eleven-x

Real-Time, Wireless

Active Indoor Air Quality

eleven-x Tech Brief

Active Indoor Air Quality

Wireless, Real-Time Monitoring

EXECUTIVE SUMMARY

As we move to re-occupy offices, schools and other public spaces in these latter stages of COVID-19 pandemic , the workforce and general public will be looking to building owners and operators to provide a safe indoor environment by minimizing the risks around the transmission of SARS-CoV-2, the strain of virus that causes COVID-19. Each side has a lot at stake with not only re-occupancy, but also managing ongoing risk at higher levels than ever before. The key motivators include the health of those who need to be indoors with others on a daily basis, and for building owners, it is what does the future bring in terms of stable occupancy with their assets. Answers for both are directly tied to enhancing monitoring capabilities to manage not only physical areas of potential concern, but also the perception of safety to provide peace of mind on a consistent, daily basis while managing their assets in an efficient manner.

THE INDOOR ENVIRONMENT HAS CHANGED FOREVER

In the past decade, the green building and sustainability experts have brought increased focus on the importance of indoor air quality and how it drives improvement in health and well-being, workplace satisfaction and productivity. The need to embrace these principles in all buildings is brought to light in a pandemic, where in some cases, buildings themselves are contributing to transmission risk. Careful configuration of building systems is required to provide ideal occupancy conditions. Ventilation and filtration systems are now viewed as an essential strategy to improve occupant health and limit COVID transmission. When COVID-19 reaches an eventual conclusion, all building users will re-assess what their workplace needs are, and indoor air quality will be top of the list. Canadians spend up to 90% of their time indoors, it is time to spend as much time talking about indoor air quality as we do the weather.

Types of buildings and facilities needing ongoing indoor air quality:

1) Schools
2) Commercial real estate
3) Civic/public sector buildings
4) Banks
5) Retail stores

REALITY AND THE PERCEPTION OF SAFE INDOOR ENVIRONMENTS

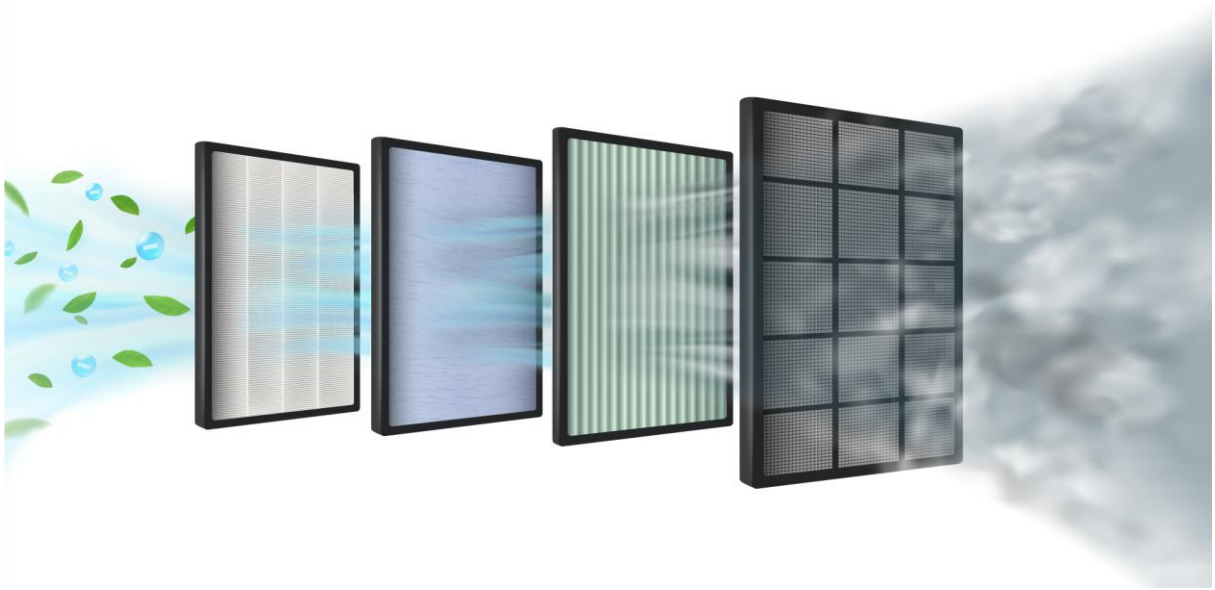
Risk assessment has been identified as a necessary step in the opening and ongoing management of workplaces and, in lieu of a vaccine, following a structured risk assessment model is an important strategic tool in terms of re-occupying workspaces. Environmental researchers have linked a lack of adequate ventilation in indoor environments with an increased risk of airborne transmission of COVID-19. SARS-CoV-2 is spread primarily via respiratory droplets during close interactions between individuals. As people cough or sneeze, remnants of the respiratory droplets can stay suspended in the air and over time, become concentrated, increasing the risk of infection. As a secondary means, the virus is spread by contact with contaminated surfaces.

Naturally, the first request of tenants and building owners is to test for the SARS-CoV-2 virus in the air and on surfaces within buildings. However, focusing on detecting the virus in buildings is too narrow of an approach in terms of managing the risk of transmission. Fundamentally, managing the risk of transmission is related to the Five Primary Management Controls that include:

1. Staying home when sick
2. Maintaining physical distance between occupants
3. Maintaining access to hand washing facilities
4. Maintaining cleanliness of surfaces
5. Maintaining high ventilation rates while controlling draft

A meaningful verification program related to COVID-19 risk mitigation should provide confirmation that these primary management controls are in place and effective. Testing for the SARS-CoV-2 virus does not accomplish this goal because the SARS-CoV-2 virus will only be present in the air and on surfaces should the management controls fail. At this point, it is too late.

It is here where building managers can provide not only accurate and consistent monitoring to support the management controls, but they can also provide the much-needed assurance in response to the tenant perception of safety. Additionally, while the current the focus is on managing the SARS-CoV-2 virus in buildings, any monitoring and management would also be best served to cover more than just this virus, but also a wider range in order to maintain standards and levels for other types of contaminants that could have similar affects.

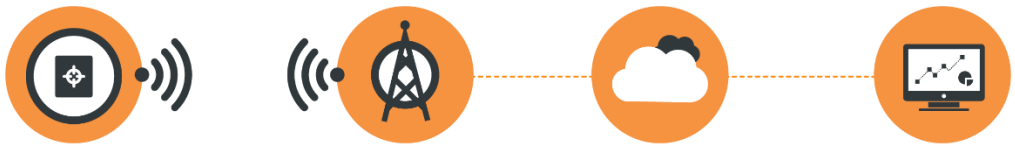


WIRELESS, REAL-TIME RISK MANAGEMENT FOR RE-OCCUPANCY AND BEYOND

COVID-19 is bringing about a whole new approach to how indoor environments will be monitored and managed. Traditionally, measurements were captured intermittently on a monthly or even quarterly basis. Moving forward, indoor environments will require far more consistent tracking and as previously discussed, testing for COVID-19 itself is not pragmatic. To adequately assess risk and alleviate any negative perceptions in a proactive manner, building owners must address airborne transmission by monitoring and managing ventilation rates, humidity and carbon dioxide levels. Improving the management of buildings via accurate, real-time indoor air quality metrics will not only enable more efficiency, but also ensure compliance with new standards while at the same time providing a positive occupant experience leading to maximized tenant retention. Increasingly ambient air quality is impacted by climate-driven events which can impact on indoor air quality. In the last 5 years wildfire smoke events have resulted in significant air quality impacts in western Canada. These events can last for months at a time, and real-time monitoring provides data-driven insights into occupant risk, and the effectiveness of mitigation strategies.

According to the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), carbon dioxide levels are a proven indicator of air ventilation. Humidity levels also play a key role in limiting exposure to the virus, with research suggesting that keeping humidity levels between 40% and 60% reduces virus transmission.

Active IAQ is a wireless real-time monitoring solution that includes long-lasting sensors (10-years), wireless connectivity and easy data access and actionable analytics. Active IAQ is based on low power LoRaWAN® technology, which enables ultra-long sensor life while offering cost-efficient wireless connectivity. Management is done remotely; data is communicated in real-time and is easily accessible via online portal and custom notifications (email and SMS) can be set so that building stakeholders can proactively monitor their indoor spaces and respond instantaneously to any situation.



In terms of COVID-19 risk management portfolios, the typical elements of a management plan include Risk Assessment, Re-Occupancy Planning, HVAC Optimization and Space Planning. Validation of the elements adds real value to these plans and helps all stakeholders to understand that the plan is working. Real-time monitoring of carbon dioxide, relative humidity and airborne particulate ($PM_{2.5}$) are effective tools to support this validation process.

> Carbon Dioxide (CO^2) – monitoring this parameter confirms that HVAC optimization has been successfully implemented to deliver maximum possible outdoor air, and that space planning is working effectively to keep occupants physically distanced, resulting in CO^2 concentrations generally below 800ppm.

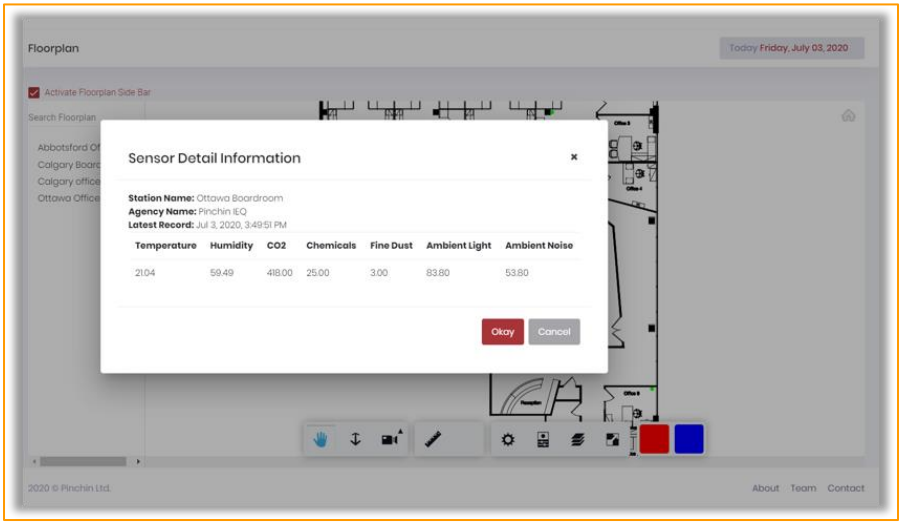
Relative Humidity (RH) – monitoring this parameter demonstrates that RH is being effectively managed (40-60%) to prevent respiratory irritation and limit the airborne spread of SARS-CoV-2 fomites and virus nuclei.

Airborne Particulate ($PM_{2.5}$) – monitoring this parameter demonstrates that airborne particulate, including potential respiratory particulates, are being effectively controlled by the ventilation and filtration systems.

IMPROVED EFFICIENCY, BETTER BUILDING MANAGEMENT

Active IAQ can be installed anywhere in any building via a simple 3-step process that includes sensor installation, activation for wireless connectivity and validation of the sensor within the data management platform. The solution is also stand-alone so there is no need for integration with any building automation system (BAS). Additionally, because the solution is wireless, there are no cables or conduit that need to be installed. Sensors can also quickly and easily be re-deployed, enabling real-time monitoring anywhere, including areas of specific need or interest. You get secure, accurate indoor air quality data that can be managed safely and remotely via the data management platform.

Active IAQ offers a cost-effective opportunity to improve the efficiency of managing buildings in a better manner. In addition to the easy integration, once deployed, there is no longer any need for costly in-person site visits. Additionally, once deployed, more applications can be added safely and securely to the wireless network to enhance your monitoring services. Additional use cases include people counting, occupancy detecting, energy monitoring, leak detection and many more.



The impact of COVID-19 has brought about the start of a new approach when it comes to building monitoring and management. Inconsistent data via singular-focussed technologies simply is not enough to ensure occupant safety and the best experience. Building monitoring now requires real-time capabilities to not only provide peace of mind for the occupants to ensure tenant retention, but to also improve efficiencies and manage indoor spaces in a better way overall.

About eleven-x Inc.

eleven-x simplifies IoT and facilitates faster, evidence-driven decisions through wireless connectivity and real-time data collection for Intelligent Cities, Campuses, Buildings and Industry. We offer complete device to cloud LoRaWAN® solutions, comprised of accurate and reliable sensor networks delivering secure data to our customers through easy-to-use dashboards and industry standard APIs. Organizations rely on eleven-x's wireless connectivity expertise to deliver turnkey solutions that improve operations, simplify processes and deliver value in today's connected world.