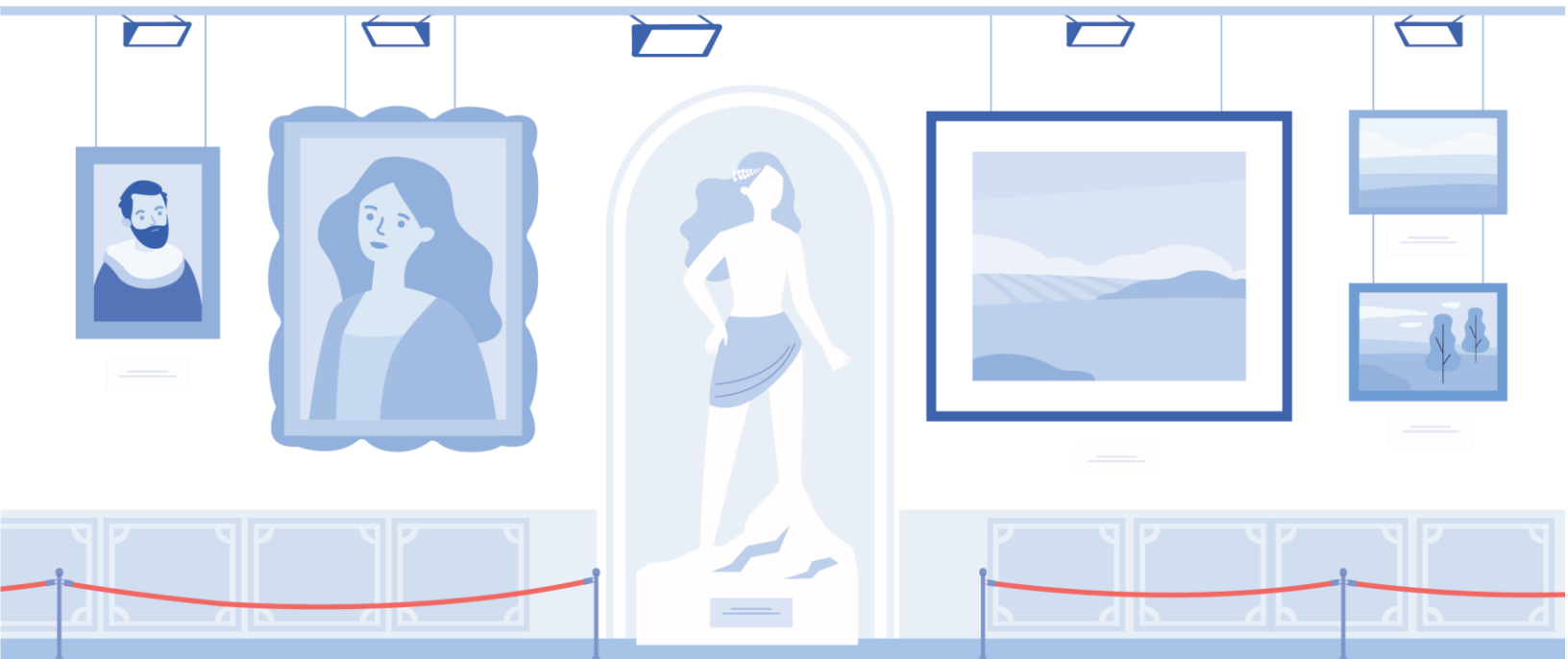




SIMIACCI

Deliverable 13.2

Policy Brief



Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Research Executive Agency (REA). Neither the European Union nor the granting authority can be held responsible for them.

Nature of the deliverable		
R	Document, report	X
DEM	Demonstrator, pilot, prototype	
DMP	Data Management Plan	
OTHER	Software, technical diagram, etc	

Dissemination level		
PU	Public (<i>fully open</i>)	X
SEN	Sensitive (<i>limited under the conditions of the Grant Agreement</i>)	
EU CI	EU Classified (<i>eu-restricted, eu-confidential, eu-secret under Decision 2015/444</i>)	

Deliverable No.	D13.2
Dissemination level	PU
Work Package	WP13
Task	Task 13.5
Lead beneficiary	IST ID
Contributing beneficiaries	ALL
Main authors	Moisés Pinto, Abeer Mohtar, Telma Henriques and Paola Fasiello
Due date of deliverable	31/12/2025 (M12)
Actual submission date	19/12/2025 22/04/2026 (revised version after review meeting)

Quality procedure			
Date	Version	Reviewers	Comments
12/11/2025	V1		IST ID
18/11/2025	V2	IST ID (Moisés Pinto, Abeer Mohtar, Telma Henriques)	Combining the project's approach with policy relevance and recommendations
16/12/2025	V3	IST-ID (Moisés Pinto, Telma Henriques) and REHVA (Paola Fasiello)	
19/12/2025	Final	IST-ID (Moisés Pinto, Telma Henriques)	
22/04/2026	Rev1	IST-ID (Moisés Pinto, Abeer Mohtar, Telma Henriques)	Corrected version following review meeting

Acknowledgements

This report is part of the deliverables from the project SIMIACCI, which has received funding from the European Union's Horizon Europe research and innovation program under grant agreement N° 101178095. More information on the project can be found at www.simiacci.eu.

Table of contents

1. Overview.....	5
2. Challenge	5
3. SIMIACCI Approach, Policy Relevance and Recommendations	6
4. Expected Impact	8
5. Conclusion	8

List of abbreviations

IAQ – Indoor Air Quality

GLAMs – Galleries, Libraries, Archives and Museums

HVAC – Heating, Ventilation and Air Conditioning

MOF – Metal-Organic framework

EU – European Union

VOCs – Volatile Organic Compounds

NO_x – Nitrogen Oxides

H₂S – Hydrogen Sulfide

DCV - demand-controlled ventilation

HRV - heat recovery ventilation

1. Overview

Indoor Air Quality (IAQ) is a critical factor in the preservation of cultural heritage and the health of occupants in Galleries, Libraries, Archives and Museums (GLAMs). Conventional HVAC systems, while effective in pollutant control, are energy-intensive and often lack adaptability to the specific microclimatic needs of cultural spaces. The SIMIACCI project addresses this challenge by developing a modular, intelligent IAQ management framework that integrates advanced Metal-Organic Framework (MOFs) based adsorbents, wireless sensor networks, and AI-driven predictive control systems. These innovations aim to reduce energy consumption between 30% and 50% enhance pollutant removal efficiency and support the long-term conservation of sensitive materials. SIMIACCI's approach is designed to be scalable across diverse cultural institutions and transferable to other sectors, contributing to the EU's climate neutrality and cultural and sustainability goals.

2. Challenge

Cultural institutions must address a dual challenge: protecting sensitive collections from airborne pollutants while ensuring healthy indoor environments for visitors and staff, all within a sustainable framework. Pollutants such as volatile organic compounds (VOCs), nitrogen oxides (NOx), and hydrogen sulfide (H₂S) pose significant risks to both heritage materials and human health. Also, EU has already identified that Museums, Archives and Libraries will have to make significant endeavours to in the upcoming years to adapt to the climate change challenges, particularly by adapting their buildings also need to adapt to energy efficiency requirements.¹

Policy frameworks should explicitly recognize ventilation strategies as core components of sustainable IAQ management in cultural institutions. Ventilation-based solutions, particularly demand-controlled ventilation (DCV) and heat recovery ventilation (HRV), should be prioritized, as they represent key technologies that enable dynamic adaptation to occupancy and environmental conditions while minimizing energy consumption.

Equally important is the role of HVAC system designers. These highly qualified and well-trained professionals possess the expertise to develop air treatment solutions that are effective, efficient, and sustainable. Their involvement ensures that technological

¹ Pasikowska-Schnass, M. Museums, Libraries and Archives in the Face of Climate Change Challenges. **2023**, No. October. [https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI\(2023\)753970](https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2023)753970)

strategies are properly implemented and optimized for both IAQ and energy performance.

We recommend integrating DCV and HRV into building standards and operational guidelines for museums, archives, and similar cultural facilities to ensure long-term preservation, occupant health, and environmental responsibility.

3. SIMIACCI Approach, Policy Relevance and Recommendations

SIMIACCI will introduce innovative technologies to transform indoor air quality management, directly supporting EU priorities on sustainability, cultural heritage resilience, and clean air.

3.1. Advanced Materials: Utilizing Metal-Organic Frameworks (MOFs) to capture harmful pollutants like VOCs, NO_x, and H₂S through highly porous nanoscale structures.

- **Policy Relevance:** *European Green Deal:* Contributing to energy efficiency and emissions reduction.²
GLAM adaption to the climate change: contributing to ensure an efficient IAQ management in GLAM's buildings while keeping the strict requirements for the cultural heritage conservation.¹
- **Policy Recommendation:** Introduce incentives (grants) for industries adopting MOF-based technologies.

3.2. Predictive Models & Sensors: Developing tools to monitor and forecast contaminant levels, optimizing air quality while minimizing energy and material use.

- **Policy Relevance:** *Smart cities and communities:* aligns with digitalization and smart monitoring goals in industrial and urban environments.³

² https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

³ <https://digital-strategy.ec.europa.eu/en/policies/smart-cities-and-communities>

Clean Air Policy: Improving air quality and reducing pollutants such as VOCs, NOx and H₂S⁴.

- **Policy Recommendation:** *Support Digital Monitoring and Predictive Maintenance:* Recommend policies that fund and standardize the use of AI-driven monitoring systems to improve sustainability and reduce operational costs in cultural institutions.

3.3. Modular Air Control Systems: Designing adaptable solutions that balance technical efficiency with environmental sustainability.

- **Policy Relevance:** Promotes circular economy principles and resource efficiency through adaptable, scalable solutions. SIMIACCI aligns with key European IAQ and building-performance frameworks, the standards **EN 16798-1** and **the transposition of the EPBD issued by the EU Commission in 2025**. By providing energy-efficient sensing and adaptive control solutions, SIMIACCI supports Member States and cultural institutions in meeting these obligations while improving conservation conditions in GLAMs.
- **Policy Recommendation:** Include modularity criteria public procurement for sustainable infrastructure. Reinforce IAQ monitoring requirements in line with **EN 16798-1** and the revised **EPBD** and promote low-energy sensing and adaptive HVAC strategies suitable for GLAMs, considering their specific cultural heritage conservation needs.

3.4. Sustainable Business Models: Integrating these innovations with market strategies backed by economic, environmental, and social analysis.

- **Policy Relevance:** *Sustainable Development Goals (SDGs):* Impact on SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action) by promoting sustainable solutions for cultural institutions.⁵
- **Policy Recommendation:** *Cross-Sectoral Uptake:* Promotion technology transfer to other sectors, beyond GLAMs, such as

⁴ https://environment.ec.europa.eu/news/new-pollution-rules-come-effect-cleaner-air-2030-2024-12-10_en

⁵ <https://www.undp.org/sustainable-development-goals>

education, transports, healthcare and tourism to capitalize on emerging opportunities linked to public incentive schemes in these sectors.

Promote Energy-Efficient Climate Control in heritage Buildings:
Recommended incentives and guidelines for adopting low-energy solutions, aligning with the European Green Deal.

4. Expected Impact

We expect the following major impacts:

- Improved preservation of cultural heritage and visitors' well-being.
- Achieving a 30%–50% reduction in energy consumption for air treatment.
- Demonstrated scalability across six European GLAMs.
- Transfer the SIMIACCI solutions to other sectors, beyond GLAMs.

5. Conclusion

SIMIACCI exemplifies how innovation in the cultural sector can drive Europe's green transition. By supporting intelligent IAQ solutions, policymakers can empower cultural institutions to become champions of sustainability, while safeguarding our shared heritage for future generations.

This 1st version of the policy brief will serve as a starting point for discussion with the Policy Advisory Board (PAB) of SIMIACCI, that will start beginning of 2026. It is expected, by summarizing the contribution of the PAB members, that the upcoming version of the policy brief can be enriched by the complementary perspectives of several policy stakeholders.

A leaflet version of this Policy Brief will be prepared and shared publicly on SIMIACCI's website.