AIR QUALITY MONITORING

QUALITY THROUGH INNOVATION AND DESIGN

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Energy, Water, Environment.
Global Sustainable Solutions.

18 Air Quality Monitoring – AQMS System

ENEA Grupo® markets complete Air Quality Monitoring Stations and Networks for the measurement of inorganic gases and Volatile Organic Compounds where parts per billion (ppb) detection is required, as well as optical aerosol/ particulate monitors for PM1, PM2.5 and PM10.

Our current technologies include Electrochemical, Catalytic, Optical, including NDIR & PID Semiconductor / metal oxide and Spectroscopy and we continue to explore the integration of new technologies for the benefit of our customers.

ENEA Grupo® Air Quality Monitoring Station 4000 Series (AQMS-4000) is a robust remote fixed site air quality station designed to be exposed to outdoor environments twenty-four hours a day, seven days a week, ensuring longer term reliability. Our Air Quality Monitoring System (AQMS) is used to determine compliance with clean air standards, assess the nature of air pollution in cities and for measuring the exposure of humans to airborne pollutants as:

- Carbon monoxide (CO)
- Nitrogen dioxide (NO2)
- Nitric Oxide (NO)
- Sulfur dioxide (SO2)
- Ozone (O3)
- Hydrogen Sulfide (H2S)
- Volatile Organic Compounds (VOC)
- Particulate Matter (PM1, PM2.5 and PM10)

The measurement of gaseous pollutants in air is a sensitive and priority issue as it has large impact on human health and environment. Vehicle emissions remain a major contributor to air pollution in cities worldwide so it is fundamental to implement sustainable air quality monitoring networks due to the fact that current reference air quality monitoring systems based on gas analyser technology are expensive in cost and maintenance and, therefore, the number of such type of monitoring stations is obviously limited by budgetary reasons. Our

Air Quality Monitoring System does not have among its objectives to replace the measurement networks based on sophisticated gas analysers, but to complement them.

Some of the advantages of our Air Quality Monitoring Stations with respect to the gas analysers are summarized below:

- Much lower cost and minimum maintenance requirements, so it is possible to install more dense networks with much larger number of measuring points.
- Much lower power consumption, operating by means of internal battery and solar panel.
- Reduced size and weight.
- Better temporal response for the measurement of air traffic peaks, as analysers normally log only every 30 or 60 minutes.
- Possibility of incorporating additional noise and meteorological sensors.
- Data Transmission in real-time via GPRS/3G cellular Network or Radio-Link to a Central Receiving Station.
- Web Posting by our advanced WEBTRANS Ubiquitas Internet Platform.

ENEA Grupo® Air Quality Monitoring System and Networks can work as a low cost but efficient solution for real-time and long-term measurement at urban areas, along roadside for targeting of hotspots and at airports, combined with environmental noise monitoring, meteorological conditions and even traffic data.

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Carbon Monoxide

Carbon monoxide (CO) is a colourless, odourless gas emitted from combustion processes. Nationally and, particularly in urban areas, the majority of CO emissions to ambient air come from mobile sources. CO can cause harmful health effects by reducing oxygen delivery to the body's organs (like the heart and brain) and tissues. At extremely high levels, CO can cause death.

EPA first set air quality standards for CO in 1971. For protection of both public health and welfare, EPA set a 8-hour primary standard at 9 parts per million (ppm) and a 1-hour primary standard at 35 ppm.

Nitrogen Dioxide

Nitrogen dioxide (NO2) is one of a group of highly reactive gasses known as “oxides of nitrogen,” or “nitrogen oxides (NOx).” Other nitrogen oxides include nitrous acid and nitric acid. EPA’s National Ambient Air Quality Standard uses NO2 as the indicator for the larger

group of nitrogen oxides. NO2 forms quickly from emissions from cars, trucks and buses, power plants, and off-road equipment. In addition to contributing to the formation of ground-level ozone, and fine particle pollution, NO2 is linked with a number of adverse effects on the respiratory system.

EPA first set standards for NO2 in 1971, setting both a primary standard (to protect health) and a secondary standard (to protect the public welfare) at 0.053 parts per million (53 ppb), averaged annually. The Agency has reviewed the standards twice since that time, but chose not to revise the annual standards at the conclusion of each review. In January 2010, EPA established an additional primary standard at 100 ppb, averaged over one hour. Together the primary standards protect public health, including the health of sensitive populations - people with asthma, children, and the elderly. No area of the country has been found to be out of compliance with the current NO2 standards.

Sulphur Dioxide

Sulphur dioxide (SO2) is one of a group of highly reactive gasses known as “oxides of sulphur”. The largest sources of SO2 emissions are from fossil fuel combustion at power plants (73%) and other industrial facilities (20%). Smaller sources of SO2 emissions include industrial processes such as extracting metal from ore, and the burning of high sulphur containing fuels by locomotives, large ships, and non-road equipment. SO2 is linked with a number of adverse effects on the respiratory system.

EPA first set standards for SO2 in 1971. EPA set a 24-hour primary standard at 140 ppb and an annual average standard at 30 ppb (to protect health). EPA also set a 3-hour average secondary standard at 500 ppb (to protect the public welfare). In 1996, EPA reviewed the SO2 NAAQS and chose not to revise the standards.

In 2010, EPA revised the primary SO2 NAAQS by establishing a new 1-hour standard at a level of 75 parts per billion (ppb). EPA revoked the two existing primary standards because they would not provide additional public health protection given a 1-hour standard at 75 ppb.

Ozone

Ground level or "bad" ozone is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC) in the presence of sunlight. Emissions from industrial facilities and electric utilities, motor vehicle exhaust, gasoline vapours, and chemical solvents are some of the major sources of NOx and VOC. Breathing ozone can trigger a variety of health problems, particularly for children, the elderly, and people of all ages who have lung diseases such as asthma. Ground level ozone can also have harmful effects on sensitive vegetation and ecosystems.

Particulate Matter

Particle pollution (also called particulate matter or PM) is the term for a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. Others are so small they can only be detected using an electron microscope.

Particle pollution includes "inhalable coarse particles" with diameters larger than 2.5 micrometres and smaller than 10 micrometres and "fine particles," with diameters that are 2.5 micrometres and smaller. How small is 2.5 micrometres? Think about a single hair from your head. The average human hair is about 70 micrometres in diameter – making it 30 times larger than the largest fine particle.

These particles come in many sizes and shapes and can be made up of hundreds of different chemicals. Some particles, known as primary particles are emitted directly from a source, such as construction sites, unpaved roads, fields, smokestacks or fires. Others form in complicated reactions in the atmosphere of chemicals such as sulphur dioxides and nitrogen oxides that are emitted from power plants, industries and automobiles. These particles, known as secondary particles, make up most of the fine particle pollution in the country.

“Particulate matter,” also known as particle pollution or PM, is a complex mixture of extremely small particles and liquid droplets. Particle pollution is made up of a number of components, including acids (such as nitrates and sulphates), organic chemicals, metals, and soil or dust particles.

The size of particles is directly linked to their potential for causing health problems. EPA is concerned about particles that are 10 micrometres in diameter or smaller because those are the particles that generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects. EPA groups particle pollution into two categories:

• “Inhalable coarse particles,” such as those found near roadways and dusty industries, are larger than 2.5 micrometres and smaller than 10 micrometres in diameter.

• “Fine particles,” such as those found in smoke and haze, are 2.5 micrometres in diameter and smaller. These particles can be directly emitted from sources such as forest fires, or they can form when gases emitted from power plants, industries and automobiles react in the air.