesel fuels by trucks and buses, incineration of garbage, mixing and application of fertilizers and pesticides, road construction, industrial processes such as steel making, mining operations, agricultural burning (field and slash burning), and the operation of fireplaces and woodstoves. Particulate pollution can cause eye, nose and throat irritation and other more serious health problems, even death. Currently, there are two particulate matter standards, a standard for larger particles (more than 10 microns in diameter) and fine particles (those under 2.5 microns in diameter). PM2.5 is associated with more severe health effects, because the smaller particles can be inhaled deeper into the lungs.

Pollutants (pollution) — Unwanted chemicals or other materials found in the air. Pollutants can harm health, the environment and property. Many air pollutants occur as gases or vapors, but some are very tiny solid particles including dust, smoke or soot.

Source — Any place or object from which pollutants are released. A source can be a power plant, factory, dry cleaning business, gas station or farm. Cars, trucks and other motor vehicles are sources, and consumer products and machines used in industry can be sources too. Sources that stay in one place are referred to as stationary sources; sources that move around such as cars or planes are called mobile sources.

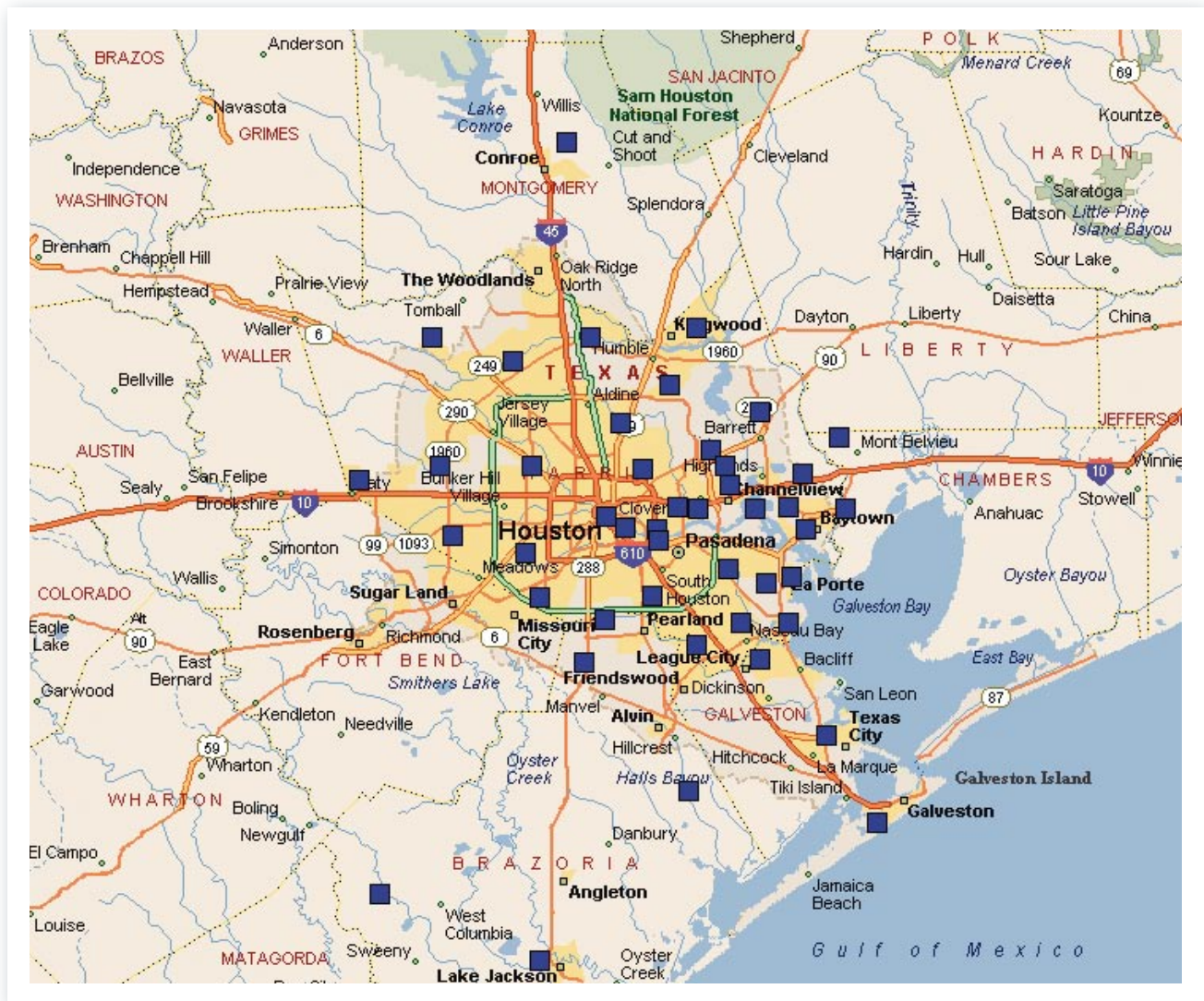
State implementation plan (SIP) — A detailed description of the programs a state will use to carry out its responsibilities under the Clean Air Act. SIPs are collections of the regulations used by a state to reduce air pollution. The Clean Air Act requires that EPA approve each state implementation plan. Members of the public are given opportunities to participate in the review and approval of state implementation plans.

Stationary source — A place or object from which pollutants are released and which does not move around. Stationary sources include power plants, gas stations, incinerators, houses etc.

Sulfur dioxide — A criteria air pollutant. Sulfur dioxide is a gas produced by burning coal and other sulfur containing fuel most notably in power plants. Some industrial processes such as production of paper and smelting of metals produce sulfur dioxide. Sulfur dioxide is closely related to sulfuric acid, a strong acid. Sulfur dioxide plays an important role in the production of acid rain.

Volatile organic compounds (VOCs) — Organic chemicals all contain the element carbon (C); organic chemicals are the basic chemicals found in living things and in products derived from living things such as coal, petroleum and refined petroleum products. Many of the organic chemicals we use do not occur in nature, but are synthesized by chemists in laboratories. Volatile chemicals produce vapors readily; at room temperature and normal atmospheric pressure, vapors escape easily from volatile liquid chemicals. VOCs include gasoline, industrial chemicals such as benzene, solvents such as toluene and xylene, and tetrachloroethylene (perchloroethylene, a dry cleaning solvent). VOCs also are emitted from natural sources such as trees, plants and swamps.

OZONE MONITORS IN HOUSTON GALVESTON-BRAZORIA REGION



Detailed map of ozone monitoring locations. For current data on specific monitors, visit the TCEQ website at www.tnrc.state.tx.us/cgi-bin/monops/select_curlev.

FOR MORE INFORMATION

For additional information on air quality issues, please visit the following organizations and their Web sites:

Houston-Galveston Area Council (H-GAC) Transportation Department works on the region's efforts to meet federal Clean Air Act standards through its Clean Air Action, Clean Cities/Clean Vehicles and Commute Solutions programs.
<http://www.h-gac.com/HGAC/Departments/Transportation/Air+Quality.htm>

Texas Commission on Environmental Quality is the environmental agency for the State of Texas.
<http://www.tceq.state.tx.us/index.html>

U.S. Environmental Protection Agency, Region 6, headquartered in Dallas, oversees enforcement of federal environmental regulations in Arkansas, Louisiana, New Mexico, Oklahoma and Texas, as well as for 66 Indian tribes.
<http://www.epa.gov/region6/>

Texas Clean Air Working Group
<http://www.cuc.org/tcawg/>

For specific information on ozone concentrations in Texas, visit:

Texas Commission on Environmental Quality
<http://www.tnrcc.state.tx.us/air/monops/ozoneindx.html>

EPA Ambient Monitoring Technology Information Center
<http://www.epa.gov/ttn/amtic/>

Harris County Office of Emergency Management
http://ozone.hcoem.org/ozone_subscribe.php



Photo courtesy of Mike Mallory

