TwinAIR: Improving Indoor Air Quality in the Built Environment

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Integrated Environmental Solutions Ltd

Sustainable Places 2025

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TwinAIR

Funded by the European Union

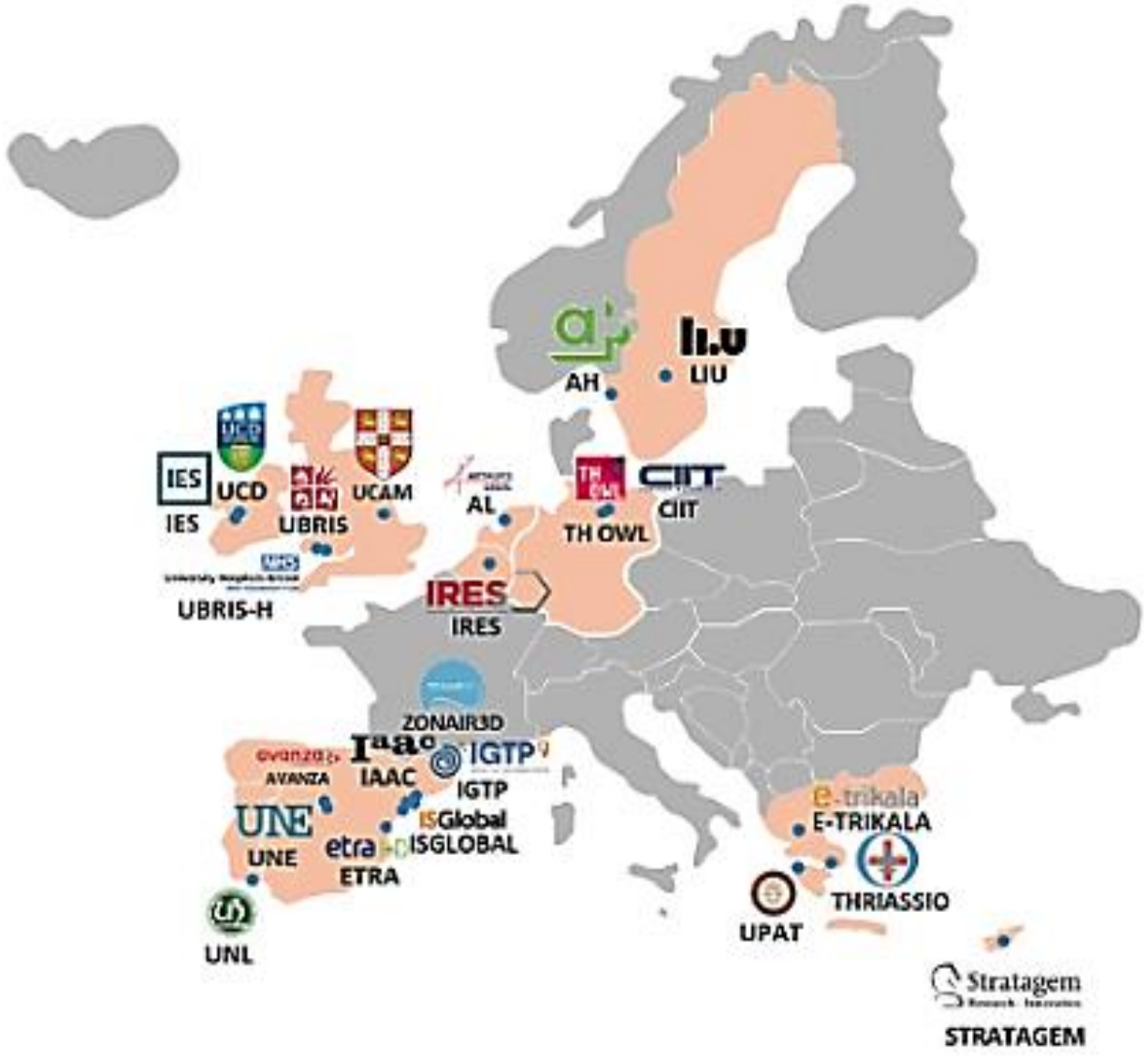
IES - Leading Global Innovator of Sustainable Analysis

Better Buildings: Smarter Cities

- We believe that **every building** of every city in the world can be **decarbonised**
- Our **purpose is developing the technology** to make that happen
- Our ultimate aim is to create a built environment that is resource and energy efficient
- **Eliminating** global **reliance on fossil fuels**
- Promoting comfort, health and wellbeing, **improve access to energy** for every citizen in the world

TwinAIR at a glance - Consortium & landscape

- Horizon Europe Project / GA 101057779
- 22 partners from 10 countries
- 48 months / March 2022 – August 2026
- https://twinair-project.eu/

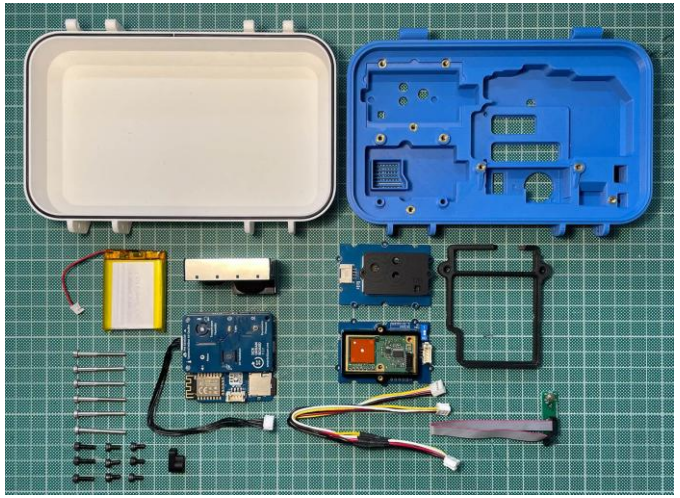


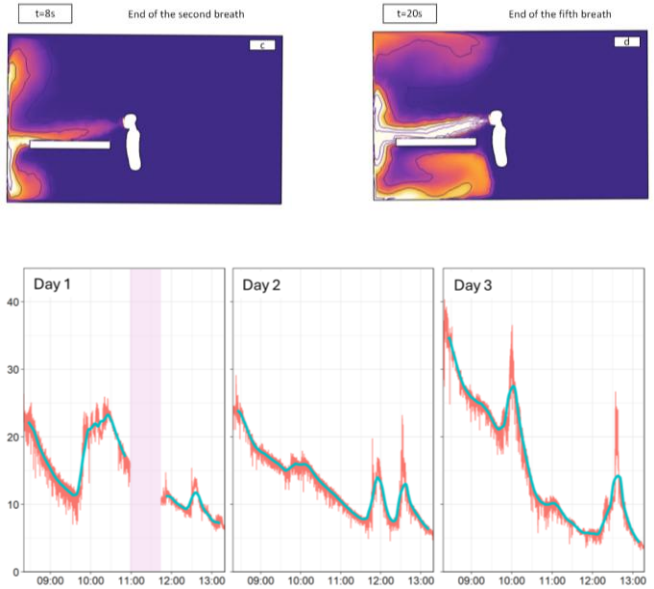
Twin AIR

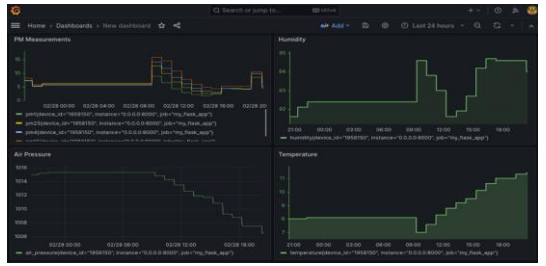
TwinAir at a glance - Project overview

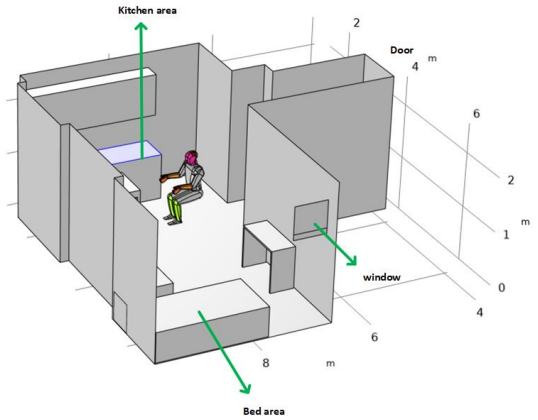
1. Goal

Improve Indoor Air Quality health through sensing, data analytics and visualisation to enhance user decision making.









TwinAir at a glance - Project overview

2. Methodology

Combination of environmental, medical and technological approach to Indoor Air Quality (IAQ).

		TGH	E-TRIKALA	ETRA I+D	AVANZA	UCD	CIIT	LIU	AH	UoB	UoB-H
HLUC1	Transportation				■			■		■	■
HLUC2	Education		■			■			■	■	
HLUC3	Residencies		■			■		■	■	■	
HLUC4	Workspaces		■	■			■			■	
HLUC5	Health	■								■	■

TwinAir at a glance - Project overview

3. Use Cases

5 High Level Use Cases in 10 Pilots:

- Transportation
- Education
- Residencies
- Workspaces
- Health

Harold's Cross Educate Together National School

Thriassio General Hospital

Campus Valla - Studenthuset

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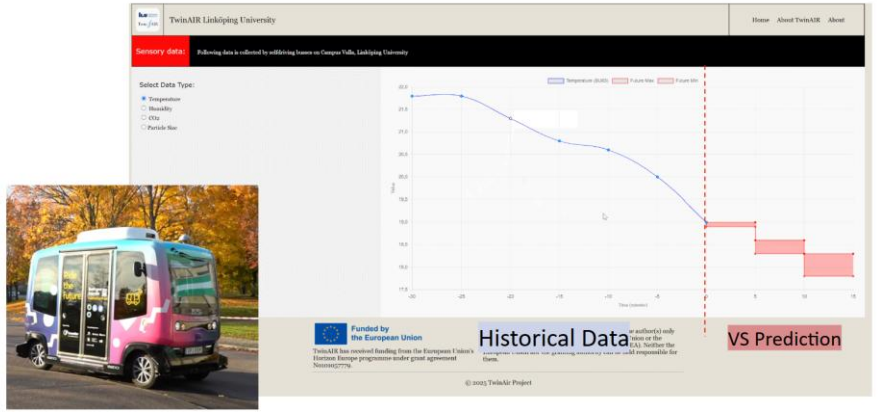
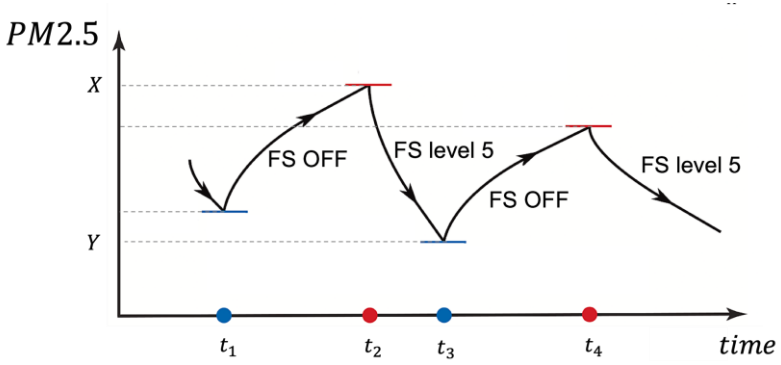
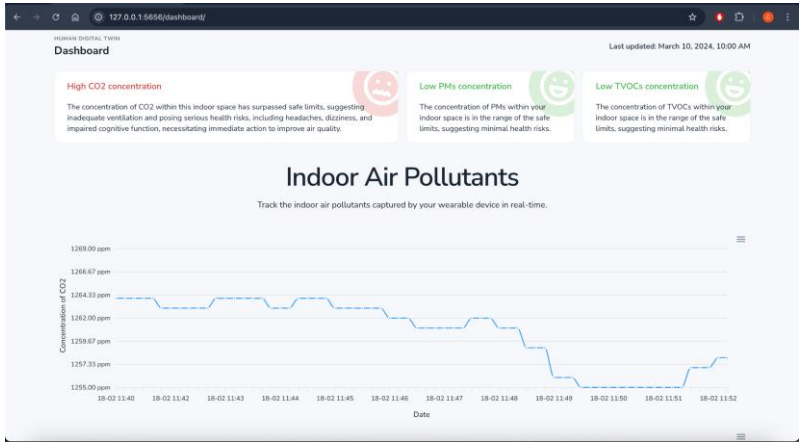
TwinAir at a glance - Project overview

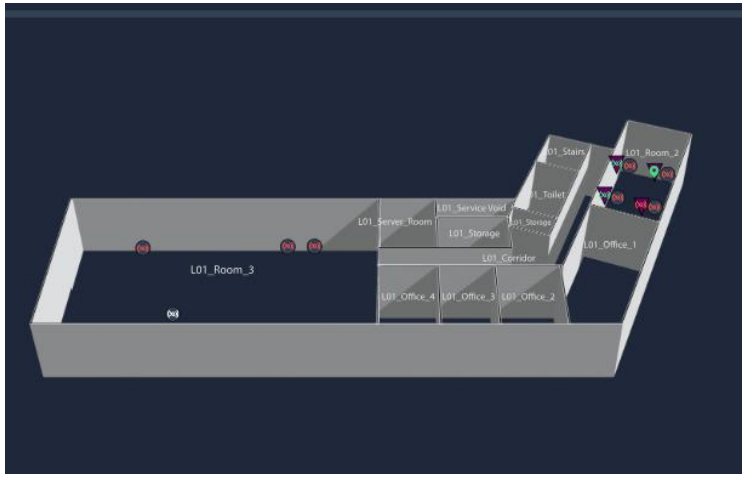
4. Implementation

Development of **technological toolset** correlated with Health and Environmental Study to facilitate a holistic approach to improving IAQ









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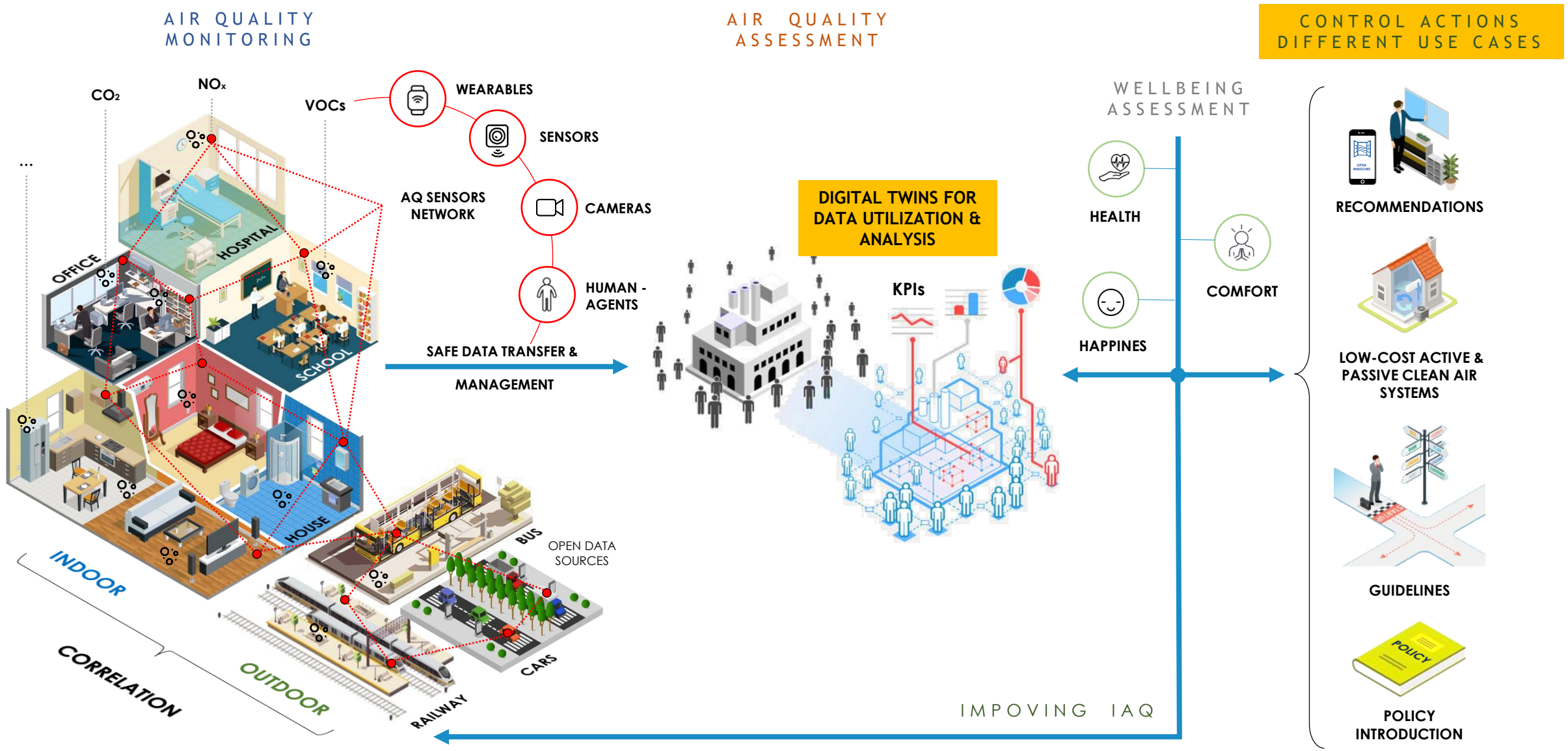
TwinAIR concept



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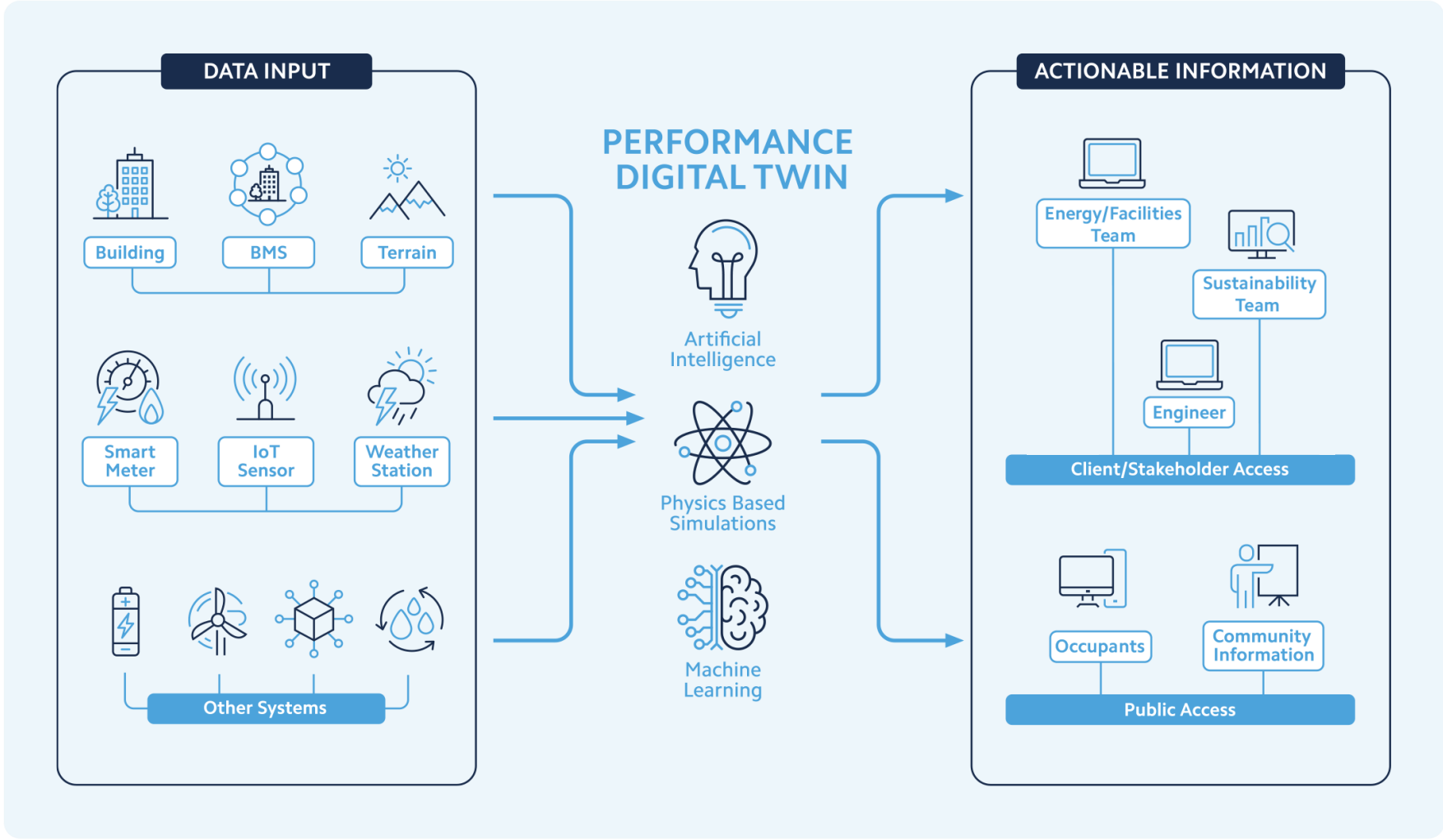
IES Contribution - Performance Digital Twin

- **Digital twin:** a virtual model of a building's physical and functional features
- Simulates energy performance and helps **optimize operations**
- Enhances **energy efficiency** and predictive maintenance



IES Contribution - Digital Twins for Indoor Air Quality

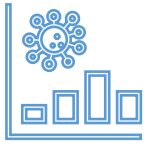
How IES supports TwinAIR's goals with its technology:

- Energy performance + indoor air quality monitoring + actionable recommendations based on IAQ pollutants analysis.

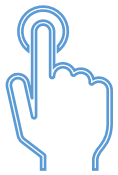
Building **Digital Twins**

Sensor & filtration **time series data** on indoor air pollutants

Actionable intelligence to offer users suggested actions based on analysis to improve indoor air quality (IAQ) and send recommendations to users.



Dashboard providing users with access to all measured and simulated data and relevant KPIs in a user-friendly interface



Pollutants **Short Term Forecasting tool**

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TwinAIR Case Study Demonstration

Enhancing Indoor Air Quality at ETRA Building: TwinAIR Case Study

- **Pilot Site:** ETRA Office in Spain to test TwinAIR health studies and apply TwinAIR solutions.
- **Goal:** to enhance IAQ performance through monitoring and recommendations.
- **Targeted Use Case:** Workspace
- **Demonstrated Outcomes:** Creation of interactive dashboards with actions and KPIs for energy efficiency and occupant IAQ comfort

IES Live Case Study Demonstration – ETRA office

IES Live: Cloud based platform to maximize building efficiency with data-driven insights

Building Energy Performance

- Energy breakdown by loads, Energy Use Intensity…

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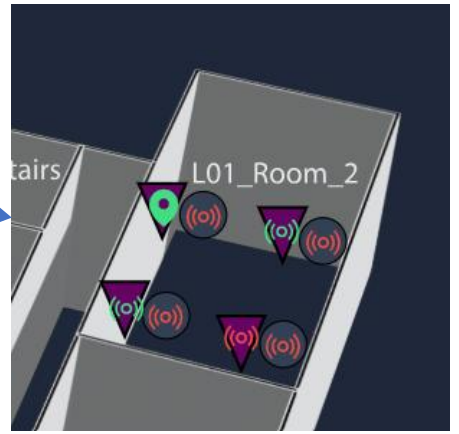

Building Energy Performance

- Energy breakdown by loads, Energy Use Intensity…

Indoor Air Quality (IEQ) Tracking

- Floor plans with sensor locations

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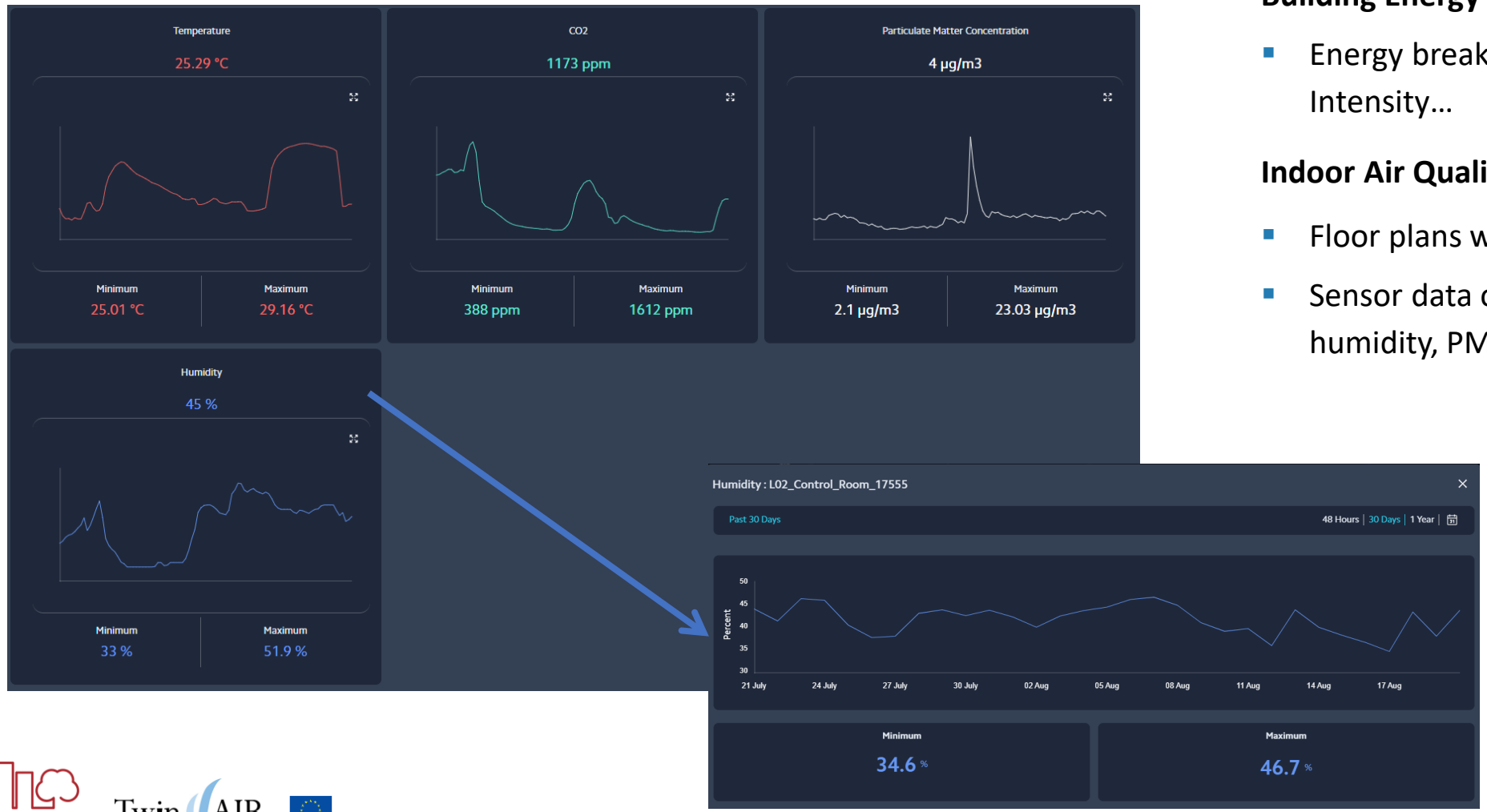

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- Sensor data on CO2, temperature, humidity, PM 2.5

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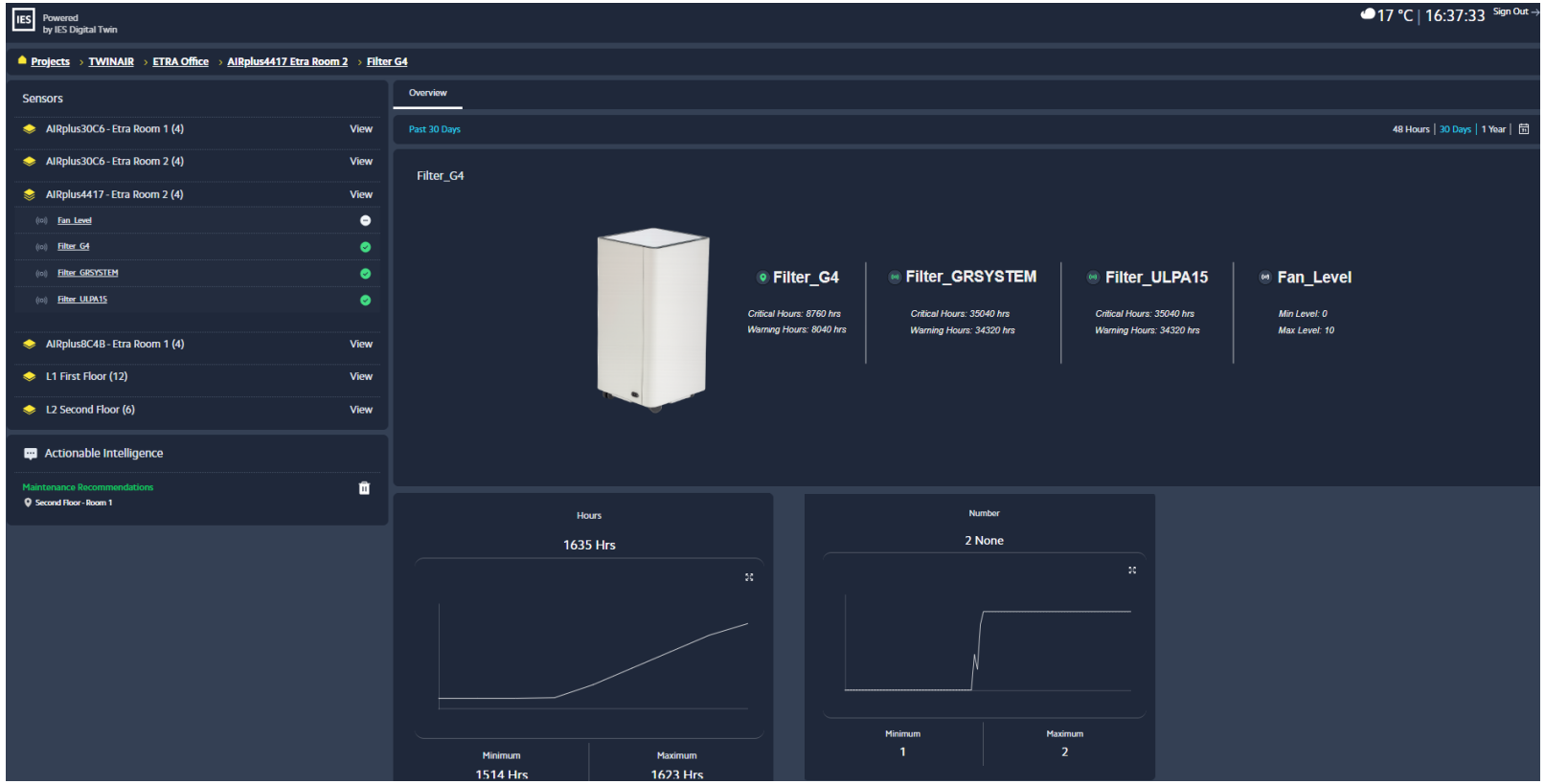

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- Air Purifying systems & filters metrics

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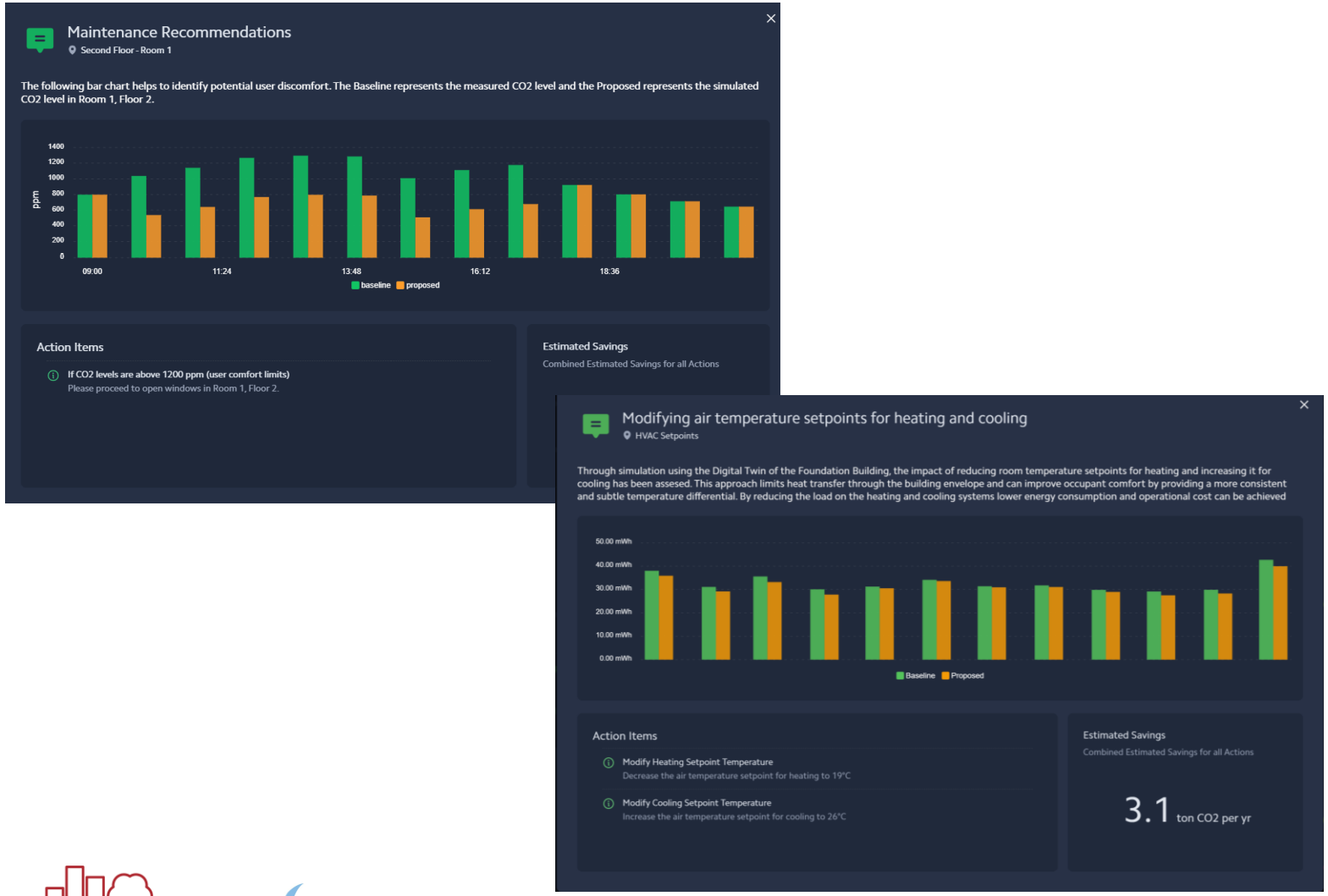

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Actionable Insights

- Impact of improvements
- Energy, cost & carbon savings

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Conclusion – Key Takeaways

- **Energy Savings Potential:** Every building has energy savings that can be achieved.
- **Data-Driven Insights:** Data analytics and tools can help start the journey towards net zero.
- **Informed Retrofit Decisions:** Dynamic simulation modelling, coupled with industry standards, can increase confidence in retrofit decisions.
- **Empowerment Through IES Live:** The platform empowers building owners to make best use of their Digital Twin, even when they don't have the in-house skill sets for energy and physics modelling.

Conclusion – Key Takeaways

How do you think these technologies can be applied to your own spaces and buildings?

Are you working on projects where these tools can help you drive your sustainability goals?

Thank you

Any Questions?

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