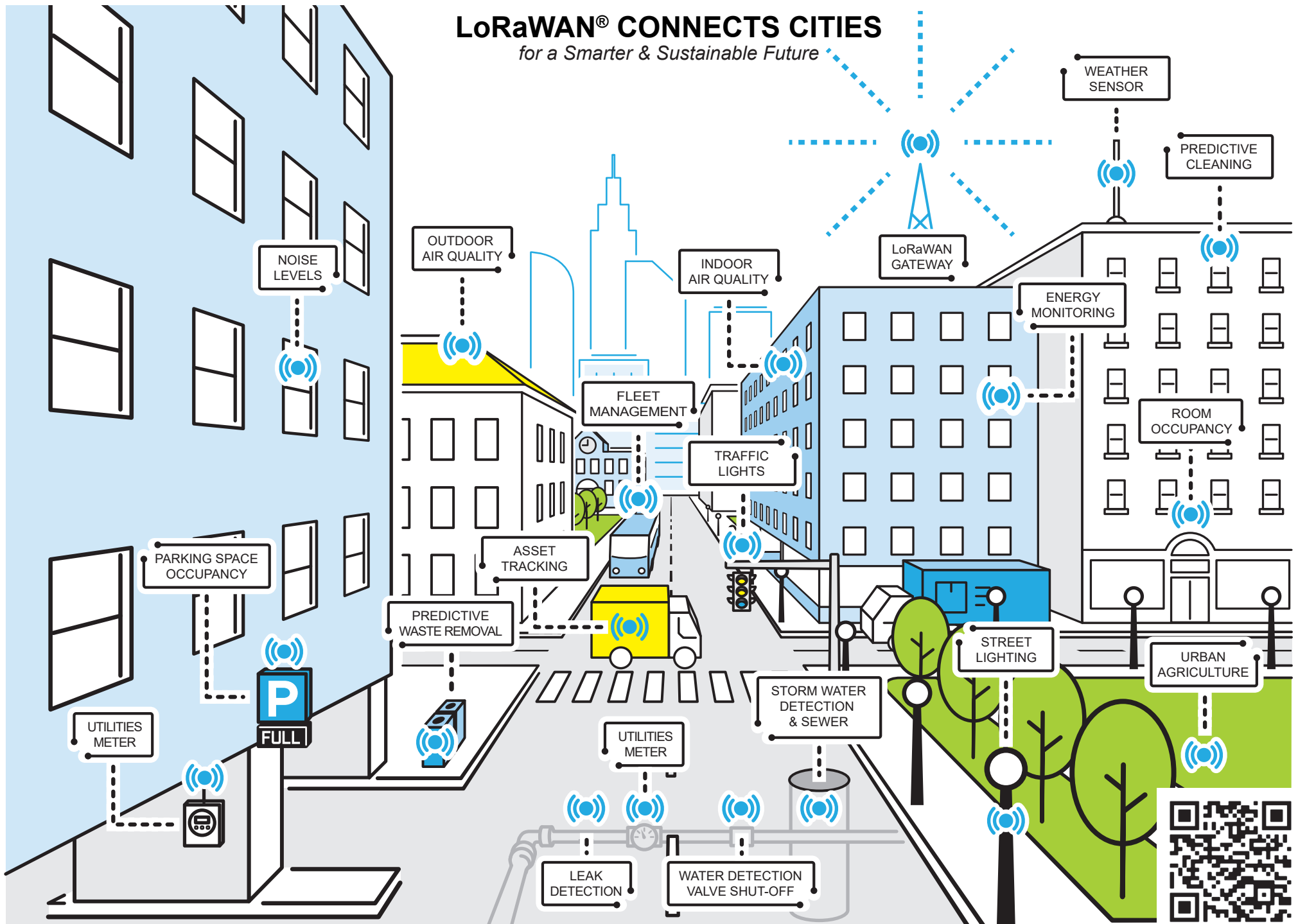


# LoRaWAN® CONNECTS CITIES

for a Smarter & Sustainable Future



# REAL WORLD SMART CITIES DEPLOYMENTS BY OUR MEMBERS



*A large city's LoRaWAN® network can include several LoRaWAN gateways that connect multiple types of LoRaWAN sensors, through concrete, steel, and below ground.*

## QUALITY OF LIFE

### STREET LIGHTING

- **Challenge:** conserve energy by creating a street light system that is responsive to changing needs for light.
- **Solution:** LoRaWAN sensors can trigger streetlights to turn on and off depending upon a city's needs in certain locations.

### PARKING

- **Challenge:** create a system that saves people time when they are looking for parking spaces.
- **Solution:** with a LoRaWAN sensor in each parking spot, a sign can indicate if a ramp has space, saving drivers time and aggravation.

### WEATHER MONITORING

- **Challenge:** create real-time monitoring of temperature, humidity, and precipitation for specific locations beyond meteorologist systems.
- **Solution:** LoRaWAN sensors can provide accurate weather information for micro-climates throughout the city.

### NOISE MONITORING

- **Challenge:** the noise of busy cities can impact the health of its citizens—and the economy—if not measured and managed to stay within legal noise limits.
- **Solution:** LoRaWAN sensors can monitor noise levels in real-time and alert city management when projects have exceeded prescribed noise levels or if certain areas of the city need assistance in noise management.

### OUTDOOR AIR QUALITY

- **Challenge:** inform the public of hazardous air quality in real-time.
- **Solution:** LoRaWAN sensors can detect wildfire smoke and smog on the outskirts of a city and provide early warnings to the public allowing them to plan to remain indoors.

## BUILDING MANAGEMENT

### INDOOR AIR QUALITY

- **Challenge:** ensure safe and comfortable environments for people in offices, universities, schools, gyms, nursing homes, retail and other public or private facilities.
- **Solution:** monitor real-time Indoor Air Quality with LoRaWAN sensors that report temperature, humidity, and excessive levels of carbon dioxide (CO<sub>2</sub>).

### EXTERNAL TEMPERATURE MONITORING

- **Challenge:** indoor HVAC systems do not take outdoor temperatures into account, which can impact the need for heating and cooling.
- **Solution:** a ruggedized, high-accuracy LoRaWAN temperature sensor measures the outdoor temperature and works with the HVAC system to create an adequate indoor building indoor temperature and save energy.

### ROOM OCCUPANCY

- **Challenge:** create real-time data on the occupancy and utilization of different spaces and areas in offices, hybrid workplaces, hot desks, hotel rooms for room allocation, cleaning, or usage analysis.
- **Solution:** LoRaWAN sensors with embedded PIR lenses enable companies to monitor usage and occupancy of different indoor settings.

### PREDICTIVE CLEANING

- **Challenge:** create real-time sanitation practices to be responsive to needs as they occur.
- **Solution:** LoRaWAN sensors can monitor soap and paper towel supply in restrooms, indicate when a garbage bin is full, or count the number of times a door opens to infer usage. That information can trigger an alert to cleaning crews who can meet cleaning needs as they happen.

## WATER

### LEAK DETECTION

- **Challenge:** prevent high repair costs for homes, vacation properties, offices, nursing homes, churches and many other public or private facilities.
- **Solution:** detect water presence or a leak at a specific point of interest by placing a LoRaWAN sensor at the location where the leak is expected. For instance: under a bathtub, fridge, dishwasher, and probe at the water pipe connection.

### URBAN AGRICULTURE

- **Challenge:** An easy-to-deploy soil telemetry solution benefits urban gardens, sports fields and golf courses with improved vegetation and turf quality, optimized maintenance, and reduced water consumption.
- **Solution:** LoRaWAN agriculture sensors provide real-time data on soil moisture and temperature, air temperature, humidity, and ambient light so that maintenance staff can make informed irrigation decisions on when to irrigate and how much water to apply, treating each site individually to optimize quality and prevent unneeded watering.

### STORM WATER DETECTION

- **Challenge:** storm water systems often lie beneath a city's streets and cannot be easily visually monitored.
- **Solution:** LoRaWAN sensors can provide a real-time indication of rising storm water levels.

### FLOOD SENSORS

- **Challenge:** create an early detection system of floods to warn inhabitants of unsafe conditions.
- **Solution:** LoRaWAN sensors can provide real-time warnings to citizens of impending floods and other water hazards.

## OTHER

### SUB-METERING FOR UTILITIES

- **Challenge:** utilities infrastructure is often the oldest part of a city and connecting the old infrastructure to new networking can seem an insurmountable task.
- **Solution:** LoRaWAN sensors can be easily added to existing networks and strengthen the solutions by providing connectivity through steel, concrete, and multilevel buildings.

### SMART POLE

- **Challenge:** avoid or minimize service disruption in electricity and communication when a pole supporting a cable or base station has fallen or become tilted.
- **Solution:** LoRaWAN smart pole detectors provide the status of each pole to alert an intervention team if a pole is tilted or has fallen, thus preventing or limiting service interruption and sending the team to the precise location.

### ASSET TRACKING

- **Challenge:** create a real-time indoor asset tracking and monitoring solution that is accurate, easy to deploy, simple to use, and low cost to maintain.
- **Solution:** LoRaWAN sensors with accelerometers monitor the movement and use of assets. Its compact size and multiple mounting options make it easy to deploy. The solution is optimized for a variety of asset locations in warehouses, hospitals, gyms, offices, universities, schools, retail and other public or private facilities.

### TRANSPORTATION MANAGEMENT

- **Challenge:** create real-time fleet management solutions that are responsive to traffic and optimize vehicle usage.
- **Solution:** LoRaWAN networks can manage asset utilization and route planning remotely.

