Vaisala CO2 sensors in ‘Building Biospheres’ exhibit help show plants' ability to manage indoor environments

Vaisala has donated some of its leading-edge carbon dioxide sensors to this year’s Biennale in Venice, which uses trees to create an agreeable indoor climate.

Building Biospeheres exhibition within the Belgian Pavillion

HELSINKI, FINLAND, July 4, 2025 /EINPresswire.com/ -- Commissioned by the Flanders Architecture Institute and curated by landscape architect Bas Smets, the Belgian Pavilion will this year feature an exhibition titled ‘Building Biospheres’. “Climate change and the recent crises that we have faced, are forcing us to rethink the relationship between architecture and nature,” Smets explains. “Historically and traditionally, architecture has isolated itself from the natural world, recreating an indoor climate with heating, ventilation and mechanical tools. As humans we prefer the conditions of a sub-tropical climate, so our project will investigate and demonstrate what happens when sub-tropical plants such as the camphor tree are used to manage the indoor environment.”

With its inception in 1895, La Biennale di Venezia is one of the longest-running cultural festivals in the world, and now features around 30 permanent pavilions established by different countries. In 2025, the goal of the Biennale Architettura will be to eliminate waste, recycle and circulate materials, and regenerate natural systems to demonstrate that the built environment can coexist harmoniously with the natural environment.

In November 2024, a prototype of the ‘Building Biospheres’ exhibit was built at the Faculty of Bioscience Engineering at Ghent University, where Professor Kathy Steppe and her team established a greenhouse facility in which sub-tropical trees are closely monitored with TreeWatch technology. Prior to the beginning of the Biennale Architettura, all of the plants and associated monitoring infrastructure were transported to Venice and re-established within the

Belgian Pavilion. Four of the key environmental measurements are light, temperature, humidity and carbon dioxide because these are the factors with greatest influence on indoor human comfort and well-being.

Prof Kathy Steppe - Universiteit Gent - fitting Vaisala GMP252 CO2 probe to weather station

Explaining the potential for utilizing plants to manage indoor environments, Prof. Steppe says: “In order to maintain optimal conditions inside buildings, it is usually necessary to implement some form of heating, ventilation and/or air conditioning, but this can be very costly, both financially and from a carbon footprint perspective.” Comparing and contrasting the built and natural environments, she continues, “Plants actively interact with and help regulate their local climate through processes such as photosynthesis and transpiration. This means, for example, that the CO2 produced by humans, other organisms and natural processes can be taken up by plants during photosynthesis, helping to prevent excessive indoor CO2 build-up.”

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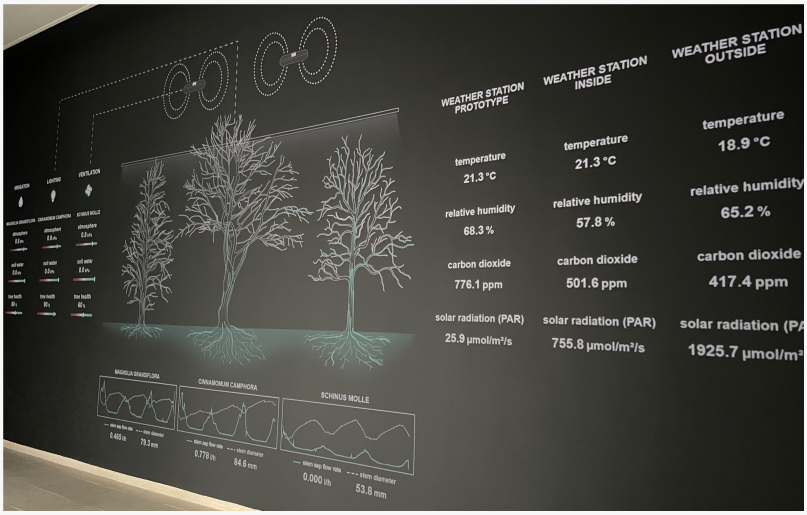
>
> *Pekka Ravila, Vaisala Vice President, Industrial Measurements EMEA*

As a greenhouse gas, CO2 levels in the atmosphere are having an impact on climate change. Indoors, CO2 affects the comfort and performance of the people inside a building. Occupied spaces with good air exchange may contain 450-1,000 ppm CO2, but anything above this can induce drowsiness. Levels above 2,000 ppm CO2 cause headaches, sleepiness, poor concentration, loss of attention, increased heart rate and slight nausea. Exposure to very high levels (from oil/gas burners or gas leaks for example) can even result in fatalities from asphyxiation.

According to the International Energy Agency (IEA), the operations of buildings account for 30% of global final energy consumption and 26% of global energy-related emissions (8% being direct emissions in buildings and 18% indirect emissions from the production of electricity and heat used in buildings). The climate crisis is therefore challenging all sectors, and the building industry in particular, to find ways to lower greenhouse gas emissions. ‘Building Biospheres’ therefore seeks to investigate the opportunities presented by the integration of plants into indoor

environmental management, and to engage with the architecture and building design community, to challenge traditional approaches to building design and operation.



Real-time data display. Credit - Dirk De Pauw, Plant AnalytiX

The 'Building Biospheres' exhibit will serve as a living laboratory, exploring the ways in which plants can be used to complement traditional energy-intensive building management technologies. Vaisala's CO2 sensors have therefore been deployed at different locations throughout the exhibit: one outdoors, one in the entrance hall of the pavilion and one within the plant canopy in the 'Building Biospheres' room, to monitor how effectively the plants help regulate indoor CO2 levels.

This year, visitors to the Belgian Pavilion of the Biennale Architettura will be able to view live data from the 'Building Biospheres' exhibit. "This is one of the most prestigious architectural events in the world," Prof. Steppe adds. "So, it represents a fantastic opportunity to inspire building designers from around the globe. The most obvious applications – you could call them the lowest hanging fruit! – are large buildings such as train stations and airports."

The objectives of the Biennale Architettura 2025 align with Vaisala's sustainability objectives, including the company's core purpose, which it describes as: taking every measure for the planet. "We were delighted to be invited to participate in this highly respected event," comments Vaisala's Pekka Ravila, Vice President, Industrial Measurements EMEA. "Not just because it highlights the performance of our CO2 sensors, but mostly because this represents a very exciting opportunity to help create a paradigm shift in the way that buildings are designed and managed. If we can achieve that, the potential beneficial impacts on climate change will be enormous."

Summarizing, Prof. Steppe says: If we are to convince building designers to incorporate plants into their design, it is essential that we are able to supply them with data to support our ideas. Vaisala's carbon dioxide sensors are therefore playing a vital role in helping us to demonstrate how plants are able to help regulate indoor CO2 levels naturally, without the need for a heavy carbon footprint, and with the added benefit that the plants look great!"

Industrial Measurements
Vaisala
+358 5 8989491

EMEA.media@vaisala.com
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