

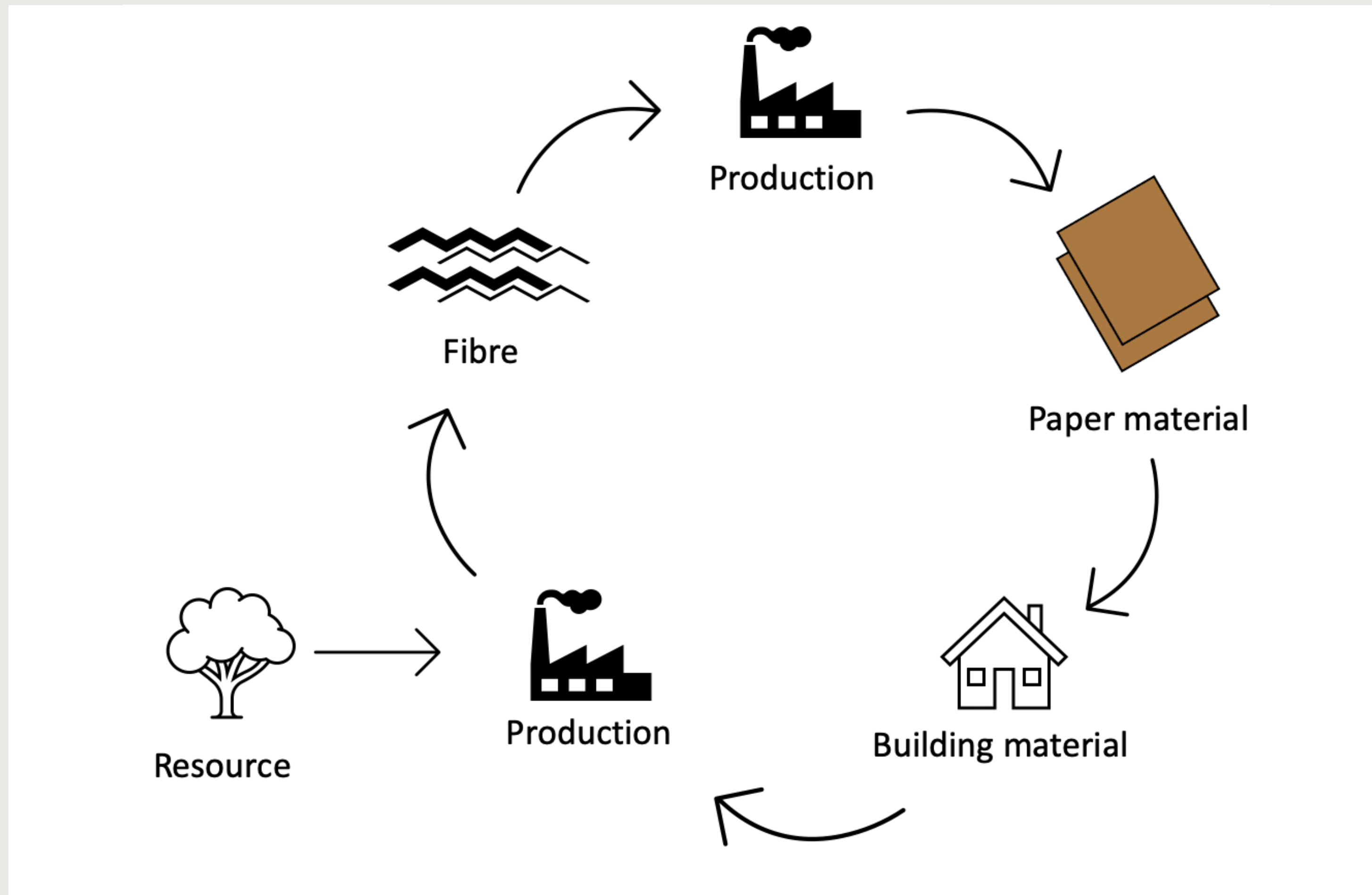
Paper: Good for the Indoor and Global Climate?

p.1.2

L Böhm, G Groth

Institute for Building Climatology and Energy of Architecture (IBEA), Architecture, Civil Engineering and Environmental Sciences, Technical University Braunschweig, Germany.

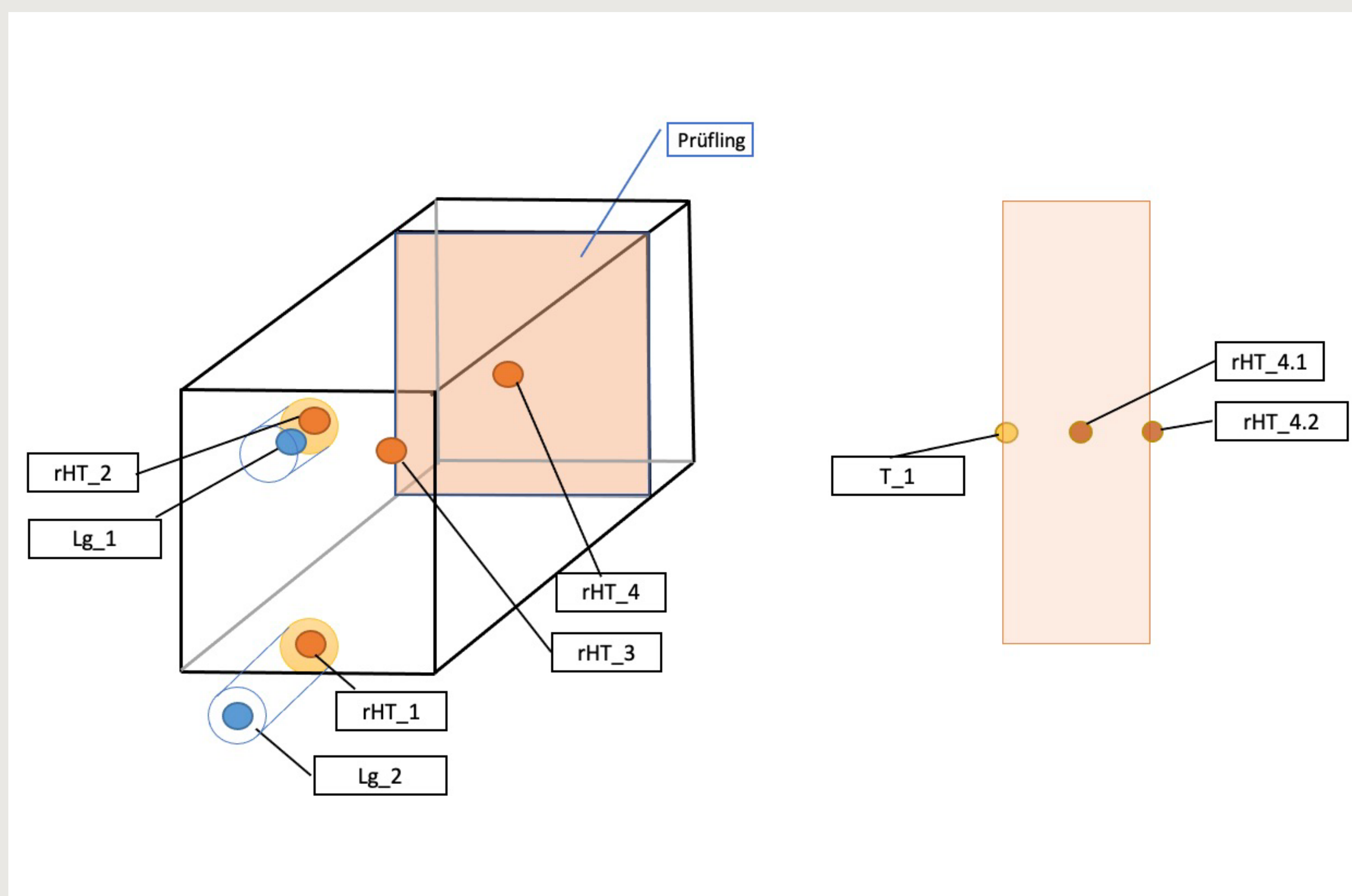
Keywords: cardboard, renewable building materials, building climate performance



Schematic display of the recyclability of paper materials.



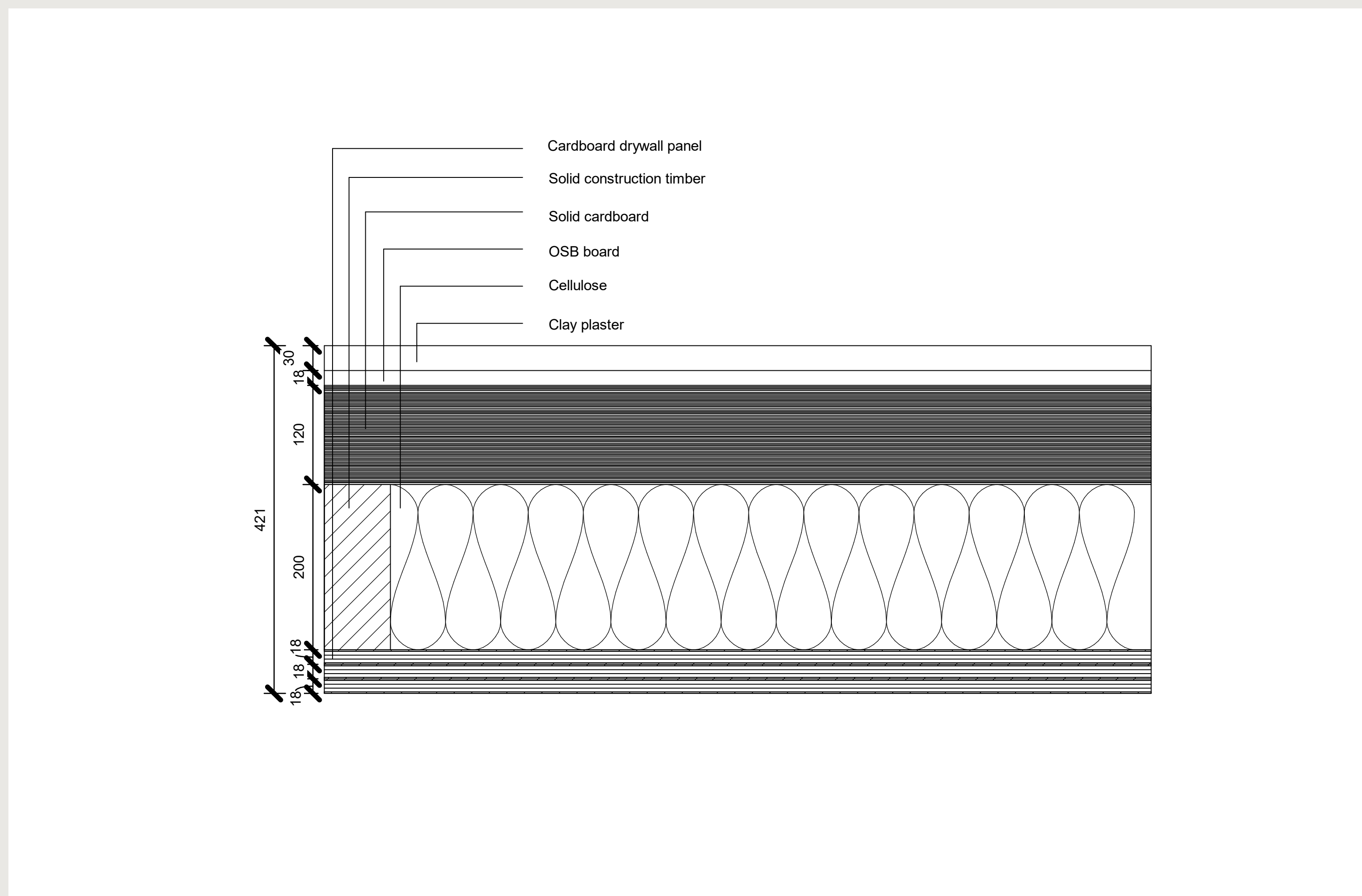
Built test box inside the climate chamber at



Sensors for measuring the moisture buffer value inside the test box and on the prototype.



Fan and measuring tools to control the conditions in the test box.



Cross-section of the developed paper prototype with an optimized building climate performance.



A paper prototype version in the process of optimizing the building climate performance with corrugated cardboard.

Paper materials offer many possibilities and potentials, but the lack of data limits their use.¹ Paper fibers have high recyclability potentials and can be recycled up to eight times.² The use of secondary fibers offers a new opportunity to be used in a circular manner and thus enhance the construction sector towards an environmentally friendly direction. Furthermore, paper materials cover a wide range of construction possibilities and can be used as aesthetic, structural or insulating components. These features illustrate the interest to investigate the possibilities of paper materials as a renewable construction materials.

Initial research has already been carried out on the structural properties of paper, while there is not yet any data on the climatic performance. Therefore, two methods regarding the building climatic performance of paper have been conducted. The first method deals with the elaboration of experimental data on the climatic performance of paper wall constructions with a designed and built test box including a standard test procedure. With the second method a paper outer wall with an optimized building climate performance is developed. For the simulation of optimization possibilities, the software WUFI® Plus by the Fraunhofer Institute for Building Climate (IBP) is used because of its ability to simultaneously simulate thermic and hygroscopic transport processes and the building climate.

The structural implementation of the developed paper wall construction as a 1x1m prototype can be tested in the climate box to provide further information about the building climate performance and to validate the results of the simulation.

The combination of the two developed methods allows the differentiated investigation of new building materials such as paper. This research therefore builds an essential foundation for the application of paper as a building material and thus enhancing the construction sector towards an environmentally friendly direction.



Front view of a 1x1m paper prototype version.