

Africa-Europe Bioclimatic Collaboration 21

Africa-Europe BioClimatic buildings for XXI century

ICBMB

THE INTERNATIONAL CONFERENCE
ON BIOCLIMATIC MATERIALS AND
BUILDINGS



ABC 21 project

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Executive summary

This document provides a comprehensive overview of the ICBMB, the **International Conference on Bioclimatic Materials and Buildings**, which was the final conference of the ABC 21 project. The ICBMB took place from May 3rd to 5th, 2023 at the Al Akhawayn University in Ifrane, Morocco.

Objectives

The primary objectives of the **International Conference on Bioclimatic Materials and Buildings** were to:

- Bring together scientists, politicians, industrials, architects, and other experts to discuss and facilitate knowledge sharing, collaboration, and networking opportunities among stakeholders of bioclimatic materials and design.
- Identify innovative solutions, trends, and best practices in the use of bioclimatic materials and designs.

Key Findings

During the conference, several key findings emerged:

- The need for labelling the construction materials in the market.
- Both architects and researchers attending the conference agreed on the need for an education program in architecture engineering that covers passive designs.
- The insufficient integration of bioclimatic materials and designs in the energy efficiency policies in both Africa and Europe.

Outcomes of the Conference

Based on the discussions and insights gained from the conference, the following suggestions were proposed:

- Consortium partners of the ABC 21 project in collaboration with several keynote speakers are actively working on the preparation of a master's program merging engineering, architecture, and passive design. This program will be submitted to the Masters Conjoins Erasmus Mundus.
- Integration of bioclimatic materials and designs in the energy efficiency policies in Africa and Europe.
- Exchange of the know how between the participating institutions present at the conference and planning of future workshops and conferences.
- Particularly important ideas related to bioclimatic materials and designs were presented and discussed.

Conclusion

The International Conference on Bioclimatic Materials and Buildings successfully achieved its objectives by fostering an environment of collaboration, innovation, and knowledge exchange. The key findings and recommendations identified during the conference will contribute to the advancement of the integration of bioclimatic materials and design. It is anticipated that the insights gained and the relationships formed during the event will continue to have a positive and lasting impact on the design and construction sector.

The organisation team of the conference extends its gratitude to all participants, speakers, sponsors, and organizers who contributed to the success of the conference.

Asmae Khaldoun

Chair of the Conference



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1. Introduction

Buildings and construction sector are responsible for 38% of the global energy-related CO₂ emissions. Governments are actively promoting and establishing new policies and strategies to mitigate the carbon footprint of the building sector. Scientists and researchers have oriented their efforts towards adopting new solutions using bioclimatic designs inspired by nature and traditional construction processes and design. Other efforts are also seen in evaluating the new emerging policies and the development of various tools for energy efficiency simulations to support the thermal regulations developed by the relevant authorities.

Climate change is one of the most significant challenges of contemporary society. One of climate change's primary outcomes is the global surface temperature increase of 1.09 °C from 1850-1900 to 2011-2020. The ongoing changes in air temperature and precipitation in different parts of the globe are impacting worldwide energy use, the economy, and human health. Climate change is expected to result in an increased frequency and intensity of hot extreme weather events affecting biodiversity, agriculture, water resources and energy systems.

In a growing world population resulting in higher energy consumption for heating and cooling purposes and increased CO₂ emissions, a redesign of used bioclimatic construction materials and processes towards more efficient eco-friendly constructions became a necessity.

In Africa, self-building plays an essential role as an affordable and quick way to access shelter and property. Constructions carried out by a qualified company remain very limited. The sector is yet to be consolidated and structured in Africa. In Europe, the industrialization of the sector has boosted the standard-based production of components and, partly, of housing. Nevertheless, the aging housing stock requires energy-use renovation to meet the climate change challenges. Introducing Energy Efficiency (EE) measures is becoming necessary and, sometimes, an obligation. Since these EE measures cannot be implemented without an appropriate regulatory framework, it is crucial to analyse the existing regulatory and legal infrastructure.

Scientists, politicians, industrials, architects, and other experts have gathered at the **International Conference on Bioclimatic Materials and Buildings** (ICBMB) to dive into innovative solutions, strategies and policies focusing on local bioclimatic approaches for more comfortable living situations, with lower carbon footprint buildings and an efficient energy demand for cooling and heating.

Four main themes were covered in this conference are:

- **Policies for highly energy efficient buildings, adopting bioclimatic approach**
- **Analysis of bioclimatic materials, construction, and design**
- **Indicators and weather files, as input for the design of buildings and districts**
- **Bioclimatic buildings and districts: case studies**

This conference covers promising policies to promote highly comfortable buildings with minimal energy needs for heating and cooling. Experts will lead the discussions in the field to highlight key points which might be useful in developing and/or assessing policies.

The conference covered two types of interventions:

- **Political Interventions**

- Social housing needs, construction practices and urbanization unification, housing demand and supply situation.
- Infrastructure to produce bioclimatic construction materials.
- Promising effective policies to promote highly comfortable buildings with minimal energy need for heating and cooling.
- Case studies.

- **Research & Education**

- Regulatory measures and training programs dealing with bioclimatic buildings
- Performance indicators and guidelines for XXI century bioclimatic buildings and districts.
- Indicators and weather files for future climate as input for the design of buildings and districts.
- Analysis of bioclimatic materials and construction practices
- Case studies.

The first day of the conference covered **policies for highly energy efficient buildings adopting the bioclimatic approach**. The topic of the morning of the second day of the conference was **analysis of bioclimatic materials and construction practices and design**, in the afternoon covered **indicators and weather files, as input for the design of buildings and districts**. The last day of the conference was dedicated to **case studies of bioclimatic buildings and districts**. The detailed program is listed in chapter 2.

The conference gathered many **keynote speakers from diverse backgrounds** like scientists, politicians, industrials, and architects. The biographies of the keynote speakers are in chapter 3.

2. Program

Day 1 – May 3rd, 2023

9:00 am – Participant registration and welcoming

Policies for highly energy efficient buildings adopting the bioclimatic approach

Opening Speeches

2:00 pm – Chair of the Conference

2:10 pm – Lorenzo Pagliano, Silvia Erba (ABC 21 coordinators)

2:40 pm – Amine Bensaid, President of AUI University

2:55 pm – Soraya Khalil (Ministry of Habitat, Morocco)

3:00 pm – Julien Tami (EU representative, DG Energy)

3:15 pm – Radouan Yessouf (AMEE)

3:30 pm – Régis Meyer (GABC Global Alliance for Building and Construction)

3:45 pm – Vincent Kitio (UN-Habitat)

4:00 pm – Round table on **“Policies for highly Energy Efficient Buildings adopting the Bioclimatic approach”**

Day 2, May 4th, 2023

Analysis of bioclimatic materials and construction practices and design

Presentations

9:00 am – Riccardo Paolini (University of New South Wales, Australia)

9:30 am – Asmae Khaldoun (Al Akhawayn University, Morocco)

9:45 am – Rachid Bennacer (Paris-Saclay University / ENS Paris-Saclay, France)

10:00 am – Mohammed el Ganaoui (University of Lorraine, France)

10:15 am – Vincent Sambou (Cheikh Anta Diop University, Senegal)

11:00 am – Discussion

Indicators and weather files, as Input for the design of buildings and districts

Presentations

- 2:00 pm – João Carlos Simões (University of Lisbon, Portugal)
- 2:20 pm – Silvia Erba (Politecnico di Milano, Italy)
- 2:40 pm – Lorenzo Pagliano (Politecnico di Milano, Italy)
- 3:00 pm – Moussa Dembele (EAMAU, Togo)
- 3:15pm – Dorra Ismail (Ecole Nationale d'Architecture et d'Urbanisme, Tunisia)
- 3:30 pm – Akouete Atsou Fiefonou (EAMAU, Togo)
- 3:45 pm – Zakaria Sadik (ALTO EKO)
- 4:00 pm – Mohamed Essaaidi (ENSIAS College of Engineering, Morocco)
- 4:00 pm – Posters

Friday, May 5th, 2023

Bioclimatic buildings and districts: Case studies

Presentations

- 9:00 am – Silvia Erba (Politecnico di Milano, Italy)
- 9:15 am – Vincent Kitio (UN-Habitat, Kenya)
- 9:30 am – Ernest Dione (DEEC, Senegal)
- 9:45 am – Prof. Abderrahim Brakez (University of Cadi Ayyad, Morocco)
- 10:00 am – Mamoun Kadiri Hassani (Morocco)
- 11:00 am – Discussion
- 12:00 pm – Closing ceremony

3. Keynote Speakers

At Politecnico di Milano has created in 1997 and leads a research group on low energy buildings, comfort models, analysis of energy efficiency technologies and programmes, efficiency and sufficiency policies (end-use Efficiency Research Group). Has been the supervisor of eight PhD candidates. Has participated in, promoted and directed more than 30 research projects and studies funded by public (e.g. Regional Governments, National Ministries, European Union) and private bodies (e.g. Electric Companies) on various aspects of buildings analysis and simulation, buildings monitoring, comfort surveys and energy economics and planning, with a special focus on end use efficiency and sufficiency.

Professor at Politecnico di Milano in Milan

Physicist, Phd in Energy Engineering.

Visiting at LBNL in energy economics and regulation.



**LORENZO
PAGLIANO**



Asmae Khaldoun has a Physics and Chemistry BSc and M. Sc. degree in Renewable Energy from the University Mohamed V in Rabat. She earned her Ph.D. in physical chemistry at the University of Abdel Malek Essaadi in Morocco in 2002. She got a second Ph.D. in Physics "Soft condensed Matter" on January 10th, 2013 at the University of Amsterdam. From 2004 to 2007 she worked, as Post Doc at the University of Amsterdam, under the direction of Profs. Daniel Bonn. This group – and particularly its work on complex fluids – is acknowledged to be among the premier experimental chemical engineering research programs worldwide. In September 2009, she started working at Al Akhawayn University as Assistant Professor and got promoted to Associate Professor in 2016. She has taught undergraduate classes such as Physics, Thermodynamics Material Science and Engineering.

Professor at Al Akhawayn University in Ifrane.

She earned her Ph.D. in physical chemistry.

She got a second Ph.D. in Physics "Soft condensed Matter" at the University of Amsterdam.



**ASMAE
KHALDOUN**



Silvia Erba is Senior Researcher in Building Physics at Politecnico di Milano and she holds a M.Sc. degree and a PhD in Building Engineering. Since 2012 she has been conducting research and teaching activities in the field of thermodynamics, building physics and building diagnostics. Her research mainly deals with low and zero energy buildings, performance simulation and thermal comfort under future weather scenarios, occupant behaviour, sustainable materials, energy flexibility and positive energy districts. She has been involved in several European projects dealing with smart buildings and smart cities, deep energy renovation, nearly Zero Energy Buildings, post-occupancy evaluations, energy and IEQ monitoring.

Professor at Politecnico di Milano in Milan.

Senior Researcher in Building Physics at Politecnico di Milano.

She holds a M.Sc. degree and a PhD in Building Engineering.



**SILVIA
ERBA**



Dorra Ismail is a PhD, Research Director in architecture, Professor at ENAU Director of the 4C-ENAU (2019-2022).

She is associated with Mehdi Dellagi, co-founder of the architecture company qartbunDESIGN, sarl. Several green building projects built since 2002 and a tunisian patent INNorPI named QAWS of a constructive system (N°23821, 04 September 2015). Co-founder of the first platform of valorization, promotion and networking of green building in Tunisia ebniecolo. Co-founder of the 1st Accreditation of continuous training in "Green Building" in Tunisia & Founding Member (2009) of the Tunisia Green Building Council – TGBC.

Dorra Ismail is also Director of Research in Architecture and Head of the EaE research team (Epistemology of Architecture & Événementialité), made up of 25 members, with 4 PhD defended.

She is an expert and trainer in bioclimatic and green building approaches.

Professor at Ecole Nationale d'Architecture et d'Urbanisme (ENAU) in Tunisia.

Architect Co-founder of qartbunDESIGN & ebniecolo.



**DORRA ISMAÏL
DELLAGI**



Biologist, holds a diploma in Professional Studies In Depths (DEPA) in Environmental Management from the International Francophone University Leopold Sédar Senghor of Alexandria in Egypt. He has held several positions as: Deputy Director of DEEC Coordinator of the Coastal Erosion Adaptation Project in Senegal's Vulnerable Areas Coordinator of the National Program to Reduce Greenhouse Gas Emissions Through Energy Efficiency in the Building Sector in Senegal (PNEEB) and the Project to Transfer Technology to Produce Building Materials-Based Typha (TYPHA). Focal point of the Global Alliance on Building and Construction (Global ABC) and the Building Energy Efficiency Program (PEEB) GIZ/AFD

Consultant on bio-based materials and sustainable construction

He holds a diploma in Professional Studies In Depths (DEPA) in Environmental Management

Focal point of the Global Alliance on Building and Construction (ABC/ PEEB)



**ERNEST
DIONE**



Mamoun Kadiri Hassani is an architect graduated from the École Nationale Supérieure d'Architecture de Paris-Val de Seine, Habilité à la Maîtrise d'Œuvre en son Nom Propre (HMONP) since 2020. His office is located in Beni Mellal, Morocco. He proposes an architectural design based on the search for comfort, favouring the use of local and natural materials. His approach begins with the observation of available resources and implementation techniques. The architectural project is then developed in a way that is adapted to the climate and the particularities of each site.

Architect specialised on local building materials.

He graduated from the École Nationale Supérieure d'Architecture de Paris-Val de Seine.

His office is located in Beni Mellal, Morocco.



**MAMOUN KADIRI
HASSANI**



He assumed several responsibilities, director of the LEEVAM research team (2003-2007), Licence degrees (2008-2010), Aggregation title (2010-2011), Master research degree (2011-2013), Transfer and Environmental Research Unit (CNRS LMT-Lab) (since July 2012), dean of Civil/Environmental department (Oct. 2012/Sep. 2016) and since 2019 Coordinate International Affairs Related To Ph.D Univ. Paris-Saclay. His present research activity is within the LMT laboratory where he manages Transfer and Environmental Research Unit. His Research field covers wide spectrum and several domains. It covers the building material for energy applications or on durability aspect, renewable and energy system. The expertise covers the direct numerical simulation including CFD coupling on multi-scales. The previous approach is consolidated by analytical or reduction approach in order to identify the instabilities and global behavior bifurcation and similarity controlling parameters in multiphysics situations. He published around 10 book chapters and more than 150 referenced international journals (Rank A).

Professor at Paris-Saclay University / ENS Paris-Saclay in France.

Prof. Dr. Ing. R. BENNACER is an Engineer in Mechanical field (1989).

He got his PhD thesis at Pierre et Marie Curie University (Paris 6) in 1993.



**RACHID
BENNACER**



His research aims to understand heat and mass transfers through modeling and numerical simulation with a specific activity in the field of the solid-liquid-vapor phase change. Applications concern materials and energy and benefit to energy systems including phenomena for sustainable building (Eco-materials). He was advisor of more than 30 Phd Thesis with strong international interaction noticeably in the Euro-Mediterranean context. He participated/managed the PAI Australia, Canada, Maghreb (Tassili, Utique, Volubilis), China (Xugangqi). El Ganaoui has participated in the Edition of more than 12 special issues and conference proceedings, co-authored over than 220 publications in journals (rank A) and participated in more than 110 international conferences including ten he co-organized. He is member of many international scientific societies in mechanics and heat transfers

Full professor at University of Lorraine in France.

He is heading the research in energy in the Henri Poincaré Institute of Technology in Longwy.

He teaches the mechanics of continuous media, heat transfers, and numerical methods.



**MOHAMMED
EL GANAOU**



Since 2006, he has contributed to the coordination of a professional license in renewable energies and energy efficiency. He has actively participated in the national research projects RafriBAT (2013-2017) and PPLaME (2022-2025) dedicated to energy efficiency in buildings. The first project is a project to introduce energy efficiency in buildings in the Marrakech area by means of passive and low-exergy air-conditioning systems. The objective of the second project is Prediction PLANning and Management of Energy Performance in Green Buildings. As part of these projects, he supervises doctoral theses on dynamic thermal simulation applied to the energy renovation of buildings, the integration of renewable energies in residential buildings with intelligent energy management as well as the use of machine learning to model the occupant-building interaction and its influence on energy consumption.

Professor at Cadi Ayyad University in Morocco

Professor in the Department of Physics of the Faculty of Sciences Semailia

Actively participating in PPLaME (2022-2025) dedicated to energy efficiency in buildings.



**ABDERRAHIM
BRAKEZ**



Zakaria SADIK

Passionate about bioclimatic architecture Zakaria collaborates and supports companies and public services in creating and developing healthy, comfortable, and low-cost living and working spaces.

With experience in Morocco as well as internationally, Zakaria is aware of the importance of current challenges, and future developments in choosing solutions adapted to the local culture and evolving needs and **will share these insights with us at the ICBMB 2023.**



- Engineer and General Manager at ALTO EKO in Morocco
- The only Passive House Designer certified by PHI in Morocco
- Teacher in architecture schools in Rabat and Casablanca
- Former president of the NGO Morocco Green Building Council.

Vincent Kitio got his PhD from the University of Rome la "Sapienza", Italy. He leads the Urban Energy Solutions of UN-HABITAT, a section that works on three focus areas: universal energy access for the urban poor; energy efficiency in the built environment (including adequate and affordable housing) and renewable energy systems (both generation and consumption) in urban areas. He develops and implements regional energy programs in Africa. Past and ongoing projects include: "Promoting Energy Efficiency in Buildings in East Africa" that aims at mainstreaming energy efficient measures in housing policies, building codes, building practices and building finance; and the "Mainstreaming Energy and Resource Efficiency measures, and Renewable Energy technologies into Building Codes in West Africa (Senegal, Nigeria and Cameroon).



**VINCENT
KITIO**



- Lead Urban Energy Solutions, UN-HABITAT.
- He is architect graduated from the Institute of Architecture of Venice.
- He holds a PhD in Appropriate Energy Technologies for Developing Countries.

Riccardo by training is a building engineer and he received a Ph.D. in Building Systems Engineering from Politecnico di Milano, Italy, in 2011. He joined UNSW Built Environment in February 2017. He is a Senior Lecturer in the High Performance Architecture research cluster. Riccardo is also an affiliate of the Heat Island Group, Lawrence Berkeley National Laboratory, Berkeley, CA, USA. Previously, he had an appointment as post-doc at Politecnico di Milano, Italy (2011-2017). He had been teaching heat and moisture transport in building envelope applications at Politecnico di Milano at postgraduate level for six years.



**RICCARDO
PAOLINI**



- He received a Ph.D. in Building Systems Engineering from Politecnico di Milano, Italy, in 2011.**
- He joined UNSW Built Environment in February 2017.**
- Senior Lecturer at School of Built Environment, University of New South Wales**

Vincent Sambou is a full professor at Cheikh Anta Diop University. He has an expertise in building heat transfer. His research focuses on the characterization of materials and the design of smart buildings in the context of tropical climate. He was awarded his PhD in 2008 from the University of Toulouse, France. He published more than 50 papers. His H-index is 15 on Scopus.

Email: vincent.sambou@ucad.edu.sn

He got his PhD in 2008 from the University of Toulouse, France.

Full professor at Cheikh Anta Diop University.

Expert in building heat transfer.



**Vincent
Sambou**



He has expertise in art history, architecture and urban planning. He is passionate about architecture and bioclimatic urban planning. Its objective is based on taking into account the context of the place, the climatic context (wind, sunshine, relative humidity, rainfall, hygrometry), the choice of local materials (Earth, Stone, Wood, Sand, etc.), the envelope (The skin of the building) and the active and passive systems (use of solar and non-solar panels). He obtained his degree in urban planning in 1990, his master's degree in Architecture in 2016, his doctorate in Art culture and heritage in 2021 and his second doctorate in architecture and bioclimatic urban planning in 2022. He was head of department in architecture, urban planning and is a head teacher at EAMAU. He has supervised more than 200 masters, written three books and articles and received several honorary citations from universities.

He is passionate about architecture and bioclimatic urban planning.

He has expertise in art history, architecture and urban planning.

He was head of department in architecture, urban planning and at EAMAU.



**Atsou Fiefonou
AKOUE**



4. Conference Recordings

Prof. Lorenzo Pagliano, Prof. Silvia Erba (ABC 21 Coordinators) | [download here the presentation “Policies for Bioclimatic Buildings”](#)

Mr. Radouan Yassouf (AMEE) | [download here the presentation “L’INFRASTRUCTURE RÉGLEMENTAIRE ET DE FORMATION EN AFRIQUE DU NORD-OUEST ET EN EUROPE”](#)

Vincent Kitio (UN-Habitat) | [download here the presentation “Policies and legislations on Energy and Resource Efficiency in the building and construction sector in Sub-Saharan Africa”](#)

Prof. Riccardo Paolini (University of New South Wales) | [download here the presentation “Supercool materials for urban heat mitigation and cooling energy savings”](#)

Prof. Asmae Khaldoun (Al Akhawayn University) | [download here the presentation “Bioclimatic Materials”](#)

Prof. Rachid Bennacer (Paris-Saclay University / ENS Paris-Saclay) | [download here the presentation “Building Bioclimatic Materials Challenges”](#)

Prof. Mohammed el Ganaoui (University of Lorraine) | [download here the presentation “Bioclimatic Architecture”](#)

Prof. Vincent Sambou (Cheikh Anta Diop University) | [download here the presentation “Thermal behaviour and energy evaluation of an ecological building located in Dakar, Senegal”](#)

João Carlos Simões (University of Lisbon) | [download here the presentation “Weather files and climate indicators for current and future weather in Africa & EU”](#)

Silvia Erba (Politecnico di Milano) | [download here the presentation “Key performance indicators and methodology for thermal comfort assessments”](#)

Prof. Lorenzo Pagliano (Politecnico di Milano) | [download here the presentation “Comfort Indicators for Bioclimatic Buildings”](#)

Prof. Moussa Dembele (EAMAU Togo) | [download here the presentation “Implication de la formation dans la promotion de l’architecture Bioclimatique en Afrique”](#)

Prof. Dorra Ismail (Ecole Nationale d’Architecture et d’Urbanisme, Tunisia) | [download here the presentation “Comment penser notre praxis, enseignement, recherche de l’architecture?”](#)

Prof. Akouete Atsou Fiefonou (EAMAU Togo) | [download here the presentation “Impacts négatifs du changement climatique sur la ville de Lomé au Togo de 2000 à 2022”](#)

Eng. Zakaria Sadik (ALTO EKO) | [download here the presentation “Energy efficiency and green building in Morocco”](#)

Prof. Mohamed Essaïdi (ENSIAS College of Engineering) | [download here the presentation “Sustainable Smart Cities for SDGs Acceleration”](#)

Silvia Erba (Politecnico di Milano) | [download here the presentation “Case Studies & Thermal comfort Assessment”](#)

Arch.Vincent Kitio (UN-Habitat Kanya) | [download here the presentation “The United Nations Offices Nairobi: Energy and Resource Efficient Office Building Headquarters of UN-Habitat and UN -Environment”](#)

Ernest Dione (Typha project Senegal) | [download here the presentation “Bioclimatic buildings and neighbourhoods – cases studies”](#)

Arch. Mamoun Kadiri Hassani (Morocco) | [download here the presentation “Pour des architectures soutenables au Maroc”](#)

Posters: [click here to download all the posters presented!](#)

5. Key Numbers



Attendees

A total of **74 individuals registered for the conference**. Out of these attendees, 29 were non-Moroccans, representing a diverse international presence at the event.

Website Visits

The conference website received a total of **6699 website visits**, indicating a significant level of public interest and effective promotion of the event. The high number of website visits suggests that the conference was well-publicized and attracted attention from a wide audience.

Abstract Submissions

We received more than **60 abstracts of which 45 were accepted**, the latter were analysed by the scientific committee for potential publication with Materials Today Journal. These abstracts covered a range of topics related to architecture engineering, passive designs, and bioclimatic materials. In terms of gender representation, 35.55% of the abstract submissions were from females, while 64.44% were from males.

Posters

On the second day of the ICBMB, a total of **18 posters** were presented. These posters showcased research, projects, and innovative ideas related to bioclimatic materials and designs. They provided an opportunity for participants to visually present their work and engage in discussions with other conference attendees. As promised in the conference website, the best oral presentation and second-best presentation were selected by the scientific committee and the keynote speakers and were awarded a prize of 10,000 MAD and 5,000 MAD, respectively. On the other hand, the best poster was also selected by the scientific committee and keynote speakers and was awarded 5,000 MAD.

Video presentations

15 video presentations were received.

6. Publication

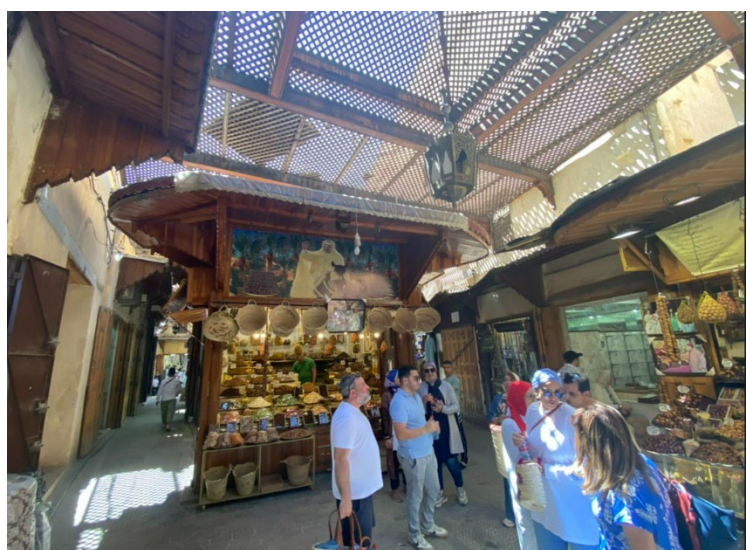
After the acceptance of the abstracts and posters, the participants are required to send their full articles to be analysed by the scientific committee of the conference. Once the articles are accepted, they will be published in the prestigious Materials Today Journal.

7. Outcomes of the Conference

The key highlights of the International Conference on Bioclimatic Materials and Designs are the following:

- The ABC 21 project partners in collaboration with several keynote speakers are actively working to prepare a master's program merging engineering, architecture, and passive designs that will be submitted to the Masters Conjoins Erasmus Mundus. More details on the Masters Conjoins Erasmus Mundus are covered in the following link: https://www.eacea.ec.europa.eu/scholarships/erasmus-mundus-catalogue_fr
- Integration of bioclimatic materials and designs in the energy efficiency policies in Africa and Europe. Revision of the current Moroccan Energy Efficiency policy RTCM to include bioclimatic materials and designs and make it as a proposed policy to be signed and approved by the minister of habitat and later by the Moroccan parliament (details about this policy are covered in the publication "*Analysis of Policies for Exploitation of results*" on the ABC 21 project website).
- Exchange of the know-how between the participating institutions present at the conference and planning of training and workshops. The first training will be offered by the Senegalese partner in the ABC 21 project, Ernest Dione, who will organize a training in favour of local artisans in the region of Ifrane, Al Akhawayn University about thatched roofs.
- The conference shed light on the importance of bioclimatic materials and designs in achieving energy efficiency and sustainable architecture. Various innovative ideas and best practices related to bioclimatic design strategies, materials, and construction techniques were presented and thoroughly discussed. The conference served as a platform for promoting and exploring the potential of bioclimatic solutions.
- The success of the current conference led to discussions about organizing a second version of the event, scheduled for May 2024. The ABC 21 project partners and key participants of the International Conference on Bioclimatic Materials and Designs (ICBMB) are actively engaged in planning the subsequent conference. This future event aims to further advance the knowledge exchange, collaboration, and exploration of innovative ideas in the field of bioclimatic materials and designs.

8. Impressions



9. Conclusion

As a conclusion, the International Conference on Bioclimatic Materials and Buildings was a great success thanks to the good publicity that has positively impacted the number of participants. The conference was a great opportunity for both the keynote speakers and participants to enlarge their network and exchange ideas and work. The exclusive speeches and discussions conducted throughout the conference were all recorded and available at the ABC 21 Website. One of the main outcomes of the conference was the collaboration in the creation of a new master program that will shape the future of architectural education into an architecture based on engineering and bioclimatic materials and design. In addition to that, the exchange of know-how between the partners of the project and the participants by scheduling future trainings to spread the knowledge to their respective communities, was the product of this conference. Finally, it was decided that the International Conference on Bioclimatic Materials and Buildings will become an annual event that will be held in one of the ABC 12 project partner's countries.

