



FREQUENTLY ASKED QUESTIONS

About Houston's Air Quality

Houstonairquality.com

Is Houston's air quality getting better or worse?

Houston's air quality has dramatically improved since the late 1980s, and it's no accident. Despite hot, humid summer weather that makes for ideal ground level ozone formation and being home to the largest concentration of petrochemical and refining facilities in the nation, Houston remains compliant with five out of the six federal health-based standards for common air pollutants.

Furthermore, since 2010, the Houston region has added more than 736,000 residents, the largest growth of any U.S. metro area during this time period. With rapid regional growth, more businesses and industrial facilities are being built or expanded, more homes are being constructed and powered, more cars are on the streets and highways, and more consumer products are being used. Due to the combined efforts of many – business and industry, local, state and federal government, and individual citizens – the Houston region has been able to maintain economic growth while achieving substantial air quality improvements.

What are the sources of air pollution in Houston?

Air pollutants may exist as solid particles, liquid droplets or gases and may originate from:

1. Large stationary sources – refineries, power plants, smelters, boilers, and smaller sources such as dry cleaners and degreasing operations
2. Mobile sources – cars, construction equipment, buses, planes, trucks, marine vessels and trains
3. Naturally occurring sources – wildfires, wind-blown dust, some tree species, and volcanic eruptions

Note: Ground level ozone is a gas that occurs both naturally and forms due to chemical reactions between nitrogen oxides and volatile organic compounds, which are emitted from industrial facilities, power plants, vehicle exhaust, household solvents, volcanic eruptions and trees.

What are the National Ambient Air Quality Standards (NAAQS)?

National Ambient Air Quality Standards (NAAQS) are a set of standards for six air pollutants, known as criteria pollutants:

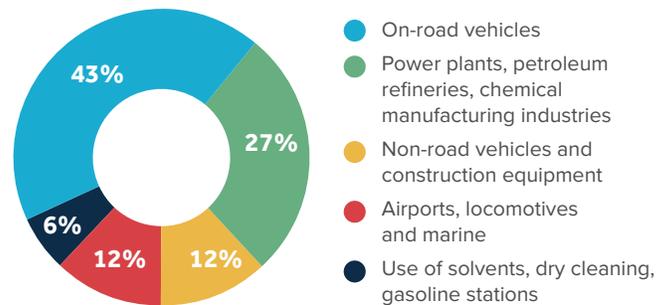
- [Particulate matter](#)
- [Carbon monoxide](#)
- [Nitrogen dioxide](#)
- [Ground level ozone](#)
- [Sulfur dioxide](#)
- [Lead](#)

Criteria pollutants are common air pollutants that are found worldwide at varying levels and can be harmful to human health and the environment.

The NAAQS are established by the U.S. Environmental Protection Agency (EPA) under the Clean Air Act. In 1970, Congress passed the Clean Air Act, giving the federal government authority to clean up air pollution in the U.S. Since then, EPA and states, tribes, local governments, industry, and environmental groups have worked to establish a variety of programs to reduce air pollution levels across America.

EPA sets NAAQS to protect public health by setting appropriate outdoor air quality standards. The standards are based on scientific knowledge and are reviewed on a periodic basis to integrate the most recent data on the health effects from each pollutant. The Texas Commission on Environmental Quality (TCEQ) has authority to enforce these national standards at the state and local level to ensure that metropolitan areas meet them. Go to <https://www.epa.gov/criteria-air-pollutants/naaqs-table> for the current standards for all six criteria pollutants.

Sources of nitrogen oxides in Houston



Source: EPA 2011 National Emissions Inventory Data

Which National Ambient Air Quality Standards (NAAQS) does Houston meet?

Houston is in compliance with the federal standards for particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide and lead. Ozone is the only criteria pollutant for which Houston fails to meet the NAAQS.

What is ozone?

Ozone is a complex pollutant. While ground level ozone is considered to be an air pollutant, ozone is also naturally present in the Earth's upper atmosphere and filters the ultraviolet rays of the sun. Ground level ozone is formed when volatile organic compounds and nitrogen oxides – emitted from industrial facilities, power plants, vehicle exhaust, household solvents and trees – react in sunlight under the right weather conditions. Ozone can aggravate bronchitis, emphysema, asthma and can reduce lung function. Ozone can also be transported long distances by wind. For this reason, even rural areas can experience high ozone levels.

For more on the basics of ozone, go to [http://www.epa.gov/ozone-pollution/ozone-basics#what where how](http://www.epa.gov/ozone-pollution/ozone-basics#what%20where%20how).

Houston meets all other national air quality standards. Why not ozone?

Houston faces several unique challenges. Houston's summer weather conditions can be ideal for allowing ground level ozone to form. Also, Houston has been challenged in its efforts to meet the ozone standard because the region is home to the largest concentration of petrochemical and refining facilities in the nation. Researchers took many years to develop and design technologies to reduce emissions from industrial sources, but over the years, industry has implemented many emissions reductions processes and technologies as they have been developed to dramatically lower emissions across the region.

Furthermore, from 2010 to 2015, the Houston metro had the largest numeric increase in population of any U.S. metro area. Houston is the fifth most populous metro area in the country. With this rapid growth, more homes are being constructed and powered, more cars are on the streets and highways, and more consumer products are being used. To counter this growth, businesses, industry and government implemented cleaner controls and construction equipment, more fuel-efficient cars and trucks, and more energy efficient homes. All of these pollution-reducing technologies improve the quality of the air across Houston.

Over the past 26 years, the Environmental Protection Agency (EPA) has lowered the standard, or threshold for the amount of ozone pollution, to compel metropolitan areas to continue to reduce ozone pollution levels. Businesses and industry in Houston continue to work to achieve lower ozone pollution levels across the region. Due to these continued efforts, Houston reached compliance with both the 1990 (1-Hour Standard of 124 ppb) and 1997 (8-Hour Standard of 84 ppb) ozone standards. Houston continues to work to meet the 2008 and 2015 EPA ozone standards.

What is ppb and ppm?

Ozone is measured by the concentration of ozone within the air, and units are recorded in parts per billion (ppb). For example, one ppb is the equivalent of one drop in one billion drops of water or about one drop of water in a swimming pool. Another unit of measurement for some of the air quality standards is parts per million (ppm), and one ppm is the equivalent of about one cup of water in a swimming pool. One ppm is equivalent to 1,000 ppb.

Who regulates the air in Houston?

The National Ambient Air Quality Standards (NAAQS) are established under the Clean Air Act. The U.S. Environmental Protection Agency (EPA) is charged with setting the NAAQS values to protect public health and welfare. Those values are set based on scientific knowledge and are reviewed every five years to integrate the most recent data on the health effects from each pollutant.

The Texas Commission on Environmental Quality (TCEQ) collects and evaluates data from available air quality monitors in the state, and then works with the EPA to designate areas in Texas that are either in compliance or out of compliance with the NAAQS. If the air quality in a geographic area meets or is better than the NAAQS, it is called an attainment area; areas that do not meet the NAAQS are called nonattainment areas.

When an area is designated as nonattainment for a given NAAQS, the TCEQ works with regional planning entities such as the Houston-Galveston Area Council to draft a plan known as a State Implementation Plan (SIP) to reduce air pollution. The state-level plan, which must be approved by the EPA, outlines the measures that the nonattainment areas will take to improve air quality so that attainment can be achieved. Once a nonattainment area meets the standards, EPA will designate the area as a "maintenance area."

Why do we need these air quality regulations?

Under the Clean Air Act, the Environmental Protection Agency establishes primary and secondary national standards for air quality. The National Ambient Air Quality Standards (NAAQS) primary standards set limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. The NAAQS secondary standards set limits to protect public welfare, including protection against decreased visibility (haze), damage to animals, crops, vegetation, and buildings.

When does Houston need to meet the ozone regulations?

Since the Houston area is in compliance with the National Ambient Air Quality Standards (NAAQS) for five air pollutants – particulate matter, carbon monoxide, sulfur dioxide, nitrogen dioxide, and lead – businesses, industry and governmental entities in Houston are working together to maintain compliance with these five standards and to address nonattainment for the ground level ozone standard.

The current Environmental Protection Agency (EPA) 8-hour ozone standard of 75 ppb has been in place since 2008. In 2015, the EPA issued a more stringent standard for ozone of 70 ppb that will take effect within the next several years. The Houston region is currently not meeting either the 2008 standard or the newer 2015 standard. Under the current regulations, the required attainment date for the 2008 standard was in 2015, though Houston received an extension to 2016. The required attainment date for the 2015 ozone standard is projected for 2023.

Since Houston did not meet the 2008 standard of 75 ppb by the required deadline, it is likely that the EPA will reclassify the metro area to a higher level of nonattainment, meaning more requirements will be imposed so that Houston can meet the standard. It is expected that Houston will be required to work with the Texas Commission on Environmental Quality to submit a State Implementation Plan that will project attainment with the NAAQS once the required control measures have been fully implemented.

How often do the national air quality standards change?

Under the Clean Air Act (CAA), the Environmental Protection Agency (EPA) is required to conduct periodic review of the air quality standards and the science upon which they are based. The CAA requires EPA to review the ozone standard every five years. The review is a lengthy process and includes several major steps. Once the EPA has completed this review, they determine whether to take action to introduce a new standard, which triggers a proposal of the new rule and a public comment period before a new standard is adopted. To learn more about how the EPA reviews the National Ambient Air Quality Standards and proposes new standards, visit <https://www.epa.gov/criteria-air-pollutants/process-reviewing-national-ambient-air-quality-standards>.

How is the air in Houston monitored?

With more than 45 ozone air monitors, Houston has the most extensive monitoring network in the country. Federal, state and local agencies collect air samples throughout the year to measure the concentration of individual compounds in the air. With the large amount of monitors, scientists have a comprehensive understanding of the state of air quality in the Houston area.

In addition to measuring the six major air pollutants that are part of the National Ambient Air Quality Standards, some of Houston's air monitors track volatile organic compounds emitted by vegetation, utilities, industrial sources, small businesses such as dry cleaners, motor vehicles and household sources. Federal, state and local agencies also monitor weather conditions that affect ozone concentrations. These include temperature, wind speed, wind direction, rainfall and net solar radiation (solar energy).

For more information about air monitors in Houston, go to the Texas Commission on Environmental Quality's air monitoring website at http://www.tceq.state.tx.us/cgi-bin/compliance/monops/site_info.pl

What are the penalties if Houston does not meet the regulatory standards?

Once the Environmental Protection Agency (EPA) determines that a metro area is out of compliance with the standard, they designate the area as nonattainment. The levels of nonattainment are: (from lowest to highest) marginal, moderate, serious, severe and extreme.

Since the Houston area was originally assigned the designation of "marginal nonattainment" for being out of compliance with the 2008 ozone standard, a State Implementation Plan (SIP) to demonstrate air quality improvements was not required.

Because Houston failed to meet the deadline to attain the 2008 standard, the region will likely be moved to the “moderate nonattainment” category. If this happens, the region must analyze and adopt control measures to show, through a SIP, that air quality is improving within the region and that attainment will be achieved once all required control measures have been implemented.

The region can show progress toward meeting a standard through a demonstration, known as conformity, which involves the local transportation agency. In this case, the Houston-Galveston Area Council would need to demonstrate that air emissions from federally funded long-term transportation plans and projects will not worsen or delay compliance with the National Ambient Air Quality Standards.

Metropolitan areas classified as nonattainment can suffer stringent penalties, including EPA overriding states on permitting decisions; new businesses being required to install the most effective emission reduction technologies without consideration of cost; and the suspension of federally supported highway and transportation projects.

What areas of the Houston region are subject to these federal regulations?

The nonattainment region for the 2008 ozone standard contains the following counties: Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery and Waller. The Texas Commission on Environmental Quality will likely recommend that this same region be designated as the nonattainment region for the newer 2015 ozone standard.

Does pollution from outside the Houston region affect our air quality?

Scientists have known for some time that increasing amounts of air pollution come from outside the U.S. Pollutants from Asia, such as ozone and particulate matter, are carried across the oceans at high altitudes and deposited across western states. Houston is often impacted by pollutants coming from Mexico and even as far away as Africa (read more about this at <http://houstonairquality.com/texas-is-in-central-american-smoke-season-will-it-impact-houston/>). With the growth of the global economy, overseas pollutants will have an increasing impact on air quality in Houston and across the U.S. This contribution may limit Houston’s ability to meet national air quality standards through regional programs alone.

For a map illustrating the impact of these foreign sources, go to <https://www.uschamber.com/above-the-fold/map-shows-why-epa-s-new-ozone-standard-makes-no-sense>. The Environmental Protection Agency is aware of these concerns through their work to address transboundary air pollution. Read more at <https://www.epa.gov/international-cooperation/transboundary-air-pollution>.

How costly is it to improve air quality in Houston?

Air pollution can be costly in terms of expenses for increased health care and property damage, as well as less tangible costs, such as decreased property values and diminished quality of life. Some of these costs are paid directly by individuals or businesses, and some are paid indirectly through insurance and decreased productivity.

Air pollution control measures are costly in terms of expenditures for installation, operation, maintenance, monitoring, and recordkeeping. Some of these expenditures are paid directly by individuals or businesses, and some are paid indirectly through increased costs of consumer products and loss of business opportunities. Some of these expenditures may be offset by the recovery of product or by the creation of business opportunities in the development and implementation of air pollution control systems.

Although the Clean Air Act requires the Environmental Protection Agency to review the ozone standard every five years, cost cannot be used as a consideration when evaluating or setting a new air pollution standard. It is difficult to quantify the total costs of health care, property damage, quality of life impacts and air quality control measures across the Houston region.

For information on the potential cost of the newer 2015 ozone standard, read the blog entry [The Clean Air Act and EPA’s New Ozone Standard: How Much Will It Cost?](#)

How do businesses and industry “clean” the air?

The Environmental Protection Agency (EPA) requires areas failing to attain one or more of the National Ambient Air Quality Standards (NAAQS) to prepare and execute a State Implementation Plan (SIP). The SIP is a blueprint of how the state will achieve compliance with the NAAQS by the compliance date. The Clean Air Act requires the state to revise the SIP regularly to incorporate new information as it becomes available. Only one SIP exists for each state. The original ozone SIP for the Houston region was submitted in 1973 and has been revised many times. The Texas SIP documents are available at <http://www.tceq.texas.gov/airquality/sip/siplans.html>.

There have been significant improvements in air quality across Houston over the past decade. Those improvements were made by reducing ozone-forming emissions like oxides of nitrogen (NOx) and volatile organic compounds (VOCs) in every sector—industry, small business, motor vehicles and heavy-duty equipment. Many other strategies are used to reduce emissions and improve Houston’s air quality. These can range from industry installing additional emissions controls, replacing or retrofitting older vehicles and equipment with cleaner vehicles and equipment to encouraging alternative commuting, and even education and advocacy.

Houston’s air is cleaner, but challenges remain. EPA’s more stringent 2015 ozone standard means that Texans will have to reduce NOx and other emissions even more. The Texas Emissions Reduction Plan, or TERP, plays a critical role in cleaner air. TERP provides financial incentives to individuals, businesses, and local governments to reduce emissions from higher polluting vehicles and equipment. Its nine different programs are designed to help reduce emissions from different types of engines by providing grant funding for a portion of the retrofit or replacement costs. The funding comes from a portion of motor vehicle registration fees. This incentive makes it easier for individuals or businesses to justify spending money on the retrofits/replacements to get the emission reductions.

TERP is an important part of Houston’s overall clean air plan for several reasons. First, the Clean Air Act does not allow states to develop standards for motor vehicle engines and fuels. Therefore, states are extremely limited in their authority to regulate emissions from the largest two sources of NOx in Texas—on-road motor vehicles such as cars and trucks and non-road vehicles such as railroad engines and boats.

However, under the Clean Air Act, Texas is allowed to impose “use restriction” types of regulations. Such regulations can include mandating carpooling for businesses, speed limit restrictions, or forbidding landscapers and construction workers from using their equipment in the morning hours as options. In the past, these types of use restriction mandates have proven extremely unpopular with the public and some businesses. TERP will be an increasingly important source of cost-effective NOx reductions over the next decade as Texas works to meet new federal standards.

For more Information on TERP, go to <http://www.tceq.texas.gov/airquality/terp>.

What can small businesses and citizens do to improve air quality?

Daily activities, such as driving, refueling, lawn mowing, painting, and the use of pesticides and high-nitrogen fertilizers, emit ozone-forming and other pollutants. Frequently, consumer products (carpeting, furniture, paints, etc.) and the services we use (dry cleaning, lawn care, etc.) also emit ozone-forming pollutants into the air. With a population of more than six million in the region, the total of all the individual activities and products create a significant portion of Houston’s air pollution.

Small business and individuals can contribute to air quality improvement by making minor changes, such as:

- Driving for better fuel economy and fewer emissions during non-rush hour time periods
- Reducing unnecessary trips by planning ahead
- Using alternative commuting options like carpooling, vanpooling, public transit, cycling, walking, teleworking, and compressed work schedules
- Keeping vehicles in good repair through emissions testing, yearly tune-ups, routine oil changes and optimum tire pressure
- Becoming a knowledgeable consumer by making wiser purchases of products that pollute less
- Reducing use of solvents like oil-based paints, paint removers, caulk, cleaning solvents, and other materials that contain VOCs
- Reducing use of energy by turning off lights not in use, having proper insulation, using energy-efficient light bulbs and appliances, and using as little air conditioning as is reasonable and comfortable
- Upgrading vehicles and fleets to a model year with higher standards will help in emission reduction, and improve fuel mileage
- Reducing emissions from off-road sources like gasoline engines on lawn mowers, leaf blowers, chain saws, boats, and other equipment, which have minimal emission controls and are significant polluters
- Postponing polluting activities listed above on forecasted high ozone days

For more tips on how to help, go to <http://takecareoftexas.org/air/air-quality>.