CASE STUDY

Construction

FLOOR SLAB

Location

Hungary

System boundary

production of building products (A1-A3)

transport to construction (A4)

maintenance and replacement, if necessary (B4-B5)

end of life (C1-C4)

Origin of data

Constructions: IS-SusCon project; Background data: OneClickLCA database, selection of the most representative datapoints for Hungary, see methodological details in the document "**Hungarian building constructions"**

FLOOR SLAB

Functional unit

1 m^2
50 years building lifetime
painting in every 10 years
gypsum-lime plaster in every 30 years

Solutions:

short name	full name	top layer	inner components	down layer
PTH	Precast concrete beam slab with ceramic cladding and ceramic infill blocks, incl. acoustic insulation and screed	cement screed PE-foil acoustic insulation	concrete top layer reinforcing steel mesh ceramic infill block prefabricated concrete beam (C30/37) beam reinforcing steel ceramic cladding of beam	lime-cement plaster wall paint
Ebeam	Precast concrete beam slab with concrete infill blocks, incl. acoustic insulation and screed	cement screed PE-foil acoustic insulation	concrete top layer (C25/30) reinforcing steel mesh concrete block (EB 60/19) precast concrete beam beam reinforcing steel	lime-cement plaster wall paint
RC	In-situ concrete slab, incl. acoustic insulation and screed	cement screed PE-foil acoustic insulation	concrete (C25/30) reinforcing steel bars	lime-cement plaster wall paint
AAC	Aerated concrete reinforced floor panel slab, incl. acoustic insulation and screed	cement screed PE-foil acoustic insulation	aerated concrete floor panel reinforcing steel bars	lime-cement plaster wall paint
Wood	Wooden joist floor, incl. acoustic insulation and screed	cement screed PE-foil acoustic insulation	OSB board wooden joist mineral wool thermal and acoustic insulation wooden battens	gypsum board 2 layers wall paint

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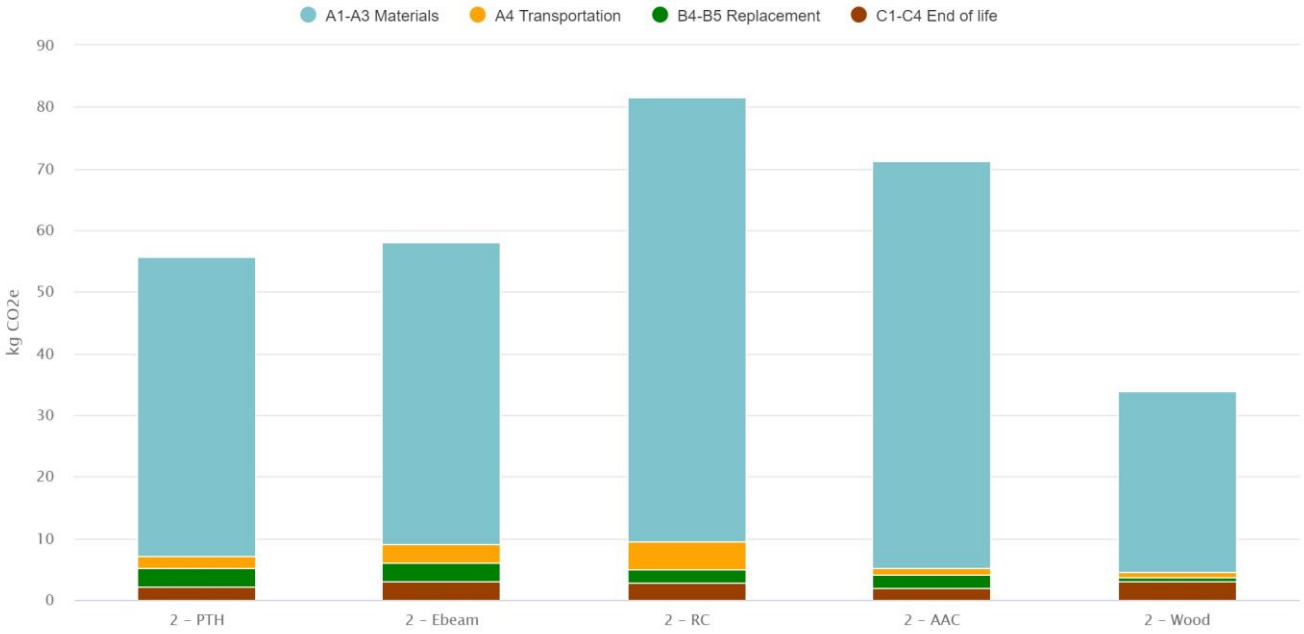
Impact assessment

Global Warming Potential (GWP)

In the most impact categories, the RC solution - In-situ concrete slab, incl. acoustic insulation and screed – has the highest impact compering with the other floor slab solutions.



- In the global warming potential the trends are same between them. The biggest impact enhancing stage is the production: materials (A1-A3) due to the environmental impacts of the concrete and mortar production.
- The RC solution - In-situ concrete slab, incl. acoustic insulation and screed-is the highest due to the utilization of high amount of concrete and mortar.
- In case of Wood solution - Wooden joist floor, incl. acoustic insulation and screed –, the influencer are floor screed mortar and cement screed. This solution gives the best environmental loading in this comparison.
- The roles of the other life cycle stages (replacement, transportation and end-of-life) are not significant.

Other Hotspots

EP

- In this impact category, the RC solution also has the biggest impact on the environment.
- The sharing of the Wood solution - Wooden joist floor, incl. acoustic insulation and screed – is higher than in the GWP category, due to the growing of the end-of-life stage (C1-C4) – mainly due to the disposal of insulation system.
- The AAC solution - Aerated concrete reinforced floor panel slab, incl. acoustic insulation and screed – decreased due to the smallest impact of the material phase.

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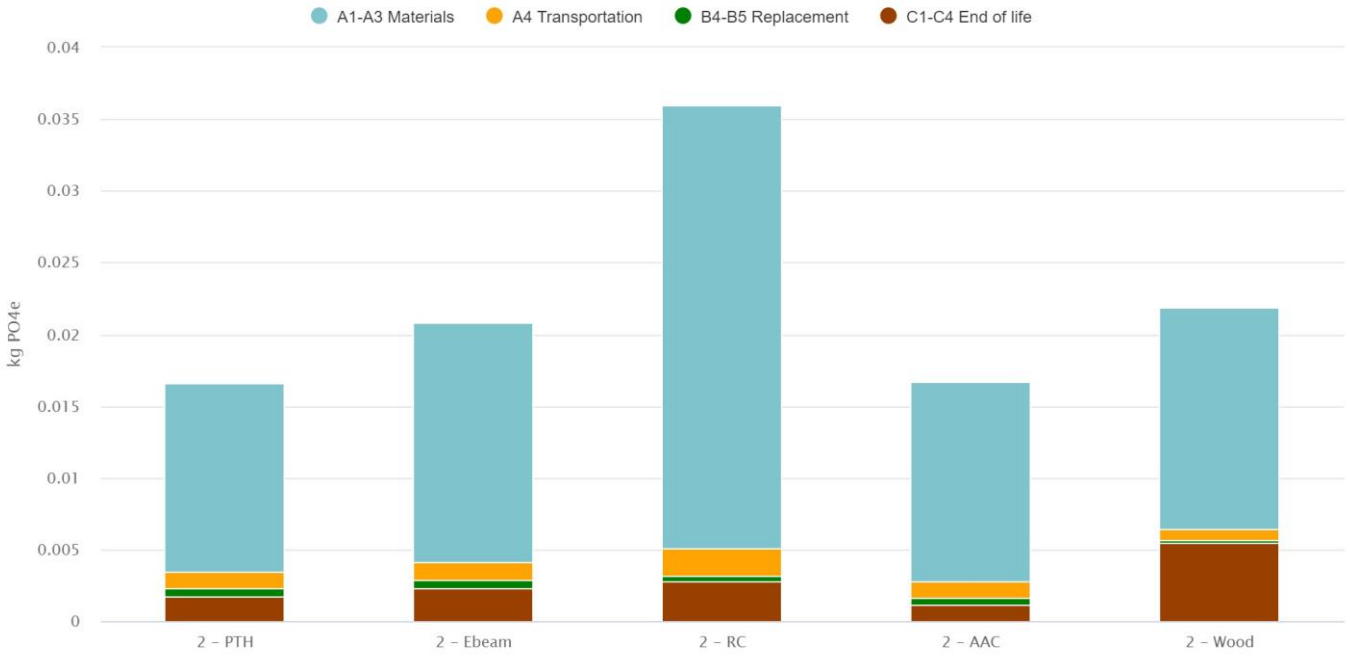
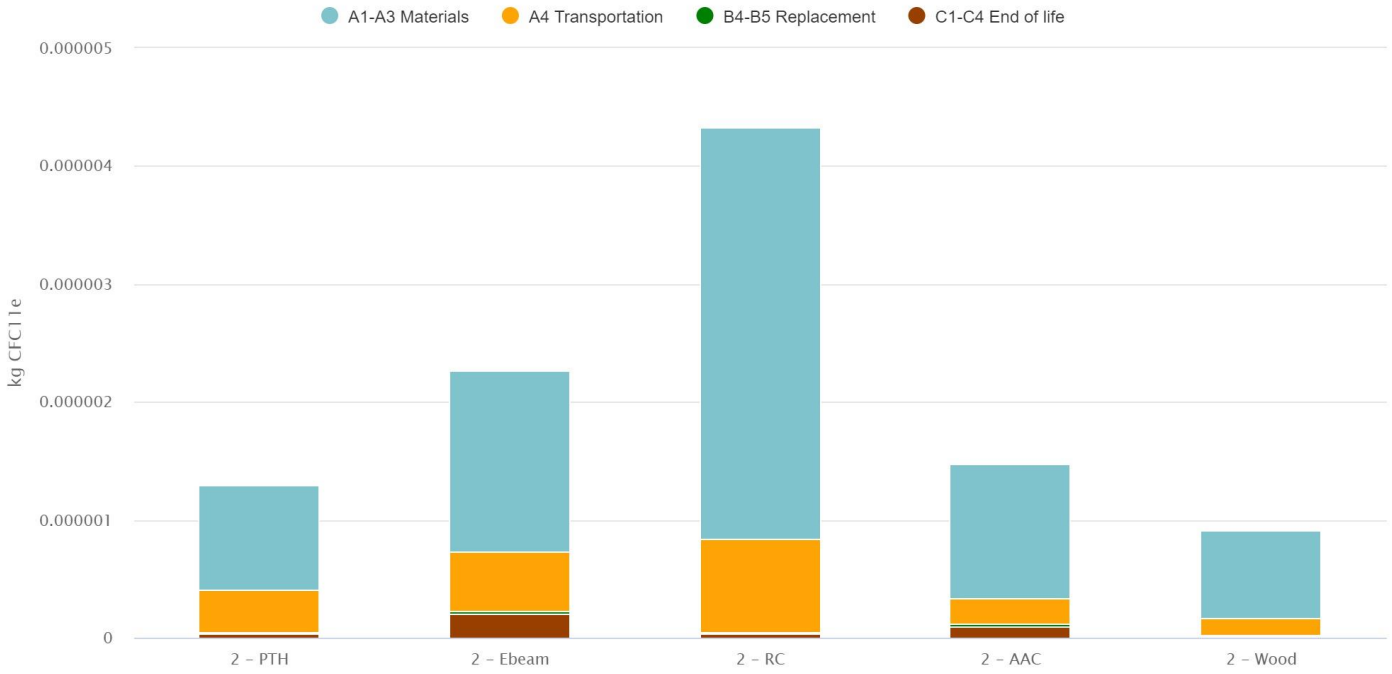


POCP



In this impact category, beside the materials and end-of-life stages the transportation stage has significant role. The results of this category were pointed, that growing the transportation distance causes higher environmental impacts.

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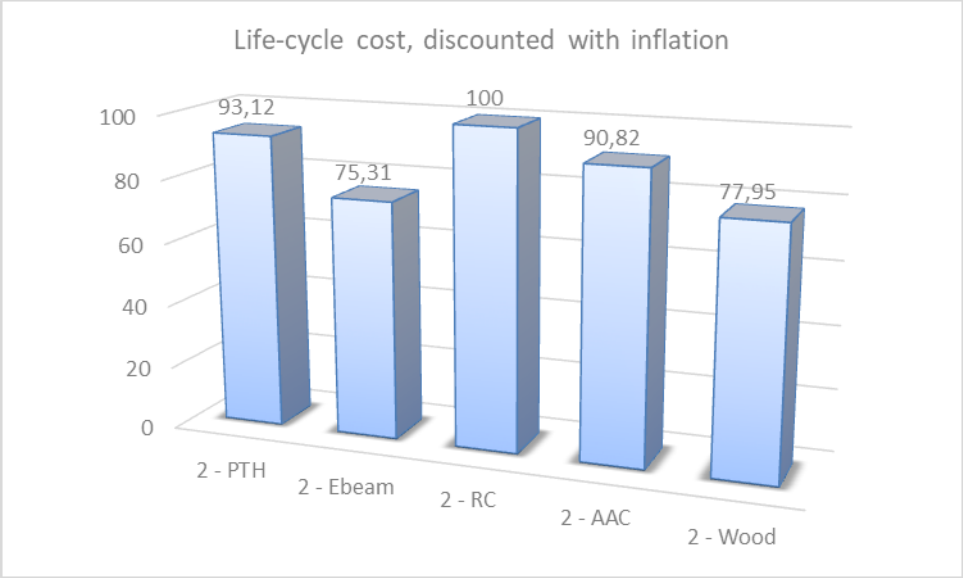
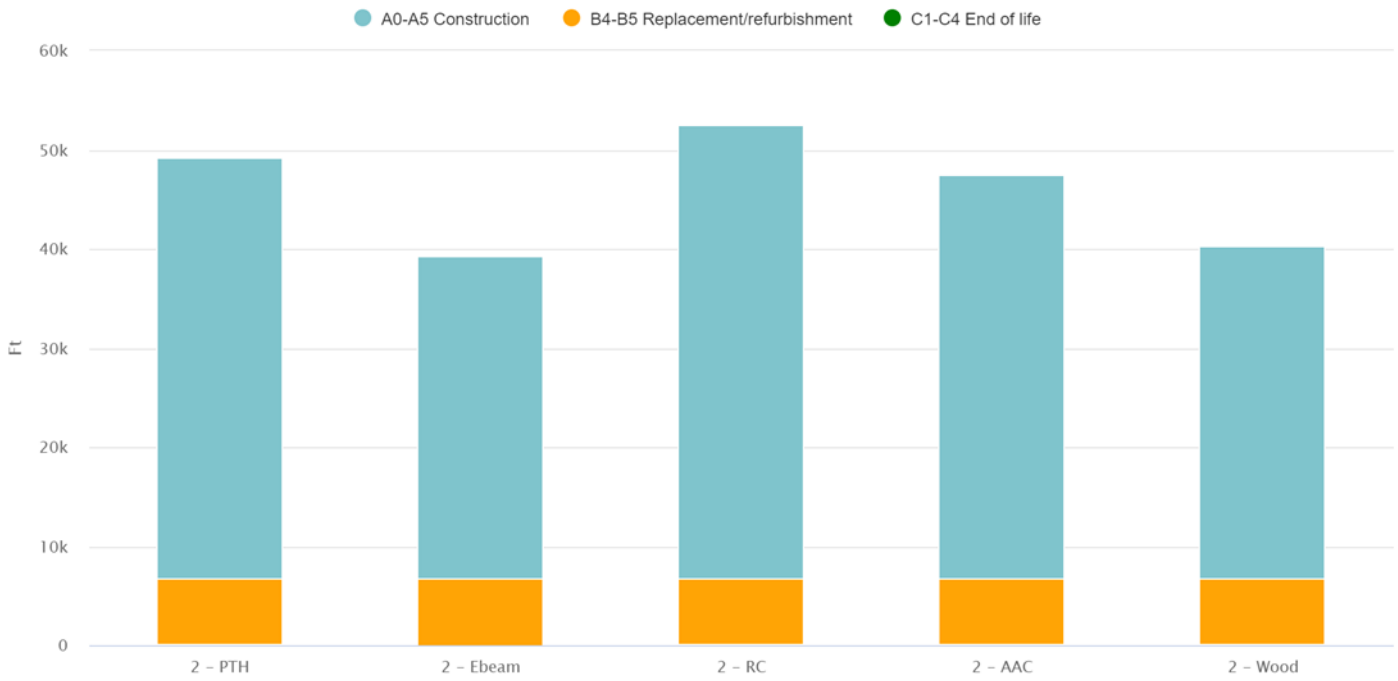
Cost

We analysed 5 designs of floor slabs. Life cycle cost analysis is just one test method that helps to select the structure of floor slab in addition to technical and environmental performances. These layer orders can be realized from the building materials available in the market.



The RC floor slab is the most expensive option. Ebeam floor slab and the wood floor slab have near the same LCC, they are with about 25 % cheaper than the RC. Also the PTH and AAC structures are about 10% cheaper than the RC floor slab. The replacement costs are the same in all cases. The cost of EoI stage is negligible.



The cost of materials represents a different proportion in each construction. The cost of concrete structures changes from 37% to 61%, plaster 13-18%, insulation 3-20%, air permeable membrane 1%, metal 0-1%, paint 22-30%.

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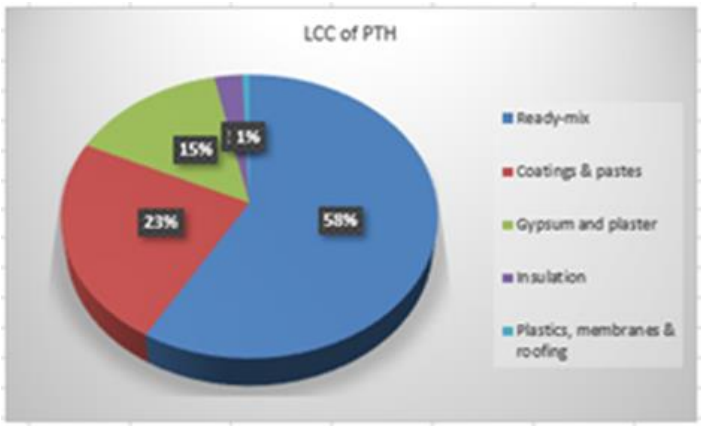
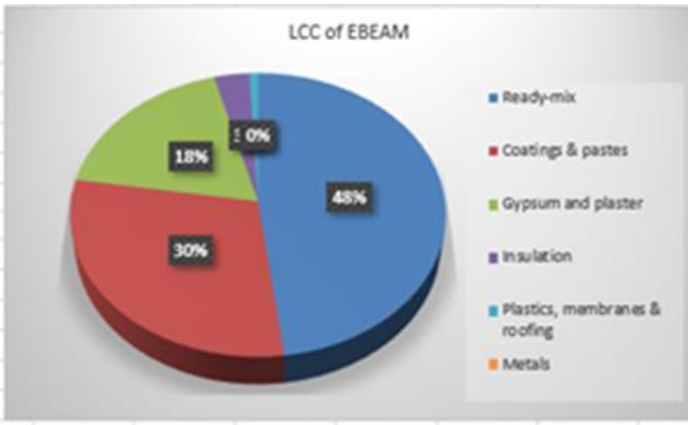
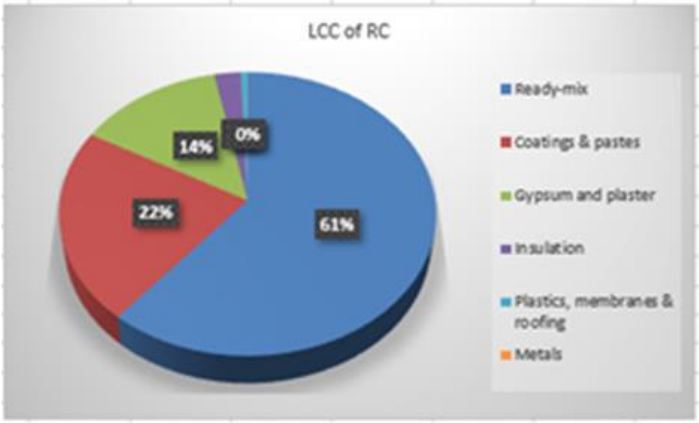
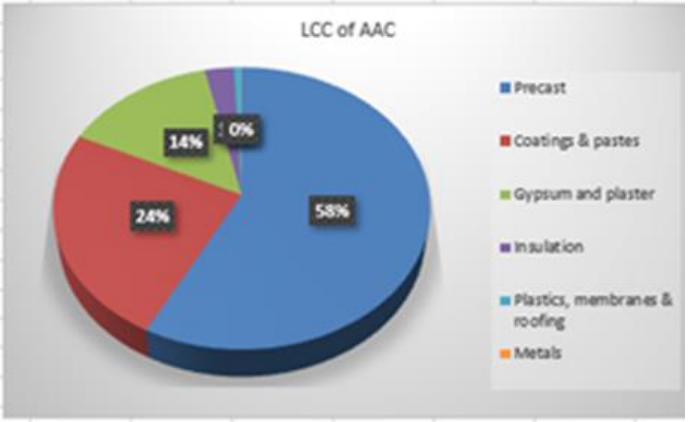
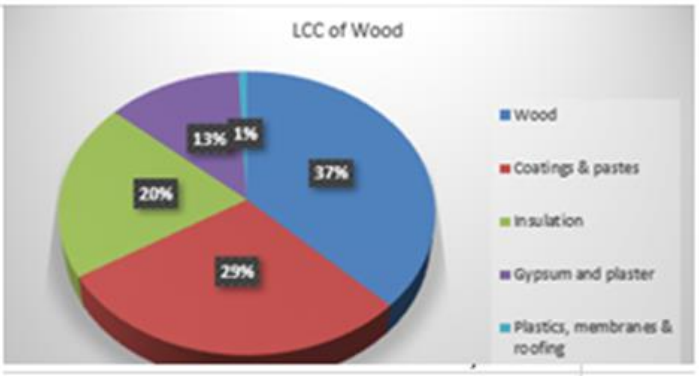
The cost sharing of materials in the LCCs











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