# SUCCESS
# STORY

## Indoor Air Quality Monitoring

47,000 Milesight IAQ Sensors in Quebec's public education institutions to improve the overall air quality.

Indoor Air Quality Monitoring for a Healthier Learning Environment in Canadian Schools

## The Situation

The COVID-19 pandemic demonstrated the importance of continuously monitoring indoor air quality, especially in schools. The Ministère de l'Éducation du Québec has announced in September 2021 the deployment and installation of air quality and comfort parameters sensors in more than 47,000 classrooms across the province.



"Quebec is the only province to equip its classes with $CO_2$ sensors."

--- Bryan St-Louis
Spokesperson for the Quebec province's Education Ministry

"This is a major undertaking. We are talking about 90,000 detectors in 4,000 locations. We wanted to do this quickly, but also to do it well. In 90 percent of cases, ventilation is adequate."

--- Marc Sirois
Deputy Education Minister

Measuring indoor $CO_2$ concentrations, relative humidity and temperature is part of a strategy developed to ensure that the best possible learning and working environment is provided at all times for students and school staff. With accurate indoor air data, well ventilated classrooms are achievable.



## The Needs

| Reduce maintenance and installation difficulties | Monitor $CO_2$, humidity and temperature level at 5 minutes intervals during school hours | Create an information system without the use of Wi-Fi or Cellular Internet |

CO₂

Temperature

Humidity

PIR

**AM107**
Indoor Air Quality Sensor

**LoRa**

**UG65**
Semi-industrial Gateway

**Assek** Technologie

**Assek Technologie**
Web Application
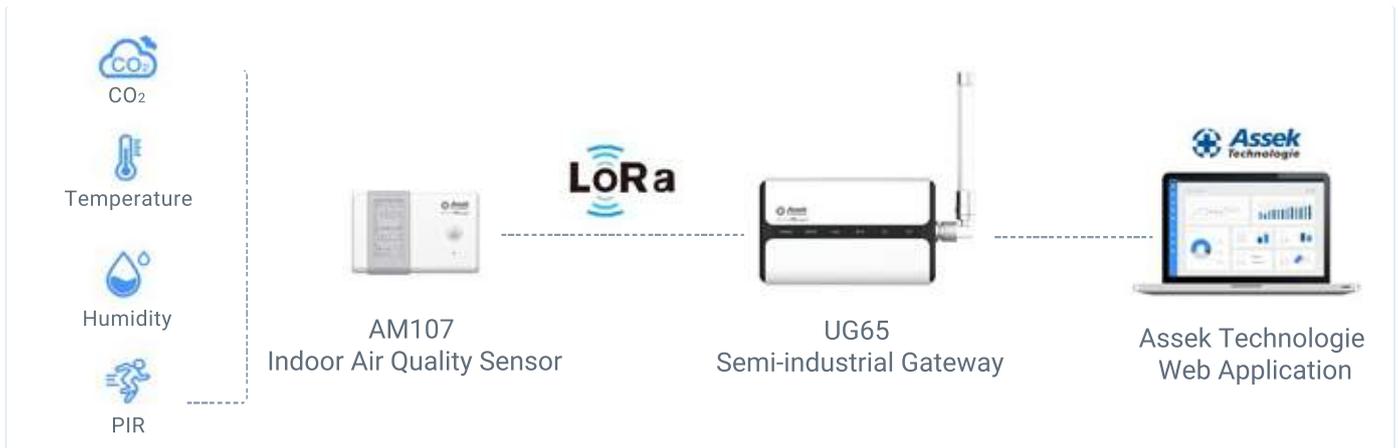
The AM107 indoor air quality sensor can also monitor TVOC, Lighting and Barometric Pressure.

## LoRaWAN® Technology

Considering all requirements, LoRaWAN® IAQ solution was a perfect candidate.
LoRaWAN® devices met all requirements:

Long Battery Life

Fast Transmission

Visualized Data

Ease of Deployment

High Reliability of Messages

Multiple Environment Data Monitoring
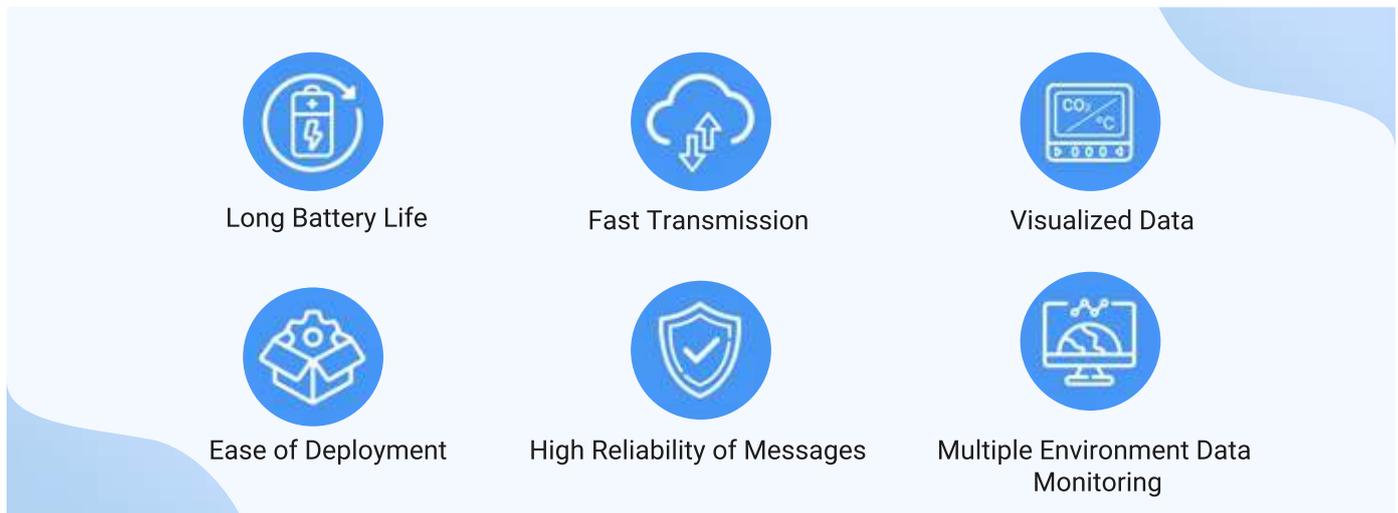
## Milesight & Assek

Milesight's hardware R&D capabilities and software expertise from our valuable partner, Assek, led to a very complete and unique solution specially made for schools in Quebec, Canada.

## Helpful Web Application

A modern web application has been developed where all the users can interact with the data. Live and historical data, tendencies analysis, threshold alerts and reporting are all features part of the solution.

## Data Reported Every 5 Minutes

Measurements are made every 5 minutes during the day and at every hour in the evening and at night.

"The hard work of our IT development and integration teams, as well as the equipment provided by Milesight, helped us fulfill the objectives of the project with the Ministry of Education of Quebec (Canada). With the increased potential of IoT and emerging technologies such as LoRaWAN®, we want to undertake new projects of the same scope in different fields. Our strength in custom software development, our vision of finding solutions, and the alliance with renowned partners such as Milesight and Semtech make large projects feasible and give us the desire to take on new challenges. "

--- *Racem Guetat*
Communications and Business Development Manager from Assek Technologie

## Encouraging Results from 2 Pilots

2 pilots were implemented before the client started the project. In each pilot，Milesight's AM107 were installed very quickly in approximately 30 classrooms，and Assek's software presented great tools to easily monitor the air quality in classrooms.

## 47,000 IAQ Sensors Deployed at Ease

The success of the 2 pilots proved LoRaWAN® was the right technology and the client believed it was possible to adopt this solution in thousands of schools across Quebec very easily and quickly. In result，approximately 47,000 classrooms were equipped with this LoRaWAN® IAQ monitoring

## Decision-Making Based on Holistic Insights

The solution is meant to help the authorities to obtain an overview of the IAQ situation of all schools. This information，unknown prior to this project，can now be used to ensure the healthiness of the learning and working environment. It allows the client to prioritize and implement corrective actions, and all users to be notified when and where fresh air is needed. The solution could soon be integrated with HVAC systems to automatically ensure good IAQ.

## Rapid Response from Real-Time Monitoring

### For school staff
Real-time readings of three comfort parameters ($CO_2$ concentration, temperature and the level of relative humidity) allow them to make changes more gradually and quickly in the affected rooms by, for example, adjusting the inflow of outdoor air or completely air out a classroom during a break.

### Educational institutions
Can use the analysis results to take timely action when the set targets are not reached.

### School service centers and school boards
Can use the analysis results to identify trends and target buildings that require broader intervention plans and/or larger scale corrective work.

**10 Years**
Solution supported for at least 10 years.

**Comprehensive Data**
Uses a wireless communication protocol to acquire all the data from the sensors.

**5 Mins Report Intervals & 4 Years' Service Life**
Allows data transmission every 5 minutes with a battery life of over 4 years.

**Easy Installation**
Can easily be shipped anywhere and requires only 5 minutes per room for the installation.

**Modern System**
Includes an information system capable of displaying, analyzing, and processing the data in real time.

## Energized for Green Air in 47,000 Classrooms



Through the course of challenging days, Milesight IAQ sensors are of help in schools across Quebec, Canada. For example, 191 classrooms in Massey-Vanier were equipped with AM107 and 208 IAQ sensors were supplied to Louis-Philippe-Paré. We are excited to see the transformation of historic schools for modern indoor air monitoring, such as Notre-Dame-de-la-Défense (founded in 1933), Notre-Dame-des-Neiges (founded in 1918), etc.

### Some of the schools that deployed Milesight IAQ sensors

**Massey-Vanier**
Deployed Milesight IAQ Sensors
in 191 Classrooms

**Louis-Philippe-Paré**
Installed 208 Milesight IAQ Sensors

**Notre-Dame-de-la-Défense**
One of the Oldest Schools
in Quebec (1933)

**Notre-Dame-des-Neige**
One of the Oldest Schools
in Quebec (1918)

## Technical Challenges Snapshot

### ⬚ Real-time Monitoring & Long Battery Life

Real-time data collection and reporting are critical for effective IAQ monitoring. However, in many cases, this will drain the battery fairly quickly. To tackle this dilemma, Milesight engineered automatic mode switch in AM107 indoor air quality sensor. In practice, the AM107 can automatically switch between different operating modes during the day and night. It responds to classroom air quality conditions as quickly as possible during the day, while saving as much energy as possible on the device's battery in unoccupied classroom environments at night. Combined with the adaptive data rate (ADR) mode, it enables the device to achieve more than 4 years of battery life, even with a data collection frequency of 1 minute and a reporting interval of 5 minutes.

### 🕐 Time Accuracy

Considering that there are time zone and Daylight Saving Time differences in various regions, the time on AM107 may not be accurate if it is not adjusted accordingly. To make it correct and convenient, our AM107 is designed to automatically synchronize its time with gateway packet forwarding on a long-term basis.

### ✅ IoT Security

The more complex and unique the password, the more secure the device will be. In our case, each device and password correspond to one another. The password for each sensor is randomly generated and is in the form of a long string.

### ⬚ Data Transmission & Integrity

To address packet conflicts and over-the-air packet loss, the AM107 has a built-in random delay reporting feature. Through this, the bandwidth and processing resources of the web server and application server can also be optimized.

### ⚙ Scaled Deployment & Configuration

To facilitate bulk deployment and installation, nodes and gateways are plug-and-play and automatically connect to the management platform after deployment. Users can configure and upgrade all remotely through the management platform.

## Supports from Semtech

During the pilot projects, Semtech provided valuable and helpful suggestions to achieve a better response for the AM107 to LinkADRReq at the MAC layer, which enhanced the compatibility of the sensors in this project.

"An increasing number of application areas are upgrading and becoming smarter by leveraging IoT technologies. Semtech is delighted to support Milesight in developing this air quality monitoring solution critically acclaimed. We believe that with advantages such as long-distance, low power consumption, and easy deployment, Semtech's LoRa will help more industries reduce costs while increasing efficiency. We will continue to be fully committed to supporting our ecosystem collaborators. "

--- *Mike Wong*
Vice President of Sales at Semtech China

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