This presentation was live at:

Smart Buildings SHOW

18-19 October 2023 • ExCel London

Using your BMS to create well being

Going beyond energy efficiency

18th October 2023

Ian Ellis

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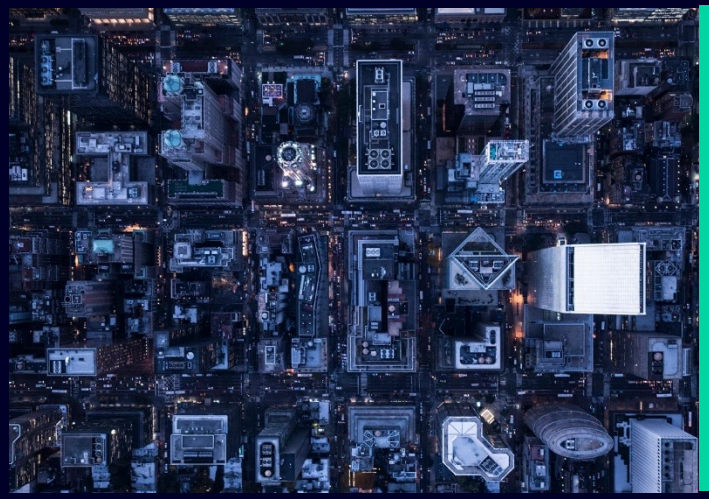
What people want from their buildings



Flexible space utilisation

Digital transformation

Demand for health and safety

Sustainability

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Sustainability/ De Carbonisation challenges

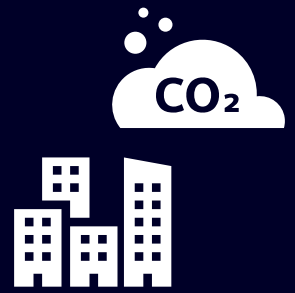
Today building energy costs and emissions are high with building regulations

High energy costs

40%

of all energy is used by buildings.

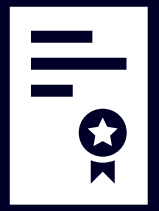
High building emissions



39%

of global energy related carbon emissions are caused by buildings[1].

Green building regulations



Enforcement of green regulations

EU Renovation Wave (Energy Performance of Building Directive)

1 - Source: https://worldgbc.org/advancing-net-zero/embodied-carbon/#:~:text=Buildings%20are%20currently%20responsible%20for,11%25%20from%20materials%20and%20construction.

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Energy efficiency has been (and still is) a key driver for BMS systems

BACS only and manufacturer neutral

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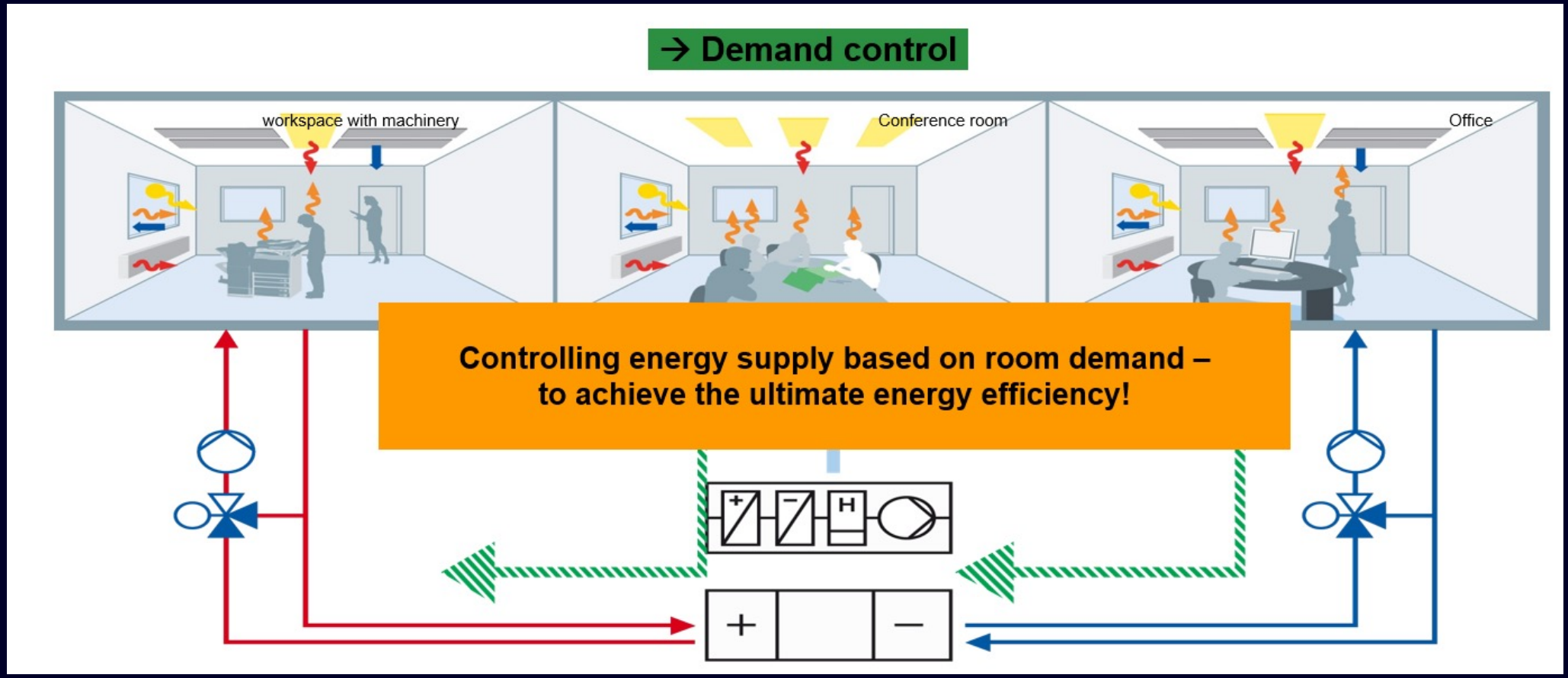
Energy efficiency under ISO 52120: Targeting integrated room automation



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The unintended consequence of energy efficiency on building design

Modern buildings are practically airtight ➡ more CO_2, higher humidity

Old buildings

Well ventilated

- Windows
- Doors
- Chimney
- Etc.

New buildings

Practically airtight

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Changing how people live and work by making smart buildings real

People's health, safety and wellbeing

Building assets and business goals

Sustainability and energy-efficiency

Make smart buildings real by combining the real and the digital worlds to create sustainable, innovative value for people, businesses and the generations to come

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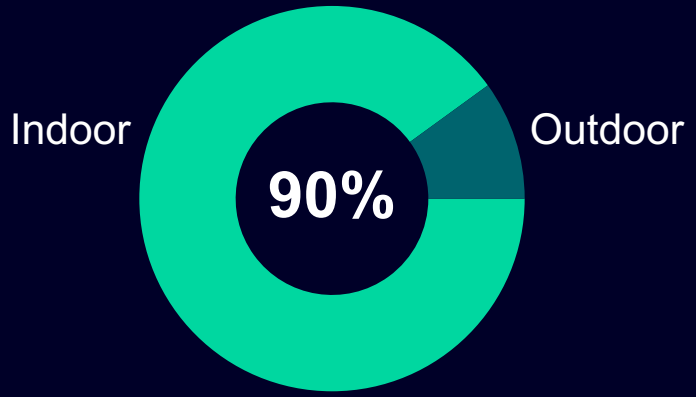
Improved indoor air quality increases health and productivity

TIME SPENT INDOORS



Compared to typical outdoor air, there is

2 – 5 times

higher pollution in indoor spaces

INDOOR AIR HEALTH EFFECTS

Poor ventilation may account for more than

50%

of all sick leave

The effect of poor indoor air quality on office work performance is over

9%

Source: Environmental protection agency; “Risk of Sick Leave Associated with Outdoor Air Supply Rate, Humidification, and Occupant Complaints” (D.K. Milton, P.M.Glencross, M. D. Walters); “The effects of indoor air quality on performance and productivity” (D.P. Wyon)

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The harmful effects of CO_2 on human health have been known for a long time

Short term effects

- Reduced cognitive performance
- Headache
- Drowsiness

→ **Reduces quality of life and work performance**

Long term effects

- Increased heart rate and blood pressure
- Inflammation
- Kidney and bone problems

→ **Can cause life-threatening and long-lasting painful diseases**

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What makes a building healthy?

The 9 foundations of a healthy building

1 Ventilation	2 Air Quality	3 Thermal Comfort
4 Moisture/ Humidity	5 Dust/Pest	6 Lighting and Views
7 Water Quality	8 Noise	9 Safety and Security

HARVARD T.H. CHAN SCHOOL OF PUBLIC HEALTH

9 FOUNDATIONS
Clear and actionable core elements of healthy indoor environments

2018

Managing air in a building is a matter of energy, productivity, and health.

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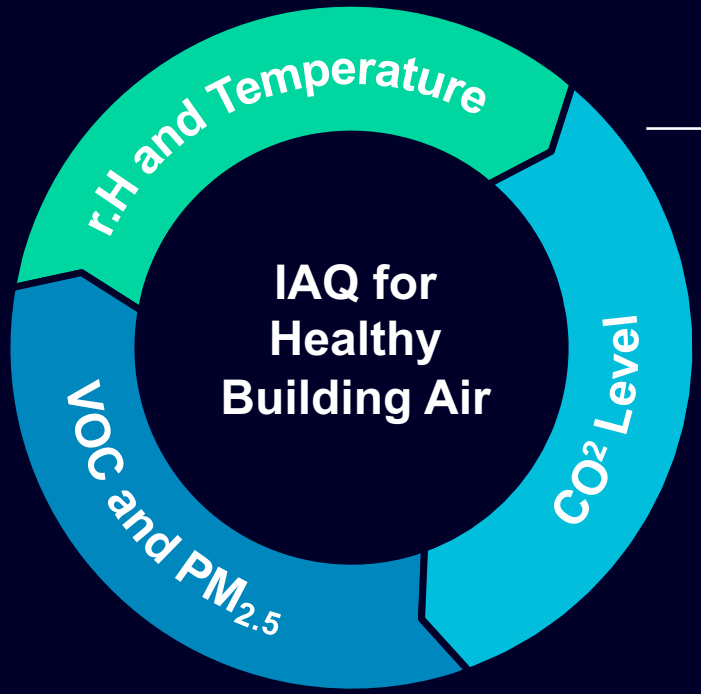
Essential components Indoor air quality (IAQ):
What can't we compromise?

1 | Optimal humidity and temperature

According to studies, 40 – 60% relative humidity is ideal for indoor human health and reducing virus vitality.

3 | Nearly Zero VOC and PM2.5

Most of these particles are harmful particles that cannot be removed after entering the body.



2 | A healthy level of Carbon dioxide

- Each person delivers approximately 8 liters of air per minute with breathing
- With each breath, we take in oxygen and release carbon dioxide (CO_2)
- The released air contains not only CO_2 but also droplets and aerosols. For infected people it may also include viruses

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Good ventilation:

IAQ

- Optimal rh Temp
- Healthy level of CO_2 (<1000ppm)
- Almost zero PM2.5

Fresh Air

- Air volume
- Air pattern
- Outside air quality

Comfort

- Conditioning
  (heat and cool, and humidity)
- Pressurisation
- Others elements (Noise,Light, etc …)

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What is changing in our industry?

- HVAC technology
- IAQ sensor technology
- Cloud – Edge – IoT technology
- New Control Algorithms
- New Regulations

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Green Buildings Certifications

Achieve high energy performances and meet building regulations

Pursuing a green building certification?

IAQ multi-sensor can support smarter energy usage and help you meet air quality monitoring requirements.

WELL V1

RESET

LBC

FITWEL

LEED

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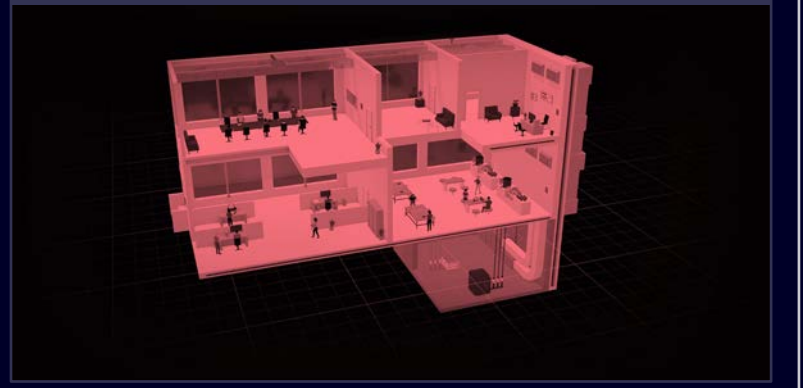
More fresh air with less energy
Less than a decade

Ventilation

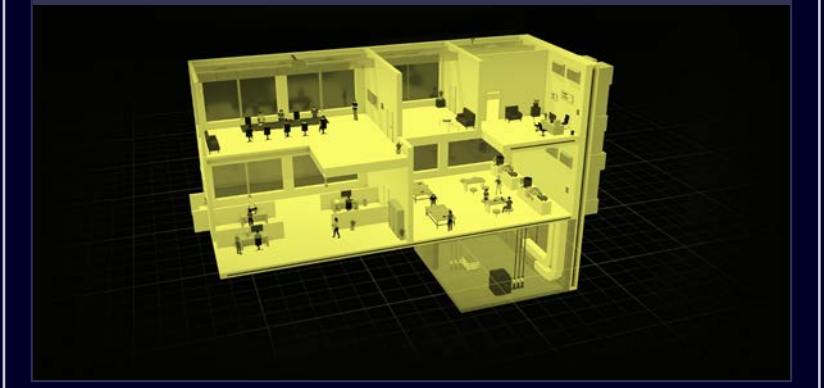
r.H and temperature



Standard application

Demand controlled ventilation (CO_2-based)

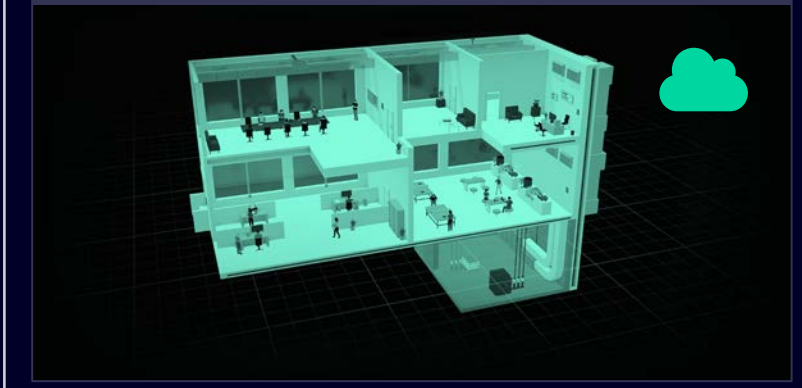
+ CO_2



- No over ventilation
- Improve air quality
- Save energy

Demand controlled ventilation with active filtering

+ $PM_{2.5}$



- More fresh air by dynamically analyzing the outside air conditions
- Accurate air pressure drop control and longer HEPA filter life
- The same amount of air with less energy

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Why use sensors?

CO_2 control
Increase occupant comfort and improve productivity

VOC control
Address offensive odors

Fine dust control
Reduce risk of lung diseases and other health issues

Humidity control
Limit spread of colds, flu and other viruses

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TO REALISE THE BENEFITS... ...WE CONTROL

CO_2

Control your CO_2 levels below 1,000 ppm to increase overall productivity by 2 – 18%

Manage the perfect balance of outside air to maintain proper CO_2 levels

VOC

Avoid sick building syndrome caused by indoor Volatile Organic Compounds (VOCs) and reduce absenteeism and improve productivity

Consider the impact of your surroundings and maintain the airflow balance

Relative humidity

Keeping humidity levels between r.h.,
40 – 60% reduces virus transmission by up to 70%

Actively control to the optimal temperature and humidity

Fine dust (PM2.5)

Monitor and control PM2.5 fine dust pollution

Combination with active filtering to keep external pollution to a minimum

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Gain transparency throughout your building

Accurate sensor data is essential to maintaining the balance between indoor air quality and energy efficiency.

CO_2, VOC and PM2.5 provide a good indication of ventilation efficiency and viral transmission risks.

Siemens ensures long-term accuracy thanks to dual-beam CO2 sensing, laser-based PM2.5 detection, and high-precision multi-sensor technologies.

INDOOR AIR QUALITY SENSORS

Comprehensive range of CO_2, VOC, fine dust (PM 2.5) and humidity sensors (r.H)

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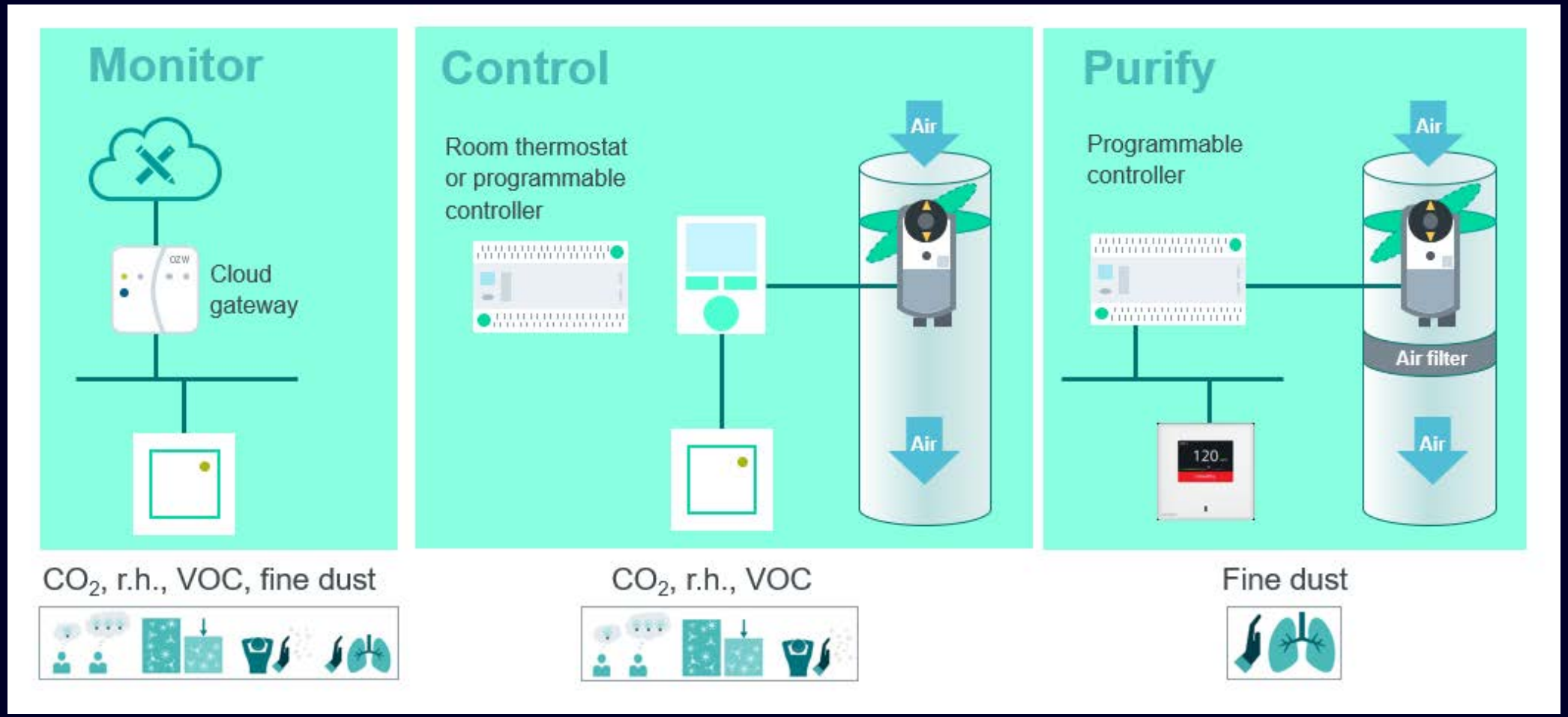
Application examples



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Connect Box

Your simple IoT solution to connect and monitor your buildings

- Install and operate **in a few clicks**
- Integrate your **IoT & building devices** – simple & fast
- One interface **for all your needs**

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Benefit from a wide range of protocols

Connect Box supports
11 communication protocols,
connecting a wide range of Siemens and third-party building devices, wired or wireless

BACnet · LoRaWAN · M-Bus · MQTT · Modbus · KNX

Additional available protocols: LON FT10, LON IP-852, LPB, Diematic

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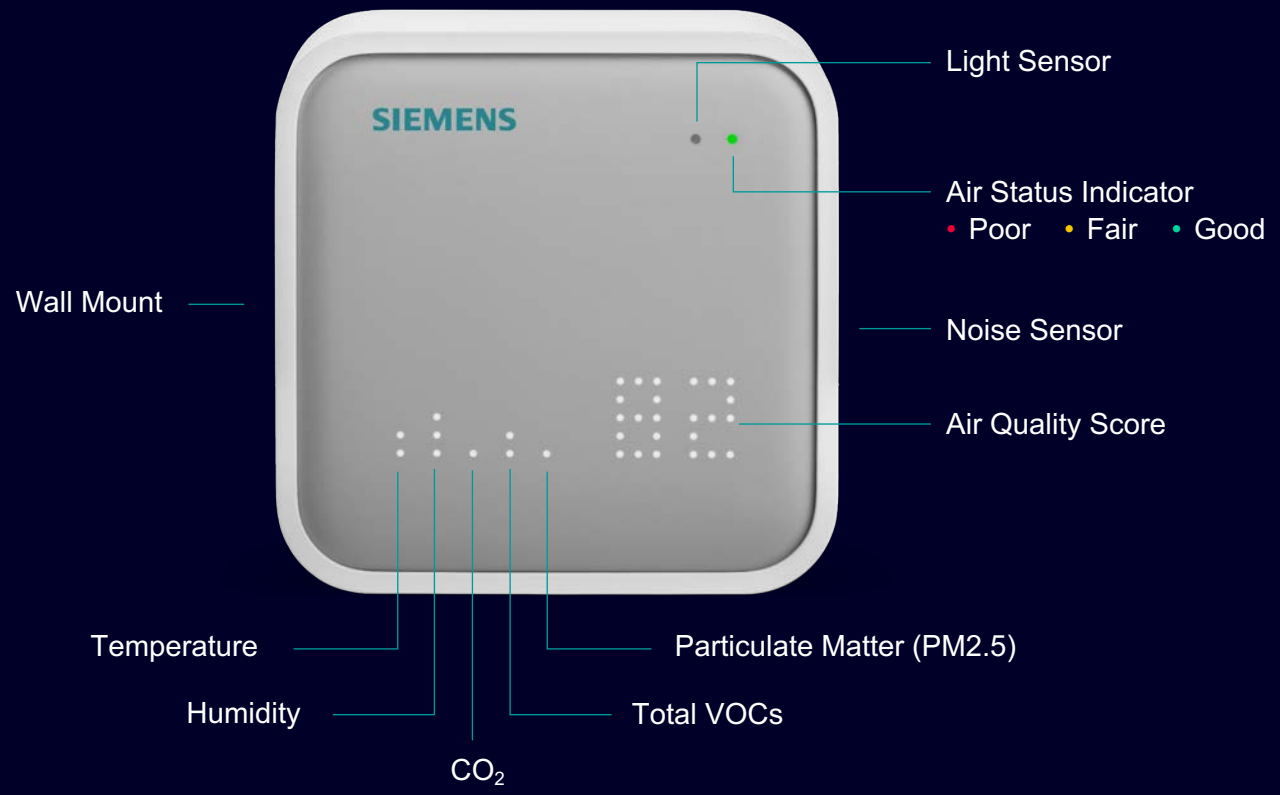
The IAQ multi-sensor simple display with 7 measured values



The air quality score = 5 air measurements

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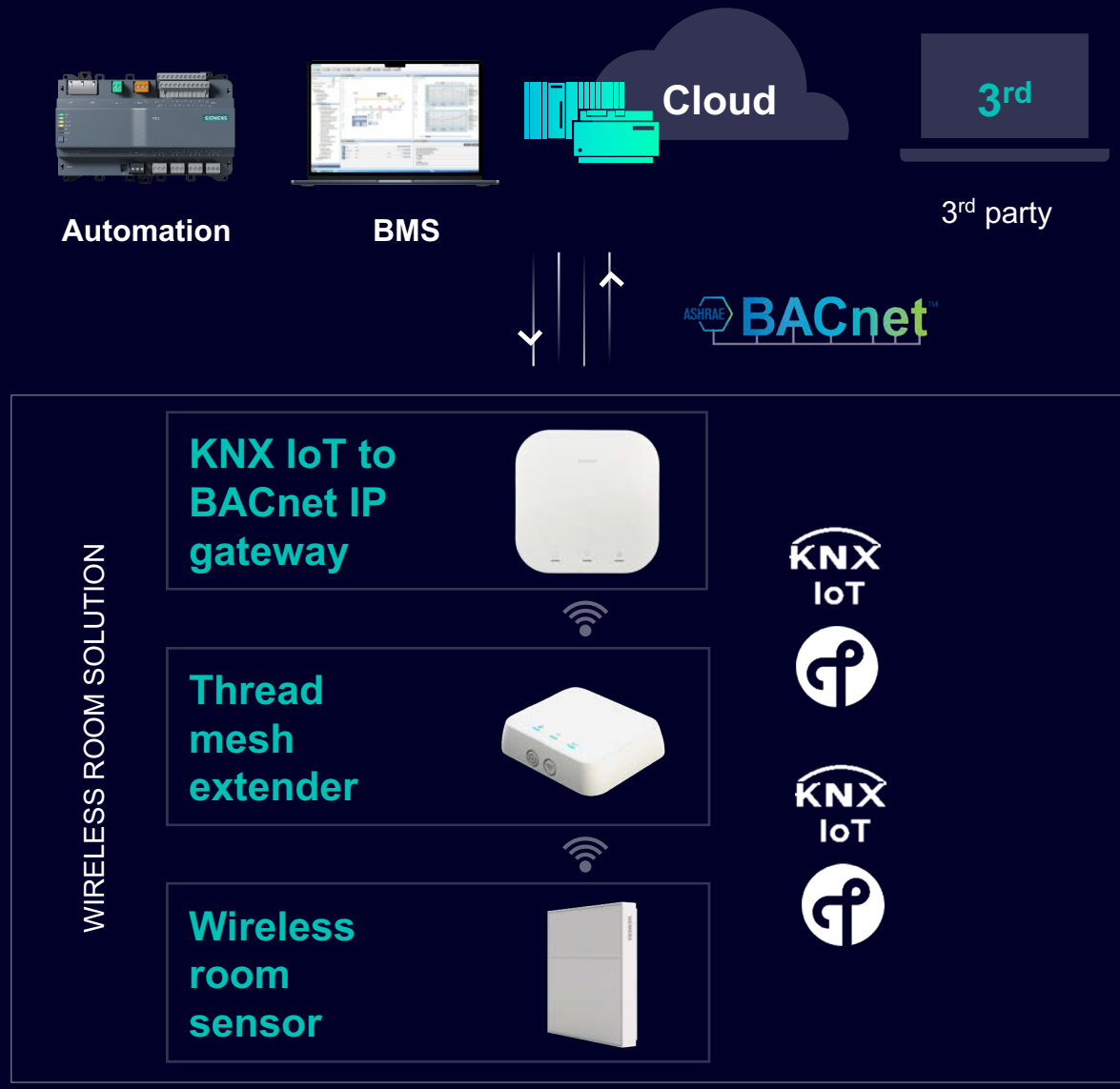
Wireless room solution



Quickly **collect** your room information and **integrate** it into your Automation, BMS, Cloud or 3rd party system.

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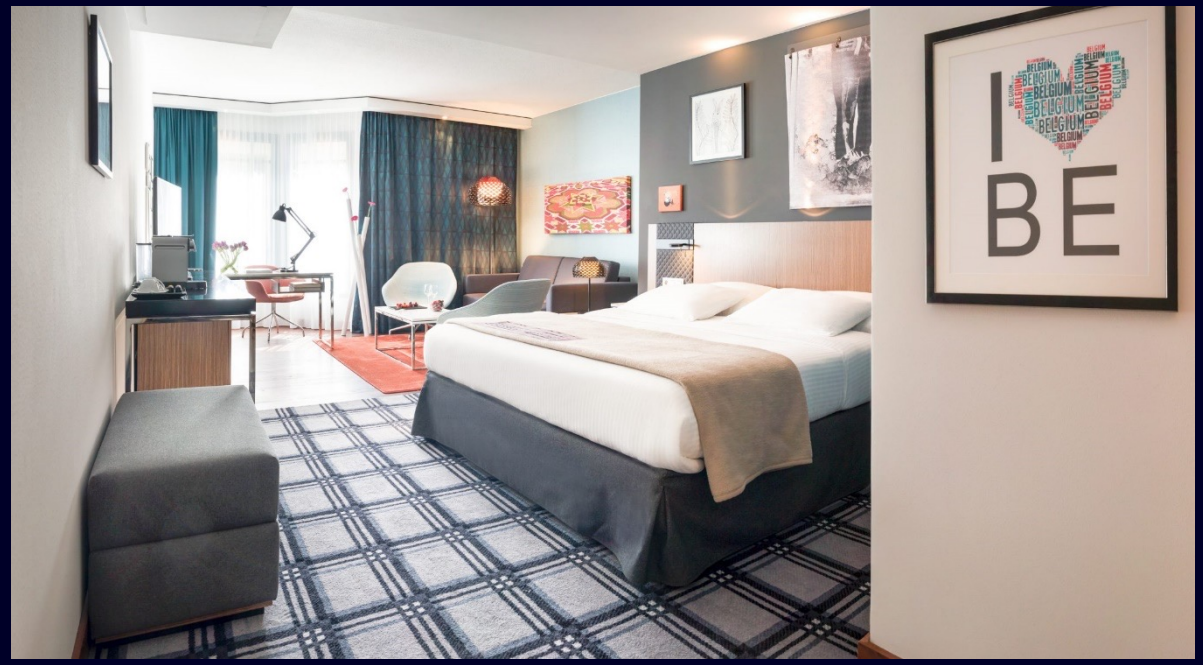
Application examples
Deployment in flexible office space or existent hotel

Operate easily in flexible office spaces

Rapidly deploy the Wireless room solution
in an open space office that changes its use

Indoor air quality automation in existing hotel

Rapidly deploy the Wireless room solution in a retrofit hotel and ensure optimal control of indoor air quality



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We spend 90% of our lives in buildings

Building automation plays a vital role:

- Staying safe & healthy
- Reducing absenteeism
- Increasing productivity
- Saving energy

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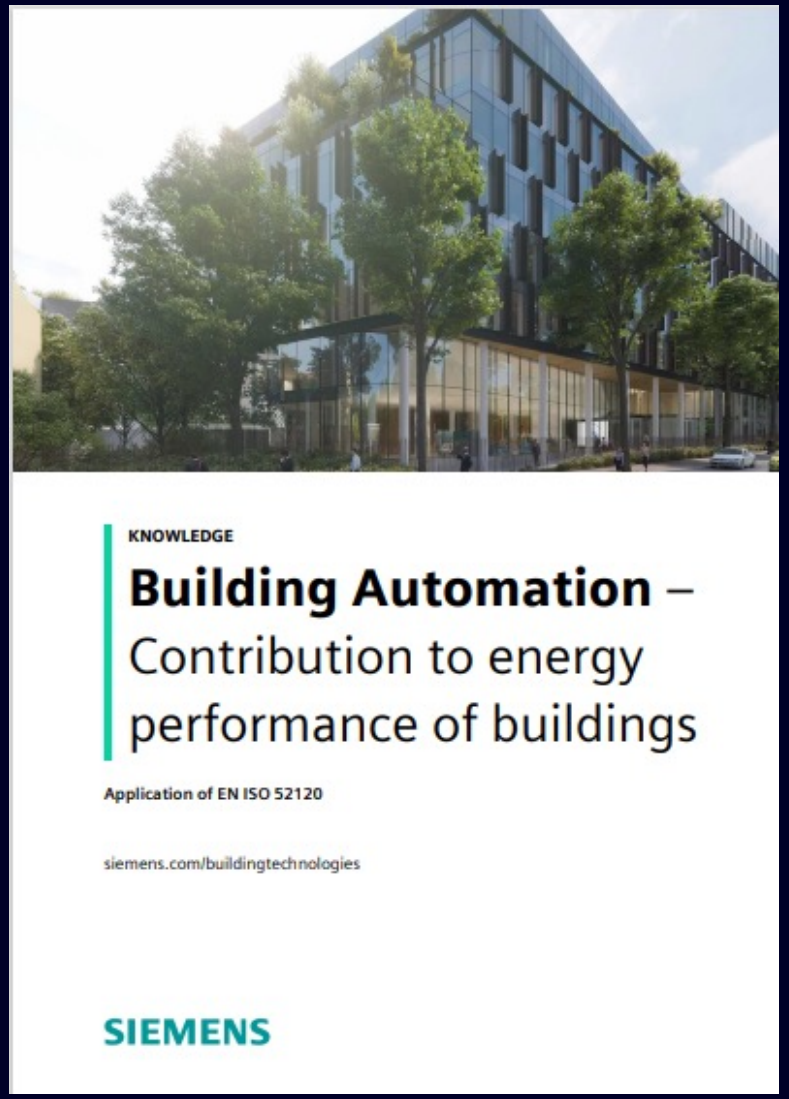
Supporting material



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We look forward to seeing you in 2024