

# Air Pollution Monitoring

LoRa® APPLICATION BRIEF

## DESCRIPTION

The OECD (Organization for Economic Co-Operation and Development) estimates the economic cost of air pollution for society to be \$1.72T (in OECD member countries). Air pollution is responsible for a wide range of medical conditions. Current air pollution monitoring systems consist of expensive stations that measure a limited range of parameters. Because of the high cost of these stations, it is not practical for cities to measure air quality across a widespread area in detail. As a result, cities do not often have the type of measuring system in place to implement better air quality programs.

By implementing an air pollution monitoring solution comprised of sensors and gateways embedded with LoRa® Technology and an intelligent low-power, wide area network based on the LoRaWAN™ protocol, cities can better measure quality and provide the type of data necessary to drive change for their citizens.

## HOW A LoRaWAN-BASED AIR POLLUTION MONITORING SYSTEM WORKS

Semtech LoRa Technology enables connectivity, real-time analytics, reporting, and additional functions such as geolocation.

- 1 Air monitoring sensors embedded with LoRa Technology are placed throughout the city
- 2 Sensors send periodic measurements of air quality data to a gateway
- 3 Gateway sends information to network where the data is analyzed by an application server which can identify zones of concern and provide recommendations
- 4 Application server provides information regarding air quality levels throughout the city, including alerts and pollution patterns, via computer or mobile device. In addition, it can also measure the effectiveness of air quality programs, so that cities can replicate programs in other problem areas

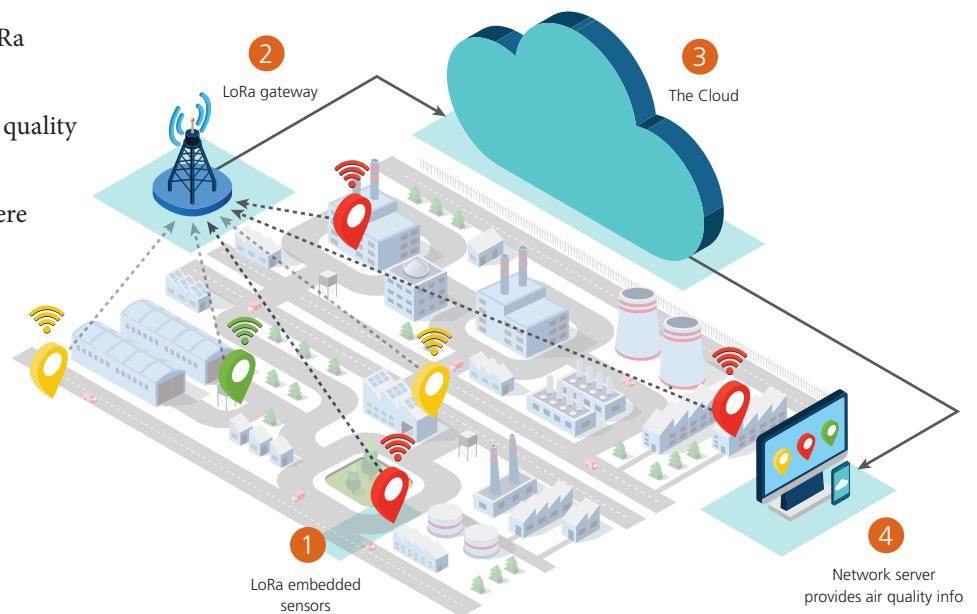
## BENEFITS

- Reduce pollution by using sensors and gateways embedded with LoRa Technology to provide cities with highly detailed data they can use to identify problem areas and implement measurable air quality control programs
- Low cost to set up, since battery-operated sensors do not need to be connected to a power source
- Keeps maintenance costs low, as low-power operation ensures sensor batteries can last up to 20 years
- Reliable RF communication link between sensing infrastructure and LoRaWAN-based network provides excellent coverage — for example, one gateway with a few hundred sensors can cover an area of 31 square miles

## APPLICATIONS

Widespread air pollution monitoring covering all major areas of a city, including:

- Roads and freeways
- Schools, buildings, downtown centers
- Industrial areas
- Parks, pools and other recreation areas



Semtech Products used in this application:

- |                |          |
|----------------|----------|
| Sensors        | Gateway  |
| • SX1272/3     | • SX1301 |
| • SX1276/7/8/9 |          |

All application elements (sensing modules, gateways, servers, software) are available through LoRa Alliance™ partners.



## FIND YOUR IoT SOLUTION FROM SEMTECH'S LoRa ECOSYSTEM

MODULES & MODEMS

SENSORS

BASE STATIONS

NETWORK SERVERS

SYSTEM INTEGRATORS







For a full list of LoRa Ecosystem partners and services, visit our LoRa Community <https://semtech.force.com/lora>

## KEY FEATURES OF SEMTECH'S LoRa WIRELESS RF TECHNOLOGY

- LONG RANGE** Penetrates in dense urban and deep indoor environments, connecting to sensors 15-30 miles away in rural areas
- LOW POWER** Enables multi-year battery lifetime of up to 20 years or more
- HIGH CAPACITY** Supports millions of messages per base station
- GEOLOCATION** Enables tracking applications without GPS or additional power consumption
- STANDARDIZED** LoRaWAN specification ensures interoperability among applications, IoT solution providers and telecom operators
- SECURE** Embedded end-to-end AES-128 encryption of data ensuring optimal privacy and protection
- LOW COST** Reduces upfront infrastructure investments, as well as operating and end-node costs

## JUMP-START YOUR IoT DEVELOPMENT TODAY

Semtech offers several training options to help you get started:

-  Learn about Semtech's LoRa Technology platform: visit [www.semtech.com/loT](http://www.semtech.com/loT)
-  Join the LoRa Community: <https://semtech.force.com/lora>
-  Become a member of the LoRa Alliance™: visit [www.lora-alliance.org](http://www.lora-alliance.org)
-  Attend a LoRa Boot Camp for a full-day of training featuring LoRa Technology and real world applications: [www.semtech.com/loT](http://www.semtech.com/loT)
-  Follow Semtech on [LinkedIn](#) and our [LoRa Showcase page](#)
-  To contact one of our global offices in North America, Europe and Asia, visit [www.semtech.com/contact](http://www.semtech.com/contact)

