

A study of the hygrothermal behavior and durability of building materials incorporating biomass

Presented by

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Context

The construction sector consumes 40% of the world's energy, much of it for heating :

- In France, the building sector accounts for around 45% of total energy consumption and 21% of CO₂ emissions [1], [2].
- Heating consumes around 60% of the total energy used in homes [2].

Subdivision of total RES generation by sectors, 2020

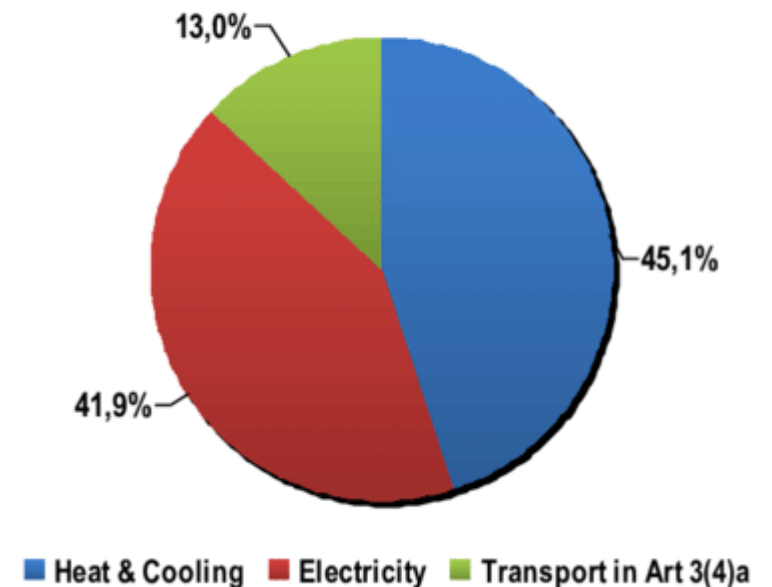


Figure 1 : Contribution of electricity, heat and cooling and transport consumption sectors in total RES generated in 2020 (right), EU 27 [3]

[1] R. Patureau, C. T. Tran, V. Gavan, et P. Stabat, « The new generation of District heating & cooling networks and their potential development in France », *Energy*, vol. 236, p. 121477, déc. 2021, doi: 10.1016/j.energy.2021.121477.

[2] E. Hache, D. Leboulenger, et V. Mignon, « Beyond average energy consumption in the French residential housing market: A household classification approach », *Energy Policy*, vol. 107, no C, p. 82-95, 2017.

[3] M. Banja, F. Monforti, et N. Scarlat, Review of technical assessment of National renewable Energy Action Plans. 2013. doi: 10.2790/75884.



Objective

- Study the interactions between biomass and low-carbon binders
 - The binders used are natural prompt cement and natural air lime CAEB CL 90-S.
 - The natural fibers used are hemp, flax and miscanthus shives are mixed with different binder
- Comparative analysis of the hygrothermal behavior of different biobased materials
- Improve the understanding of the long-term behavior of biobased materials



Natural prompt cement



Air lime



Hemp shives



Flax shives



Miscanthus shives



- Mechanical characterization
 - Density and porosity
 - Compressive strength

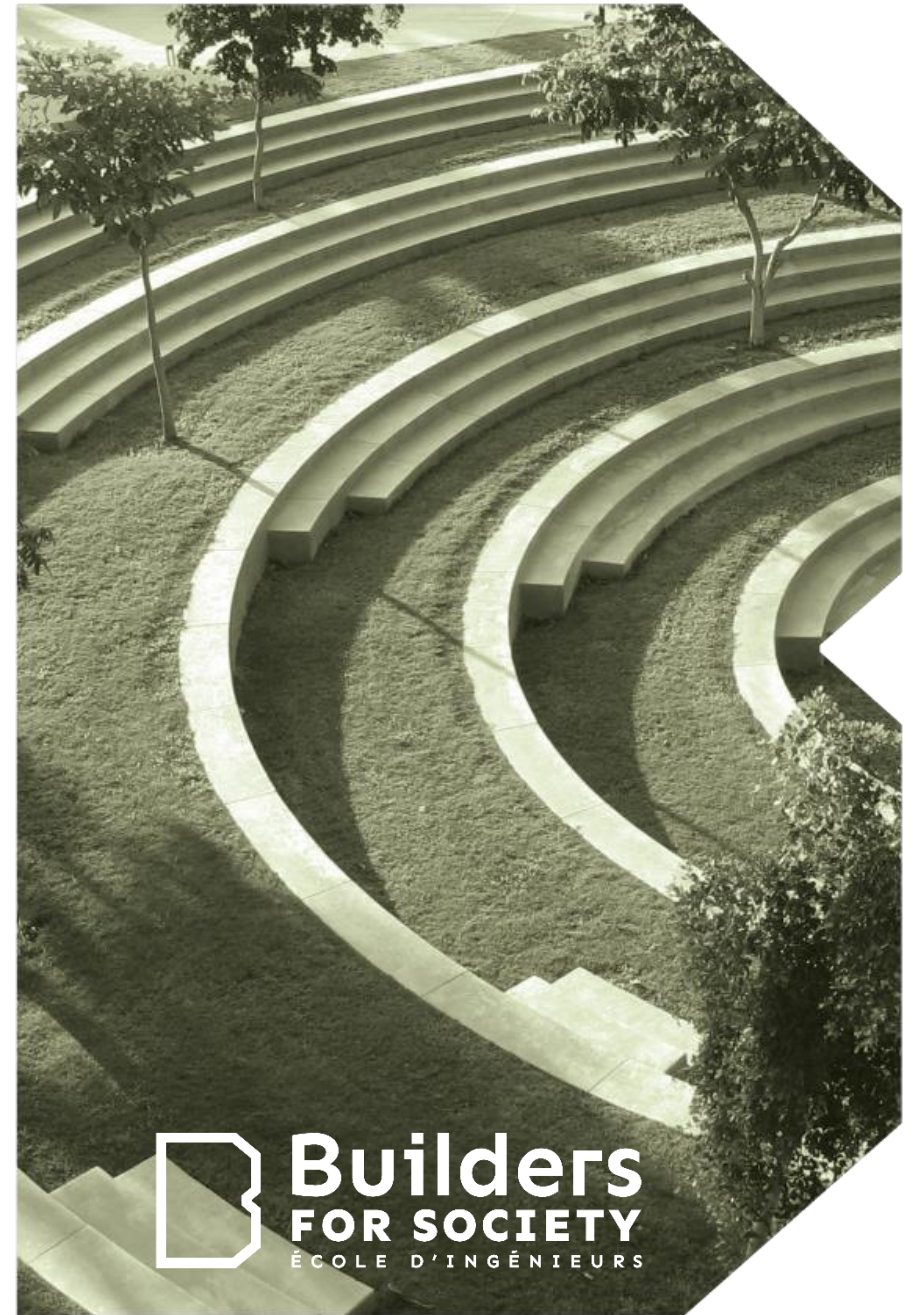


- Thermal characterization
 - Thermal conductivity
 - Thermal mass capacity



- Hygic characterization
 - Sorption/desorption
 - Water vapor permeability

THANKS
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FOR SOCIETY
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