
Can we preserve our heritage without compromising our future?
SIMIACCI

IMPORTANT INFORMATION

For participants

RECORDING

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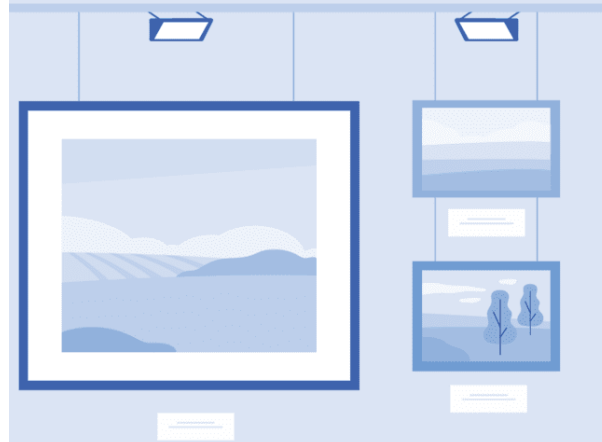
Q&A

You are all welcome to input your questions in the **Q&A** box. Before you do, please revise the previous and vote those you consider them relevant to avoid question repetition.



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REHVA

Can cultural heritage, human health and energy efficiency coexist?

The IAQ challenge for Cultural Institutions

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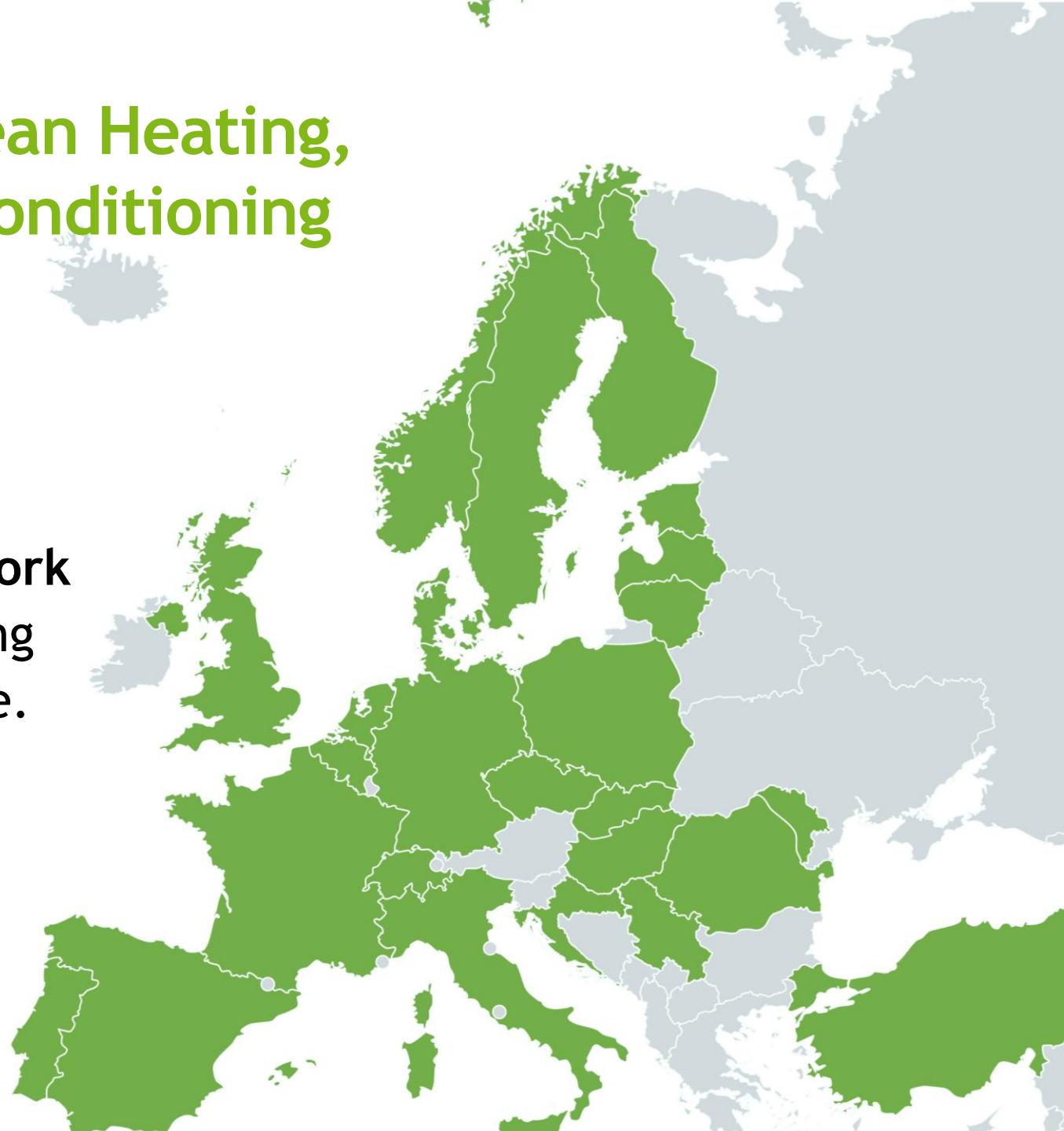
REHVA

Federation of European Heating, Ventilation and Air Conditioning Associations

Founded in 1963 and Brussels-based, REHVA is a **leading international network** representing more than 120,000 building engineering professionals across Europe.



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SPEAKERS

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Moderator

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REHVA

Francesco Robimarga
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REHVA

Moisés Pinto
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Manuel Carlos Gameiro da Silva
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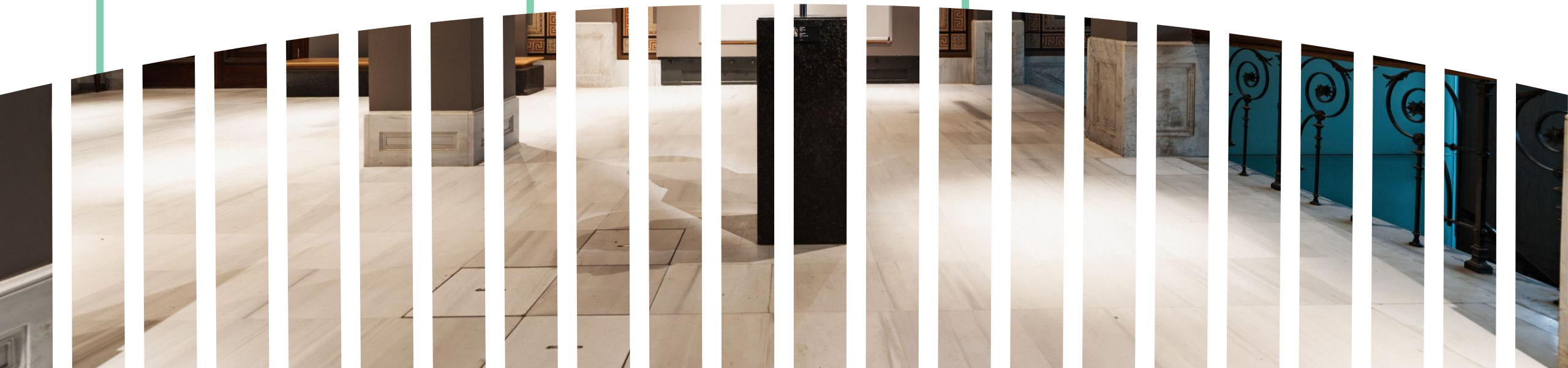
Federation of European Heating, Ventilation and Air Conditioning Associations

Policy Framework

Innovation by SIMIACCI

Roundtable





Policy Framework

What is changing—and what does it mean for cultural heritage?

Francesco Robimarga
Senior Policy and Advocacy Officer
REHVA

What is EU policy asking buildings to achieve?

THREE EU GOALS FOR 2050

1 Climate neutrality

A climate-neutral European Union

(COM(2019) 640 final; Regulation (EU) 2021/1119)

2 Zero-emission buildings

A zero-emission building stock, taking indoor environmental quality requirements into account

(Directive (EU) 2024/1275 – EPBD, Art. 1(1))

3 Zero pollution

Air, water and soil pollution reduced to non-harmful levels, “including indoors”

(COM(2021) 400 final)

WHAT IS NEW

For decades

EU air-quality law regulated only outdoor air

(Directive 96/62/EC; Directive 2008/50/EC; Directive (EU) 2024/2881)

Since 2024

The recast EPBD, an energy law, is the first EU instrument to set binding duties on indoor air

(Directive (EU) 2024/1275; Art. 194(2) TFEU)

Legal definition — Indoor environmental quality *(Directive (EU) 2024/1275 – EPBD, Art. 2(66))*

“The result of an assessment of the conditions inside a building that affect the health and well-being of its occupants, based on parameters such as those relating to the temperature, humidity, ventilation rate and the presence of contaminants.”

Energy ✓ · Occupants' health ✓ · Collections ?

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Indoor air: from good practice to legal duty

WHAT THE DIRECTIVE REQUIRES

EPBD, Art. 13(4)	Member States “shall set requirements for the implementation of adequate indoor environmental quality standards in buildings in order to maintain a healthy indoor climate”
EPBD, Art. 13(5)	Non-residential zero-emission buildings: devices to monitor and regulate indoor air quality; also existing non-residential buildings undergoing major renovation, where feasible
EPBD, Art. 13(10)(d)	Building automation and control systems in large non-residential buildings: new functionality of indoor environmental quality monitoring
EPBD, Arts. 3(1), 5(1), 19(5)	Renovation plans estimate IEQ benefits; minimum energy requirements “shall take account of optimal indoor environmental quality”; energy certificates recommend IEQ improvements

THE BENCHMARK

EN 16798-1:2019

Category II: “optimal” IEQ in new buildings and major renovations

Category III: “adequate” IEQ in existing buildings

For spaces “where human occupancy governs the indoor-environment requirements”

(C(2025) 4132 final, Annex 10)

WHERE POLICY IS FLEXIBLE

Different requirements for different building types *(C(2025) 4132 final, Annex 10)*

Adequate automation and monitoring may exempt a building from regular inspections *(EPBD, Art. 23(5))*

Outdoor boundary: stricter EU limit values for outdoor air, aligned more closely with the WHO 2021 guidelines, apply from 1 January 2030 — and outdoor air is what ventilation brings inside *(Directive (EU) 2024/2881)*

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Where the tension lies for heritage

TWO DUTIES OF EQUAL WEIGHT

PEOPLE	vs	COLLECTIONS
Comfort within fixed ranges EN 16798-1:2019 ✓ **In EU law, through the Commission's guidance**		**Stability of their "historical climate"** EN 15757:2010 · EN 16893:2018 ✗ **Not referenced in EU law**

Ventilation helps people, but brings in outdoor pollutants that damage collections — regulated outdoors, not indoors *(Directive (EU) 2024/2881)*

THREE GAPS

1 Standards never meet

Conservation standards appear nowhere in the EPBD or its guidance

(Directive (EU) 2024/1275; C(2025) 4132 final)

2 Protected buildings

Requirements may be adapted for protected buildings — where much heritage is housed

Protection or gap?

(EPBD, Art. 5(2))

3 27 national answers

All 27 Member States missed the 29 May 2026 deadline; national rules already differ

(Infringement procedures, 15 July 2026; SWD(2024) 147 final)

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What needs to change?

The gap is narrow and closable. No new legal instrument is needed: each step works within the framework already in force.

1 Member States

In national IEQ requirements, treat cultural institutions as a building type protecting both collections and occupants; adapting energy requirements for protected buildings must not mean neglecting indoor air and conservation

(EPBD, Arts. 13(4) and 5(2); C(2025) 4132 final, Annex 10)

2 Commission and standardisation bodies

Connect the occupant-health standard with the conservation standards, in guidance and in future standardisation work

(EN 16798-1:2019; EN 15757:2010; EN 16893:2018)

3 Managing authorities and funders

Recognise continuous monitoring, demand-responsive control and targeted pollutant adsorption in procurement and funding criteria for cultural infrastructure

4 Cultural institutions

Use the transposition period to establish baseline indoor-air and microclimate monitoring — the evidence on which both compliance and preventive conservation depend

Are our current policy frameworks designed to accommodate the specific needs of cultural heritage?

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Policy Framework

What is changing—and what does it mean for cultural heritage?

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Innovation Perspective

What can we actually do differently?

Moisés Pinto
Full Professor
Instituto Superior of the University of Lisboa

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Sustainable Intelligent Management of Indoor Air Quality for the Culture and Creative Industries

Innovation Action (IA) project funded under the Horizon Europe programme

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The project in brief

2025-2028

15 partners

7 countries

€3.9M EU-funds

SIMIACCI is an ambitious Innovation Action (IA) project that aims to improve the efficiency of IAQ management in Galleries, Libraries, Archives, and Museums (**GLAMs**) across Europe, thereby enhancing the conservation of cultural heritage artefacts while reducing energy consumption. To achieve this goal, SIMIACCI will introduce a portfolio of tailored innovative technologies.

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CURRENT PROBLEM

Inefficiency and lack of environmental considerations of traditional indoor air quality (**IAQ**) solutions

Cultural and creative industries (CCIs) use significant energy to control Volatile Organic Compounds (**VOCs**), Nitrogen Oxides (**NOx**), Hydrogen Sulfide (**H2S**), and humidity levels, which is essential for the preservation of cultural heritage artefacts.

There is an urgent need for solutions that meet curators' and conservators' standards while being environmentally, socially, and economically viable in the current climate transition.

SIMIACCI SOLUTIONS

AI-based predictive models and sensors to track and manage contaminant levels in real-time.

Modular systems that meet both technical and environmental needs for IAQ control.

Innovative, efficient, reusable, and stable Metal-Organic Frameworks (**MOFs**) to capture noxious VOCs, mitigating NOx, and capturing H2S in real scenarios.

New business models that combine SIMIACCI solutions.

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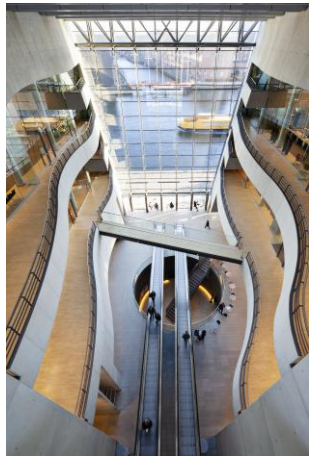
Empowering GLAMs to become the innovating leaders of indoor air quality management.

SIMIACCI GLAMs

- Prague National Technical Museum
- National Coach Museum of Portugal
- Royal Danish Library
- French National Museum Of Natural History
- Deutsches Museum München
- State Academy of Fine Arts Stuttgart



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EXPECTED OUTCOMES

- **20 prototypes** developed
- Demonstrated in **6 GLAM partners**
- **Energy demand** reduced by **30-50%**
- **Extended conservation time** of cultural heritage artefacts
- **30,000 visitors** reached by SIMIACCI exhibitions
- **Leadership in climate transition** across **GLAMs** and beyond, in particular in **5 additional sectors**:
    - Hotels and resorts
    - Educational buildings
    - Shopping centres, healthcare facilities
    - Transport hubs

consolidated by the **SIMIACCI label**.

Monitoring of IAQ, preventive conservation and maintenance

T, RH, T_{VOC}, H_2S, Formaldehyde, Acetic acid, NO_x

Monitoring devices

Data analysis

- Change adsorbent
- Ventilate room
- Conservation actions
- ……

Warning and decision assistance

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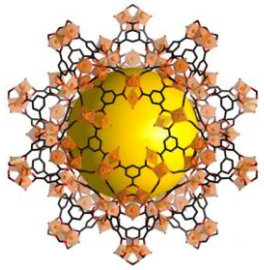
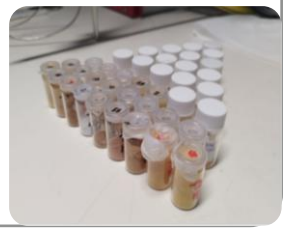
Preliminary results with new adsorbent materials



MOFs – crystalline porous materials.

MOFs

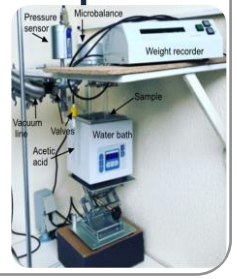
Powder MOF



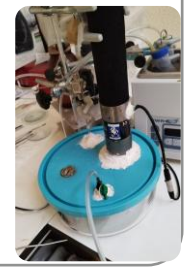
Shaped MOF

Adsorption capacity analysis

Gravimetric adsorption

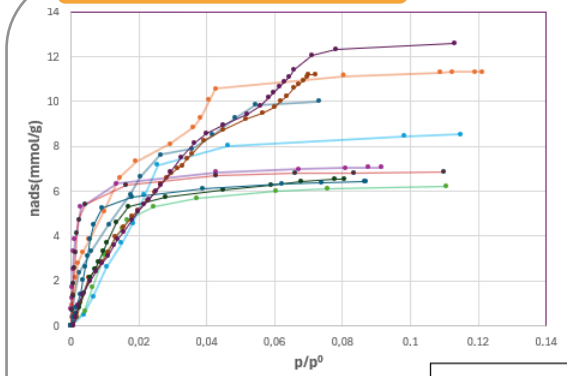


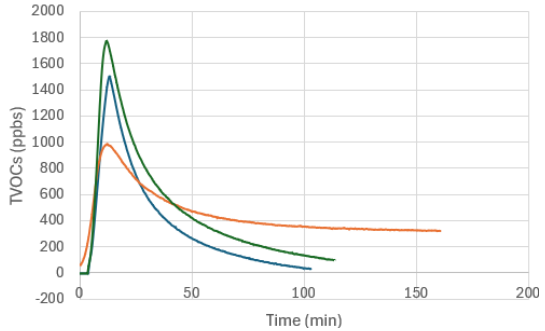
Environmental chamber

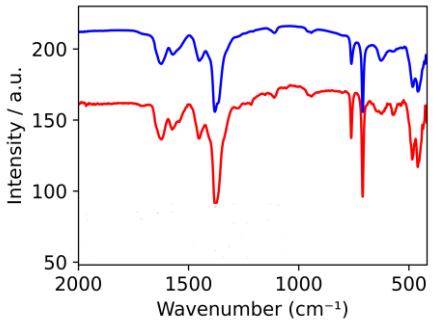


Spectroscopy measurement

Results







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Real challenges

Moving from the lab to a real case raises a lot of challenges

- ❑ Materials level:
  - Have highly selective MOFs in the presence of moisture to target contaminants at the ppb level.
  - Have scalable, affordable MOF that can be produced at industrial scale.
  - Have robust, stable MOFs compatible with the delicate GLAMs environment.
  - Understand the synergies of pollutants present in the real cases.
  - Study the end of life of MOFs.
- ❑ Monitoring level:
  - Have selective sensors where non-noxious compounds don't interfere with noxious targeted vapours readings.
  - Have accessible prices to make continuous online monitoring possible.
  - Regarding the data analysis and predictive modelling, have robust reliable models suited for the heterogenous environments of the GLAMs.
- ❑ **Will this be enough to satisfy the requirements of conservators, building engineers and policy makers?**

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Innovation Perspective

What can we actually do differently?

Moisés Pinto
Full Professor
Instituto Superior of the University of Lisboa

Roundtable

Is preserving our cultural heritage incompatible with creating healthy, energy-efficient indoor environments?

Anaïs Ortiz
Head of the Preventive Conservation Service
Archives Nationales de France

Manuel Carlos Gameiro da Silva
Full Professor

University of Coimbra

Werner Adler
Head of Marketing, Communication & Public Affairs
Condair Switzerland & Italy

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PRESERVE · PROTECT · TRANSFORM

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What is the one change you believe is needed to make heritage preservation, human health and energy efficiency compatible?

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Thank You!

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Follow the project and stay tuned for what's next.

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