

*sim*PRO

Indoor Air Quality:

Using simPRO IoT in a Pandemic Era



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The Background

[The National Health and Medical Research Council, Australia \(NHMRC\)](#) defines indoor air as air within a building occupied for at least one hour by people of varying states of health. This can be places like homes, schools, offices, or other building environments. "Indoor air quality" can be defined as the totality of attributes of indoor air that affect a person's health and well being.

On average, people spend almost [90% of the time indoors](#), where the concentration of indoor pollutants is often two to five times higher than typical outdoor environments. In today's pandemic world, indoor air quality is becoming more important as COVID-19 is transmitted through aerosol particles. These particles do not settle due to gravity. If there is a high amount of exhaled CO2 in an indoor environment, there is also a high number of aerosols. Research indicates that poorly, or non-ventilated indoor spaces can increase the chance of COVID-19 aerosol transmission.

For example, the research found that if indoor CO2 levels in a gym dropped from 2,800 to 1,000 ppm, the risk of COVID-19 transmission dropped to 25% of the original risk. In a library, if a sudden increase of people makes CO2 jump from 800 to 1,600, the risk of COVID-19 transmission triples.

To prevent the virus that causes COVID-19 from spreading indoors, the WHO (World Health Organization) released "[Roadmap To Improve And Ensure Good Indoor Ventilation In The Contact Of COVID-19](#)". The roadmap is divided into three settings -- health care, non-residential and residential spaces--and takes into account mechanical and natural ventilation systems, providing guidance to facility managers and building managers who provide home care or home quarantine.

Government Air Quality Recommendations for Combatting COVID-19

Australia

During the COVID-19 pandemic, many countries and health departments recognised this potential transmission risk and recommended CO2 monitoring and procedures to mitigate the risk of coronavirus infection. In Australia, The Department of Health published a [document](#) on minimising the risk of infectious respiratory disease transmission in the context of COVID-19. Safe Work Australia published a [webpage](#) on improving ventilation in indoor workplaces to manage the risk of COVID-19 transmission. The Australian Institute of Refrigeration, Air Conditioning and Heating (AIRAH) also published a [COVID-19 technical resource webpage](#) that includes valuable information like [COVID-19 guidance for school buildings](#), and COVID-19 articles in AIRAH publications.

[AIRAH CEO Tony Gleeson](#), said “Since the start of the pandemic, AIRAH and other organisations have been creating and sharing resources about airborne transmission of COVID-19 and heating, ventilation and air conditioning systems. We have vital technical expertise and connections within the built environment, and we are eager to work with the government to develop the best possible guidance for all Australians.”

Furthermore, starting this September, [the NSW government](#) has begun a comprehensive review of ventilation in 2,200 public schools. [The Victorian government](#) has announced it will invest more than AUD \$190 million in initiatives to support a COVID-safe reopening of schools, with a focus on ventilation.

— Government Air Quality Recommendations for Combatting COVID-19

United Kingdom

In the United Kingdom (UK), the Teaching Union have been calling for urgent extra ventilation measures, and in response, the Department of Education will provide 300,000 portable CO2 monitors to all state-funded schools from September, so school staff can quickly identify where ventilation needs to be improved. Furthermore, the UK government released "[Guidelines Of Ventilation And Air Conditioning](#)" during the coronavirus pandemic and recommended using CO2 monitors (a monitoring device that can measure CO2 ppm level in an indoor environment), to help businesses reduce the risk of COVID-19 transmission.

Suitability of CO2 Monitoring in Different Types of Space

Health and Safety Executive UK

CHARACTERISTICS OF SPACE	EXAMPLES	SUITABILITY OF CO2 MONITOR
Small spaces of up to 50 square metres in floor area Occupied by a consistent number of people for more than an hour	Small offices and meeting rooms	Can be used, but results should be treated carefully as concentrations can be affected by the differences between individual breathing rates
Small spaces of up to 50 square metres Occupancy varies over short periods	Changing rooms and small retail premises	Unlikely to give reliable measurements
Mid-sized spaces between 50-320 square metres Occupied by a consistent number of people for more than an hour	Larger office and meeting rooms, classrooms, restaurants/bars and some indoor sports (low aerobic activity)	Often well suited to monitoring as the higher number of occupants provides more reliable values
Mid-sized spaces between 50-320 square metres Occupancy varies over short periods	Larger office and meeting rooms, classrooms, restaurants/bars and some indoor sports (low aerobic activity)	Often well suited to monitoring as the higher numbers of occupants provides more reliable values
Mid-sized spaces between 50-320 square metres Occupancy varies over short periods	Some retail spaces	Can be used, but results should be treated carefully as concentrations may be affected by variations in occupancy levels
Large spaces of over 320 square metres Occupied by a consistent number of people for a longer period of time	Indoor concert venues, large places of worship and airport concourses	Can be appropriate for monitoring in occupied areas, but might require multiple sensors to provide meaningful measurements
Large spaces of over 320 square metres Occupancy varies over short periods	Rail concourses and shopping malls	Unlikely to give reliable measurements

Other countries have different guidelines to reduce the COVID-19 transmission risk. In general, proactively reviewing the ventilation and indoor air quality will be the most crucial part of air quality management. Consequently, CO2 monitoring sensors will become an essential requirement for indoor air quality monitoring.

Technology To Help You Monitor Air Quality

How Does IoT Work?

IoT, or 'Internet of Things' refers to the interaction between assets or 'things' that are connected to the internet. Attached to, or embedded in, these 'things' are sensors carrying software and connectivity. This enables objects to 'talk' to each other and exchange data.

What Are 'Things'?

Simply put, 'things' can include almost anything. However, for something to be part of the IoT, it needs to be uniquely identifiable (i.e. have an IP address) and be able to connect to the internet.

This connection can either be embedded in an asset or retrofitted to assets in the form of small devices.

IoT Can Be Used To:

- Monitor the temperature in a food storage area.
- Identify the presence of water in a critical area such as a server room.
- Track the air quality in working environments such as commercial offices.

In fact, [Envirologik](#), a simPRO IoT Partner that offers dedicated monitoring and evaluation resources focused on IoT installation and consultancy, put into place a set of monitoring solutions for a large property management customer. These included the monitoring of chiller refrigerant status, energy consumption and temperature monitoring of flow and return. As a result, they were able to identify operating inefficiencies and advise on changes that resulted in £5000 monthly savings. Envirologik are also using environmental monitoring on other [key sites](#), linked to HVAC operations such as filter condition in Air Handling Unit (AHU) (to support condition-based maintenance approach), to increase air quality for tenants and demonstrate and COVID preparedness on behalf of building owners.

Simple IoT Solutions to Solve Air Quality Risks

There are two main features of simPRO IoT that can help you to ensure air quality of your customers' buildings and environment:

Sensors: there is one device in simPRO IoT's portfolio that helps you better manage indoor air quality - **simPRO Yo Pure**. This **Advanced IoT Environmental Monitoring** node measures multiple attributions: ambient temperature, humidity, CO₂, CO, volatile organic compounds and, PM_{2.5}. So apart from the crucial CO₂ measurement, simPRO Yo Pure also helps you to monitor the overall air quality. Another benefit is that with a single node, coupled with multiple sensors, you do not need to buy multiple sensors to measure different attributes. You only need one simPRO Yo Pure to get an optimised air quality environment.

Asset Maintenance System: simPRO IoT provides customisable dashboards to ensure interpreting the performance of all the assets you monitor is easy. Because simPRO is an operations management software, this unique asset maintenance functionality helps you control devices and sensors. Not only can you set certain trigger actions for different sensors, you can also monitor every sensor in multiple buildings through the simPRO IoT dashboard. simPRO also has the functionality to record asset history and site specific information, and thus puts you in full control of all your assets.

— simPRO IoT Makes Managing Buildings Easy

Manage Your IoT Sensors in Multiple Buildings to Improve Efficiency

If you are in the facility management industry or managing multiple sites, simPRO IoT is the perfect solution for you to manage multiple buildings efficiently. With the asset maintenance system, you can monitor multiple sensors in different buildings, which is effective if you have multiple facilities management portfolios. simPRO's IoT solution helps you to view all alerts, faults or failure of assets in real-time, and in one dashboard. To make your operation more efficient, the system can automatically create a new job in simPRO if an alarm is triggered. With simPRO IoT, you can do more with less.

Advanced IoT Environmental Monitoring Goes Beyond CO2 Monitoring

simPRO's **Advanced IoT Environmental Monitoring** is not just a CO2 monitoring device. It can detect multiple attributes that greatly out-perform most sensory devices on the market. There are other significant sources of pollutants in our indoor environment, such as cooking on gas, solid-fuel burning stoves, cleaning products, paints and new furniture. These sources can expose people to CO, volatile organic compounds, and PM2.5. Exposure to these types of pollutants can cause skin reactions, dizziness and headaches, aggravate allergies and exacerbate respiratory and heart problems. These risks may become more dangerous or significant if your portfolio has indoor environments like school classrooms or aged care facilities.

In most cases, you would require different sensors for different pollutants. However, with simPRO's **Advanced IoT Environmental Monitoring**, you only need a single device for all pollutants. With simPRO IoT, you are not just reducing the COVID -19 transmission risk, you are also enhancing the wellbeing of people living under your managed buildings.

Other than Environmental Monitoring sensors, simPRO IoT offers a wide range of sensors that help you maintain your customers' assets even when their buildings are unoccupied. With simPRO IoT, you are proactively monitoring your customers' assets, as well as people who live inside. This change in service offering can contribute greatly to you and your customers.

Want to find out how simPRO IoT can benefit you and your customers?

Visit our dedicated IoT page to [learn more](#).

