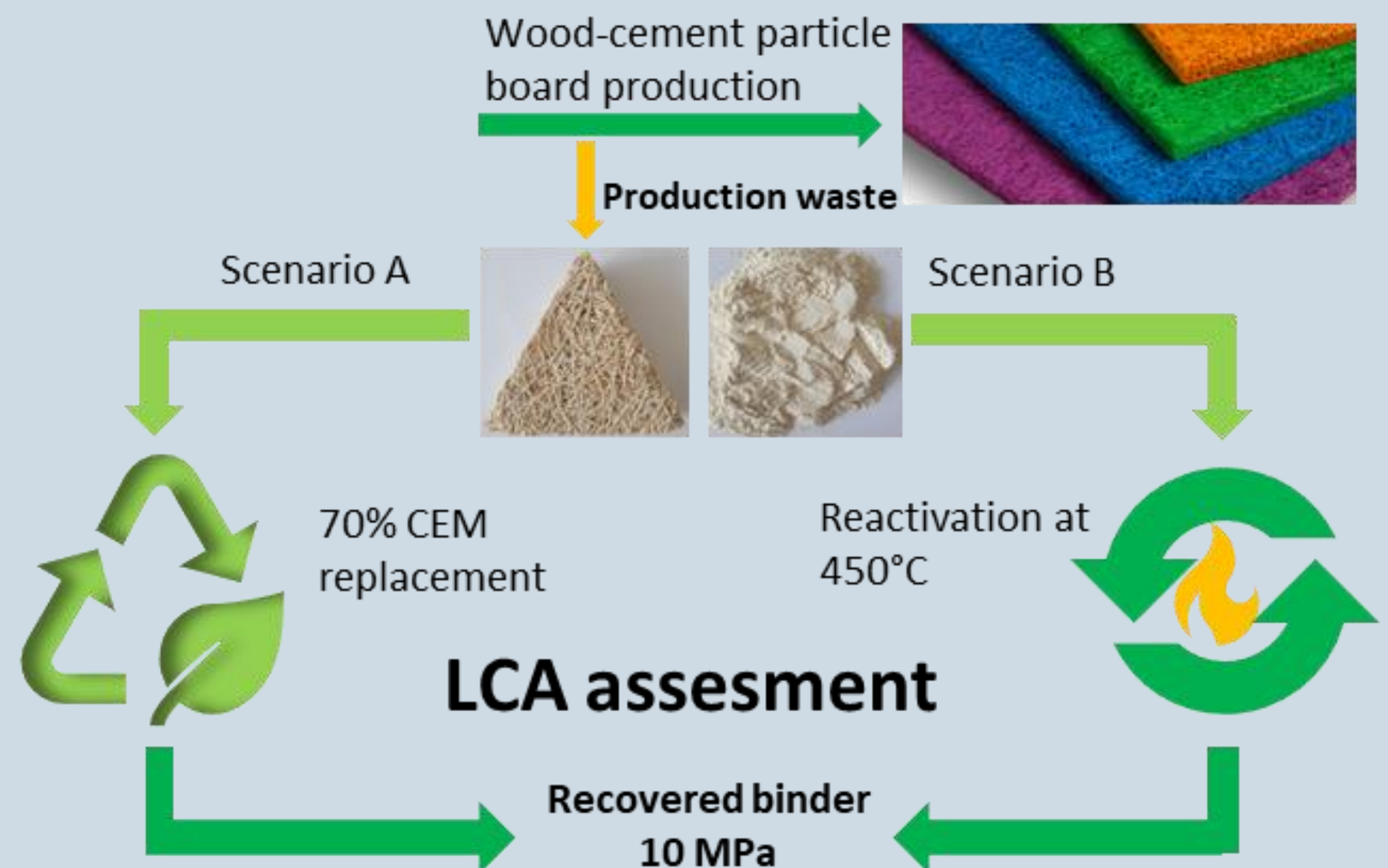


Recycling waste materials into value-added products to meet sustainable development objectives

- Applying circular economy principles
- Reducing impact on environment
- Limiting waste from industrial processes
- Reducing consumption of primary raw materials



Introduction

Wood-cement particle boards are gaining popularity within construction materials as they combine natural fiber architectural value with Portland cement durability. The production of the material is associated with processing the produced fiberboards, which includes cutting, grinding, and polishing. The remaining wood-cement dust residues are classified as production waste. About 900 t of wood-cement dust is landfilled in a year and gives extra expenditure for the enterprise. The utilization of wood-cement dust would also benefit the circular economy and reduce the environmental impact of the production process.

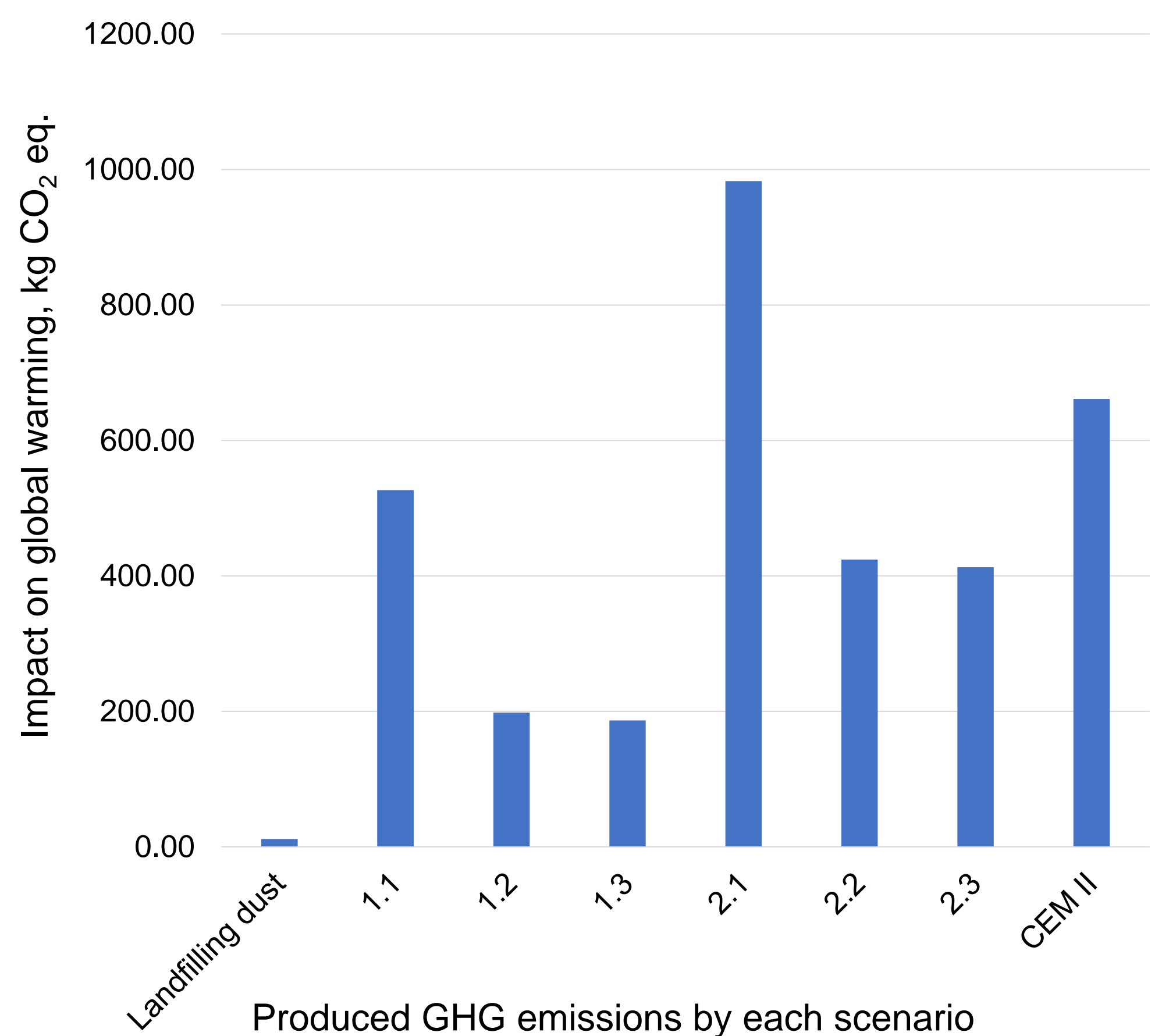
Materials and methodology

Goal of this study is to develop a comparative LCA for two scenarios of processing wood-cement dust as a recovered binder with 10 MPa compressive strength - scenario 1 – mix of dust with 30% CEM I, scenario 2- heat treatment (450°C) of the dust. 1 m³ of binder is used as functional unit.

Stages A1 to A3 or product stage were included. For calculations SimaPro with Ecoinvent database v. 3.8 were used. Implemented impact assessment method was ReCiPe 2016 Midpoint (H) V1.07.

Scenario	Description
Landfilling	Existing practice
1.1	Including impact from dust and replacing 70% with CEM I
1.2	Not including impact from dust (by-product) and replacing 70% with CEM I
1.3	Not-including impact from dust, adding avoided emissions and replacing 70% with CEM I
2.1	100% dust with heat treatment (450°C), including impact from dust
2.2	100% dust with heat treatment (450°C), not including impact from dust
2.3	100% dust with heat treatment (450°C), adding avoided emissions
CEM II	Market product

Results and Conclusions



The results show that scenario 1 has a lower impact than scenario 2 across all sub-scenarios. A large impact in the case of the second scenario is due to burnt wood, which constitutes 20% of the dust's original mass. If this wood could be sifted out, then the impact of scenario 2 would be reduced by 344 kg, making it similar with results for scenario 1.

Considering the requirements for increasing material circulation and reducing landfilling, both proposed scenarios have sufficient potential to be further investigated as applications for wood-cement particle board production waste.

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