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{Architecture is a wonderful expression of  
the discovery process. It's like a scientist  
who doesn't know the answer, but knows  
the path to it. That's what drives me: the  
joy of the path, the discovery."}

Glenn Murcutt Architect, winner of  
the 2002 Pritzker Architecture Prize

# **High Energy Performance And Energy Efficient In Building Envelopes**



*...A My BENACHIR Nouhaila*



## **Dedication**

I dedicate this modest work to my  
dearest parents, the first ones who  
encouraged and supported me during  
this long way.

# Dedication

## **Thanks**

"Praise be to GOD, lord and master of the universes".

I would like to express my thanks to a whole world of people who have made this study possible and who have contributed to its elaboration in any form.

I address myself to GOD, the almighty, to thank him for having given me the courage, the support, the patience to carry out this work.





جامعة الحسن الأول  
UNIVERSITÉ HASSAN 1<sup>ER</sup>



THÈSE PRÉSENTÉE EN VUE DE L'OBTENTION DU  
DIPLOME DE DOCTORAT EN PHYSIQUE  
INGÉNIERIE :

# SCIENCES POUR L'INGÉNIEUR



By: Benachir Nouhaila  
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**Scientific**

**production**

**Publication**

## Publication

Benachir Nouhaila (2022). Paper ID APEN-MIT-2022\_7337 JOURNAL Applied Energy Symposium:Journal. Improving the energy performance of the building envelope using phase change materials.

Benachir Nouhaila 2022 Paper ID APEN-MIT-2022\_8017 Applied Energy Symposium:Effect of solar ventilation on thermal improvement and energy efficiency of buildings using phase change materials.

Benachir Nouhaila Journal of Pharmaceutical Negative Results | Volume 13 | Special Issue 1 | 2022: Role of solar mechanical ventilation and phase change materials on thermal comfort and electrical energy of building envelope.

Benachir Nouhaila Benachir , J Nucl Ene Sci Power Generat Technol 2022, 11:9 August 29, 2022, manuscript no. JNPGT-22-73579; Publisher's Date of Assignment: August 31, 2022, pre QC no. JNPGT-22-73579 (PQ); Date of Revision: September 14, 2022, QC no. JNPGT-22-73579; Revision date: September 21, 2022, manuscript no. JNPGT-22-73579 (R); Publication date: September 28, 2022, DOI: 10. 4172/2325-9809.1000292 Nuclear Journal Énergie Science & Pooù Genrestion Ttechnologie.

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<https://revues.imi>.

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30, 2022. Benachir et al, Maghr. J. Pure & Appl Sci, 2022, Vol. 8, Issue 2,  
Page 1-19. CREATING AN ENERGY-EFFICIENT BUILDING ENVELOPE  
BASED ON PHASE-CHANGE MATERIALS (PCM).

Benachir Nouhaila International Journal of Engineering and Applied Physics  
(IJEAP) Vol. 2, No. 3, September 2022. ISSN : 2737-8071. Simulation of solar  
mechanical ventilation with phase change materials in building envelope with 2  
software TRNSYS and DESIGNBUILDER. Received June 9, 2022 Revised  
November 20, 2022 Accepted January 11, 2022. Int J Eng & App Phy, Vol. 2,  
No. 3, September 2022.

## **International Communications :**

Benachir Nouhaila The organizing committee of the 2022 MIT Applied Energy  
A+B Symposium, which is organized by the International Journal of Applied  
Energy and the Massachusetts Institute of Technology (MIT)2022. MIT  
Applied Energy A+B Symposium July 5-8, 2022. Effect of solar ventilation on  
thermal improvement and energy efficiency of buildings using phase-change  
materials.

Benachir Nouhaila (2022) The organizing committee of the MIT Applied Energy A+B Symposium 2022, which is organized by the International Journal of Applied Energy and the Massachusetts Institute of Technology (MIT)2022. MIT Applied Energy A+B Symposium July 6-8, 2022. Improving the energy performance of building envelopes using phase-change materials.

Benachir Nouhaila (2021) Project with Schneider Electric: PAWA PLANT: A PLANT-BASED CELL GREENHOUSE SYSTEM Application of Aloe Vera-derive.

Benachir Nouhaila (2022 ) 41st World Conference on Applied Science, Engineering and Technology (WCASET 2022) August 24 & 25, 2022. The role of solar mechanical ventilation and phase-change materials on thermal comfort and electrical energy in building envelopes.

BOOK 41st World Conference on Applied Science, Engineering & Technology (WCASET 2022) 24th & 25th August 2022. The role of solar mechanical ventilation and phase-change materials on thermal comfort and electrical energy in building envelopes.

Benachir Nouhaila (2020 ) Fraunhofer-Institut für Bauphysik Standort Holzkirchen. CONFERENCE ON THE TRANSYS PROGRAM.

## **NATIONAL COMMUNICATION**

The 3rd International Congress on Process Engineering for Sustainable Development 2022 (3rd ICPESD22) - June 29, 2022.

The 6th International Conference on Wireless Technologies, Embedded and Intelligent Systems  
(WITS-2020 FES).

Benachir Nouhaila 2020 "7th International Renewable and Sustainable Energy Conference -IRSEC'19" Agadir . Improving the energy performance of the building envelope using phase-change materials

Benachir Nouhaila 2022 14th International Conference on Applied Energy (ICAE2022).

Benachir Nouhaila 2019 7th Doctoral Day - Participation in the organizing committee.

Benachir Nouhaila 2021 Oral presentation 8 th Doctoral Day....

Benachir Nouhaila 2022 Oral presentation 9 th Doctoral Day...