

## Sustainable Business Partnership CIC

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SEMDP Facilities Managers Forum Sustainability Project

### CO<sub>2</sub> monitoring briefing note

A presentation from Roger Curtis of Historic Scotland to the forum led to a discussion about CO<sub>2</sub> monitoring, comfort, Covid-19 and air flow in buildings.

Roger kindly put us in touch with a colleague who has used and tested CO<sub>2</sub> monitors in historic buildings. She provided some advice on monitoring which has been supplemented with some additional research by the SBP CIC and is summarised below.

#### Why monitor CO<sub>2</sub>?

Everyone already knows about the dangerous effects of Carbon Monoxide (CO), but people are increasingly recognising that higher concentrations of Carbon dioxide (CO<sub>2</sub>) in a room can make people sleepy and make rooms feel stuffy. This is particularly an issue in spaces which are designed to have a low number of occupants, but which sometimes have a large number for a longer time e.g. gallery events, long meetings or wedding ceremonies. It is also an issue for rooms which do not have good ventilation, either mechanical or easily opened windows.

#### Covid-19

There is some evidence that the CO<sub>2</sub> levels in a building correlates with the spread of airborne infection and so CO<sub>2</sub> monitoring has become more important in the last year because it provides a relatively simple proxy for fresh air, so organisations are using CO<sub>2</sub> monitoring to manage their Covid-19 risk.

Useful article: <https://smartbuildingsmagazine.com/features/carbon-dioxide-monitoring-to-lower-the-coronavirus-threat>

#### What are safe levels of CO<sub>2</sub> in rooms?

##### CO<sub>2</sub>

250-400ppm	Normal background concentration in outdoor ambient air
400-1,000ppm	Concentrations typical of occupied indoor spaces with good air exchange
1,000-2,000ppm	Complaints of drowsiness and poor air.
2,000-5,000 ppm	Headaches, sleepiness and stagnant, stale, stuffy air. Poor concentration, loss of attention, increased heart rate and slight nausea may also be present.
5,000	Workplace exposure limit (as 8-hour TWA) in most jurisdictions.
>40,000 ppm	Exposure may lead to serious oxygen deprivation resulting in permanent brain damage, coma, even death.

Source: Kane Air Quality Monitor Suppliers <https://www.kane.co.uk/product-selector/indoor-air-quality>

#### Options for monitoring CO<sub>2</sub>

First – check if your existing systems already has CO<sub>2</sub> monitoring – do you have a Building Management System (BMS) with air quality monitoring, do you have a Tinytag system? They may well already have CO<sub>2</sub> monitoring capabilities, or potential to add on without adding additional systems.

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CO2 monitors start from simple portable options without data logging to complex integrated systems. Historic Scotland have tested some with the intention of producing guidance, though the pandemic delayed the project, so the information below are interim and forum members are advised to do their own research as other equipment is available.

If you are thinking of investing in new monitoring, ensure you consider the other areas you want to monitor – carbon monoxide, temperature and humidity, VOCs, PM10 particles, pollen etc. when choosing a new system.

Another thing to consider is whether you want a monitor with data logging capability and / or a live display.

Look for monitors with NDIR CO2 sensors

More information: <https://www.dwyer-inst.com/articles/?Action=View&ArticleID=83>

### Monitors currently being tested by Historic Scotland

Tinytag TGE-0010 (>2,000ppm)

<https://www.gemindataloggers.com/data-loggers/tinytag-CO2-data-logger/tinytag-tge-0010-carbon-dioxide-data-logger>

Tinytag TGE-0011 (>5,000ppm)

<https://www.gemindataloggers.com/data-loggers/tinytag-CO2-data-logger/tinytag-tge-0011-high-concentration-carbon-dioxide-data-logger>

Tinytag are made by Gemini Data Loggers, a Sussex based supplier

Aranet4

Domestic CO2, humidity, temp and pressure monitor

[https://aranet4.com/?gclid=Cj0KCQjwzYGGBhCTARIsAHdMTQwUTPNEA9LQsHvSon50Qw69A1LcsmE9UQwDcKE8qet1Ei1jMIRbrb4aAkdBEALw\\_wcB](https://aranet4.com/?gclid=Cj0KCQjwzYGGBhCTARIsAHdMTQwUTPNEA9LQsHvSon50Qw69A1LcsmE9UQwDcKE8qet1Ei1jMIRbrb4aAkdBEALw_wcB)

Extech CO-100 Desktop air quality monitor

<http://www.extech.com/categories/air-quality-meters/carbon-dioxide>

Therm CO2 monitor

<https://www.amazon.co.uk/Therm-Mode-Detector-Temperature-Calibration/dp/B08R9T5F3N>

Airthings View Plus Domestic smart phone linked air quality monitor

<https://www.airthings.com/en-gb/view-plus>

Available for pre-order (new model with display screen)

Fluke C02-100

Currently out of stock most places