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LIFE CYCLE ANALYSIS (LCA) OF BALEHAUS AT BATH: Environmental impacts of a straw-bale building over its life-cycle.

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ModCell panel construction

Construction of BaleHaus at Bath

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Reference brick and block building

OBJECT OF THE STUDY

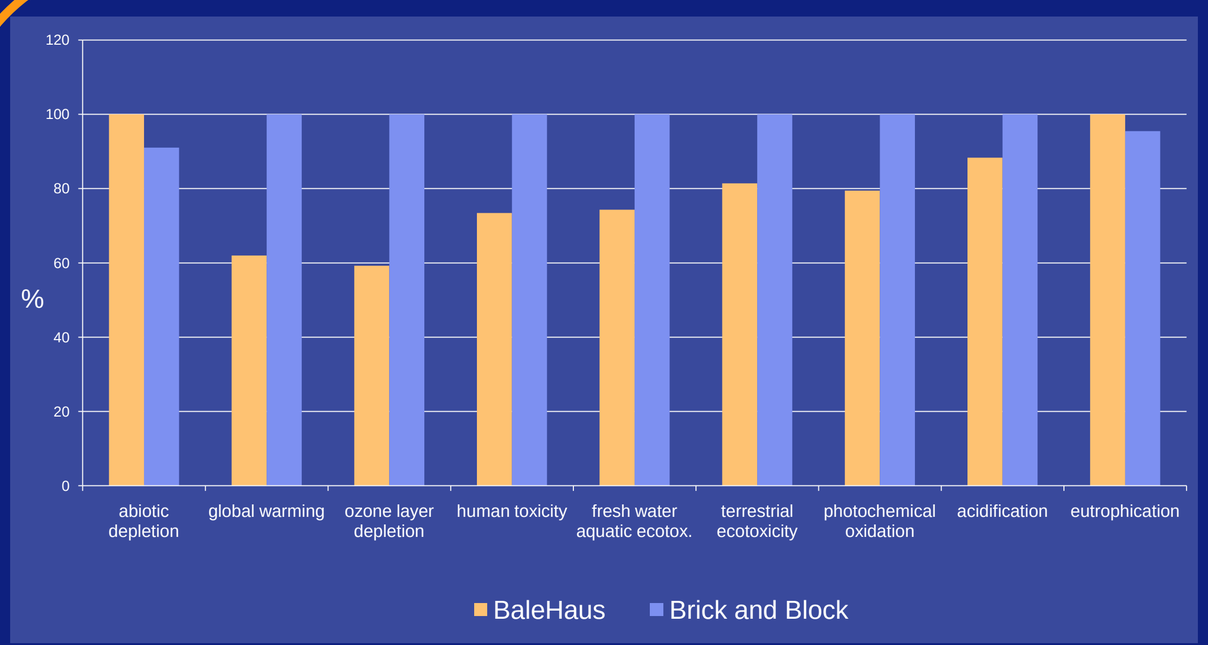
- BaleHaus is a small building using ModCell™ prefabricated straw bale panels.
- Panels are timber frames, filled with straw and rendered with a lime-based system.

AIMS

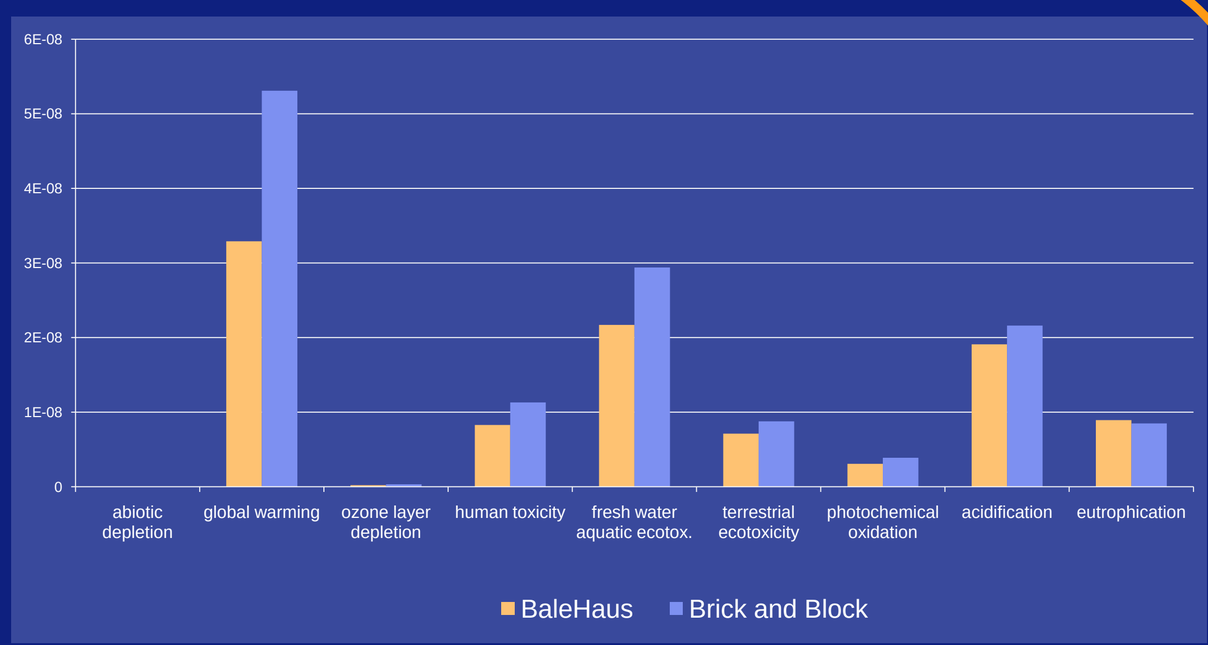
- To explore the eco-profile of BaleHaus using LCA methodology
- To identify areas where BaleHaus presents advantages/disadvantages compared with a benchmark, brick and block building.

LCA ASSUMPTIONS

- Windows, doors, electrical and water systems excluded
- 60-year life span
- Processes included are materials production, ground works, occupancy, and disposal.
- Specific data for straw, timber and lime. Other data from Ecoinvent v1.2 database.
- Predictive data used for energy requirement during occupation phase.
- Disposal scenario shown is incineration of combustible materials with energy recovery and incombustible materials sent to landfill.



Characterised *Life Cycle Impact Assessment profile of BaleHaus and the benchmark building. CML impact assessment method.*

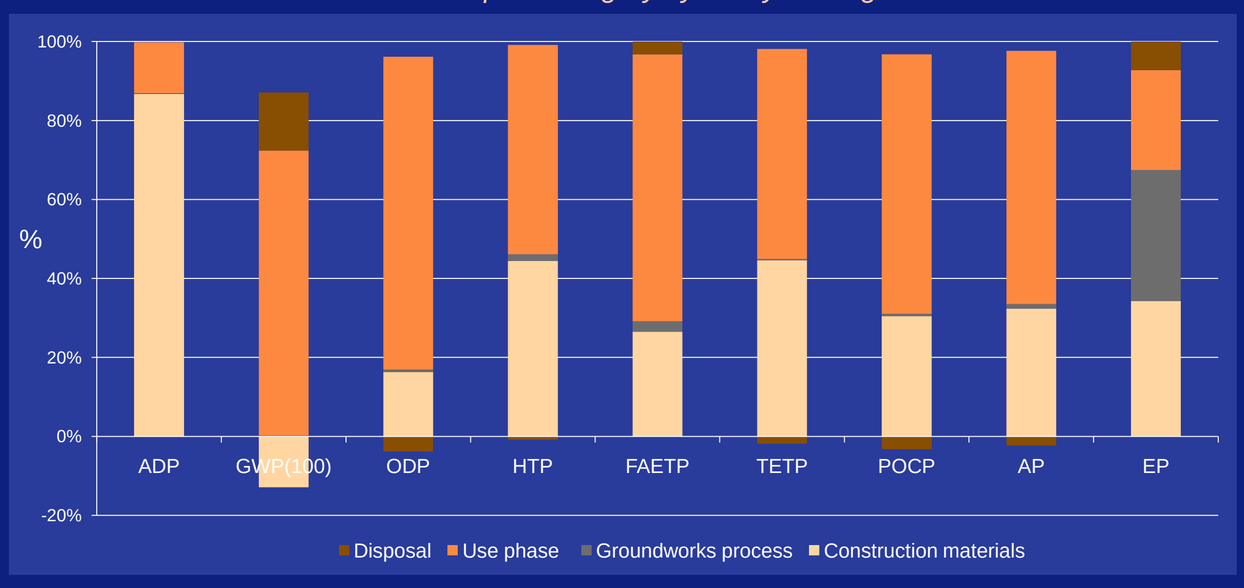


Normalised *Life Cycle Impact Assessment profile of BaleHaus and the benchmark building. CML impact assessment method Reference: Converted total emissions for Western Europe 1995.*

LCA RESULTS

- The main advantage of BaleHaus is its low GWP_{100}. This is due mainly to the low heating requirement.
- BaleHaus' only disadvantage relative to the benchmark building is in its eutrophication potential. This is linked to emissions associated with the timber and straw elements, but is compensated by low heating requirement.
- BaleHaus' impacts in other categories are generally lower than that of the benchmark building.

Contribution to each impact category by life cycle stage in BaleHaus



LIFE CYCLE CONTRIBUTION

- The use phase makes the largest contribution to most impact categories.
- Measures to further reduce BaleHaus GWP_{100} may include the use of renewable energy.
- Materials still contribute to environmental impact in BaleHaus construction

FURTHER STUDY

- Assessment and monitoring of BaleHaus at Bath will enable updating of the LCA results with in-use real energy requirements.
- Disposal scenarios should be investigated further to give definitive recommendations on the best disposal options for BaleHaus.
- Further study would be useful to obtain as far as possible specific inventory data for materials for which generic data were used.
- This study provides a good basis to a comparative analysis using the PAS2050 carbon footprinting method.

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