Project Miscanthus
Analysis of a masonry block based on lightweight Miscanthus concrete

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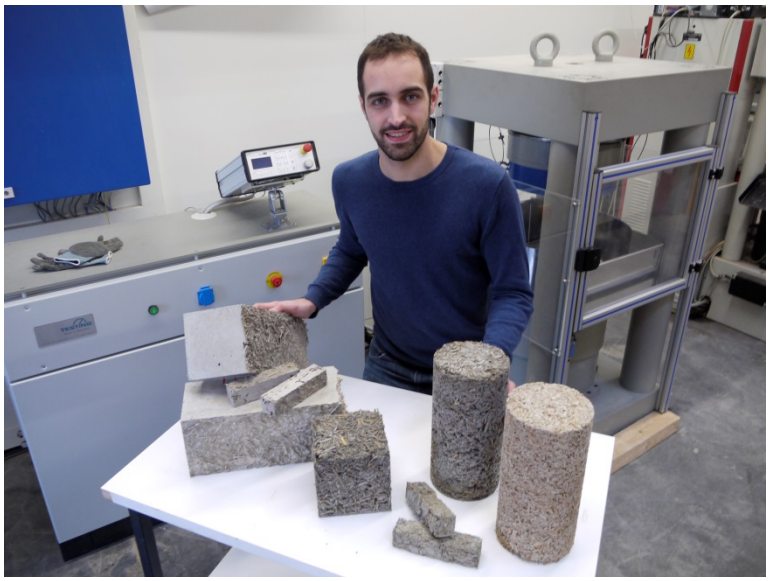
"Energy use in buildings and for building construction represents more than one-third of global final energy consumption and contributes to nearly one-quarter of greenhouse gases (GHG) emissions worldwide 1. A growing population, as well as rapid growth in purchasing power in emerging economies and developing countries, means that energy demand in buildings could increase by 50% by 2050 2, while global building floor area is expected to double by 2050, driving energy demand and related GHG emissions for construction" (Global Status Report 2016, Global Alliance for Buildings and Construction UNEP).

These figures demonstrate the urgent need for new building materials and components which allow a considerable reduction of the CO2 emissions. Within this research project, a new modular masonry block is developed which will be load carrying as well as highly insulating. Therefore different Miscanthus concrete mixtures are compared and the design of the masonry block is defined in function of the required thermal and mechanical properties.



Miscanthus x giganteus (Figure 1) is a natural reed-like grass originating from Japan and arriving in Europe through Denmark. It can be found in humid areas and can grow on barren grounds. This signifies that abandoned and polluted land can be used for this purpose. In addition, this plant is composed of many individual strands, which has a positive impact on its mechanical properties. These and other benefits make this organic material a very suitable aggregate (Figure 2) to develop a lightweight concrete which can e.g. be used in a masonry block.

As the masonry block will be used as a dry-stacked block without needing mortar in the horizontal interface between the different wall rows, the optimisation of the load transfer due to imperfect contact conditions and due to height differences between different blocks constitutes the most interesting scientific challenge.

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Figure 1: Miscanthus x giganteus in field

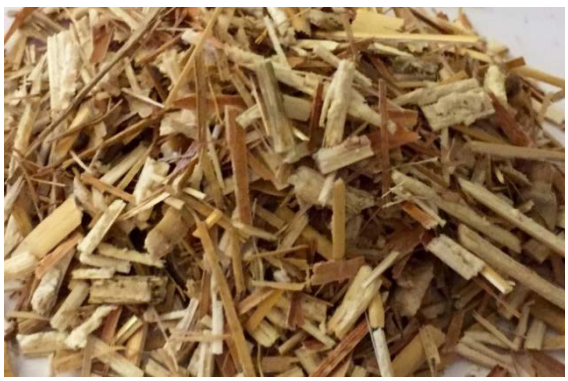

Figure 2: Fibres of Miscanthus x giganteus

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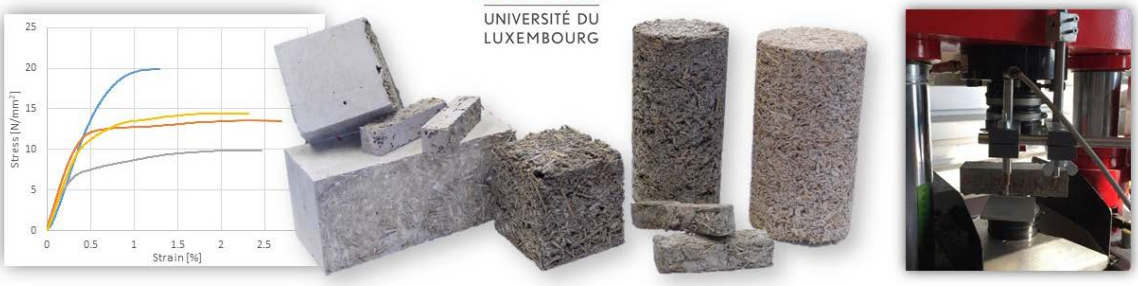

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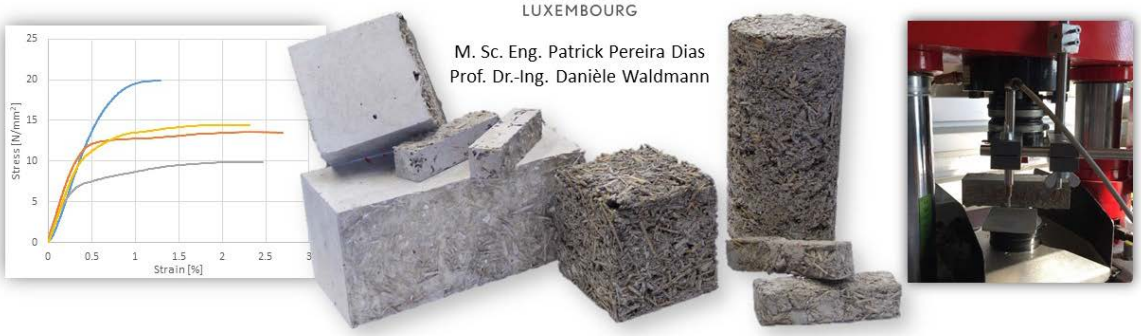

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