

## CASE STUDY

### Construction

FLOOR FINISH

### 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)

NOTE: cleaning of floor is not considered

### 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 FINISH



### Functional unit

1 m<sup>2</sup> floor surface

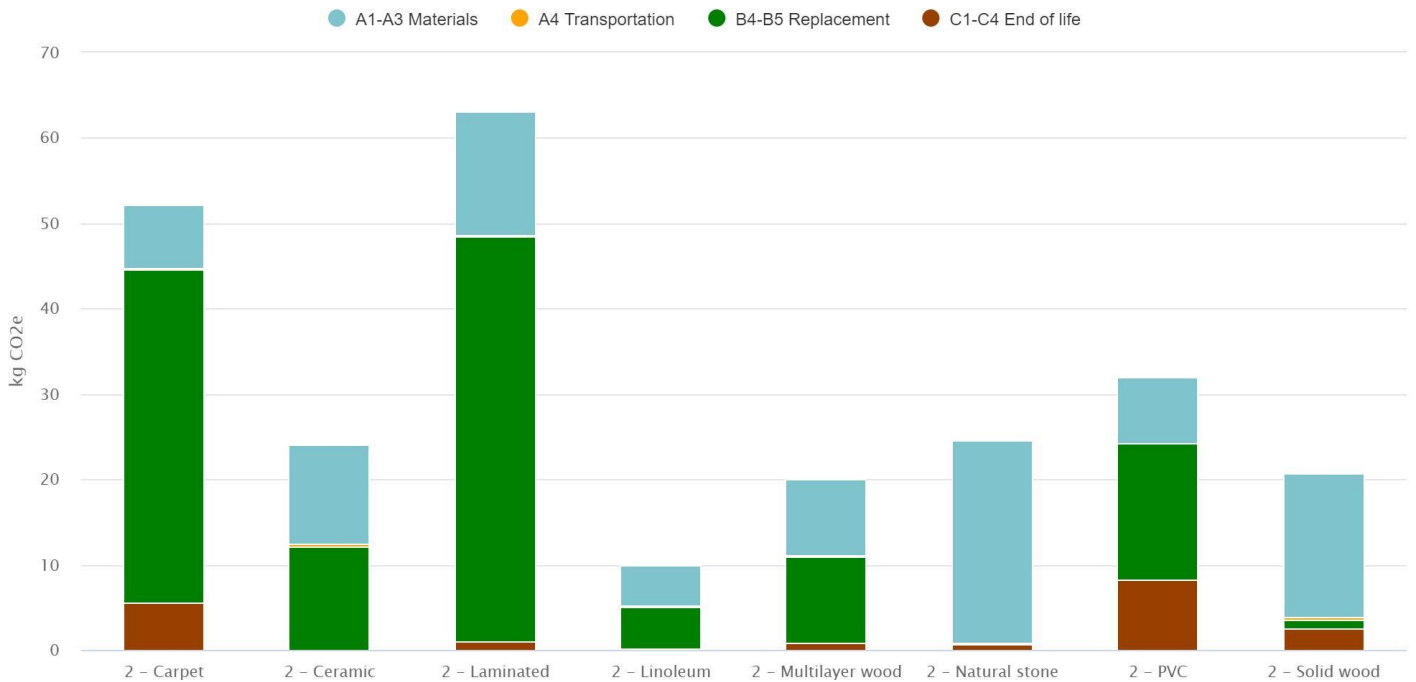
50 yr building life time

### Solutions:

	Material	Adhesive/other components	Maintenance	Replacement
<b>Carpet</b>	carpet	adhesive		after 15 yr
<b>Ceramic</b>	ceramic tile	cementitious adhesive		after 30 yr
<b>Laminated</b>	laminated floor	underlay foam		after 15 yr
<b>Linoleum</b>	linoleum	adhesive		after 25 yr
<b>Multilayer wood</b>	multilayer wood	adhesive for wood		after 30 yr
<b>Natural stone</b>	stone	cementitious adhesive		-
<b>PVC</b>	PVC	adhesive		after 25 yr
<b>Solid wood</b>	solid wood	adhesive for wood	lacquer in every 15 yr	-

## Impact assessment

### Global Warming Potential (GWP)



#### Interpretation of GWP results:

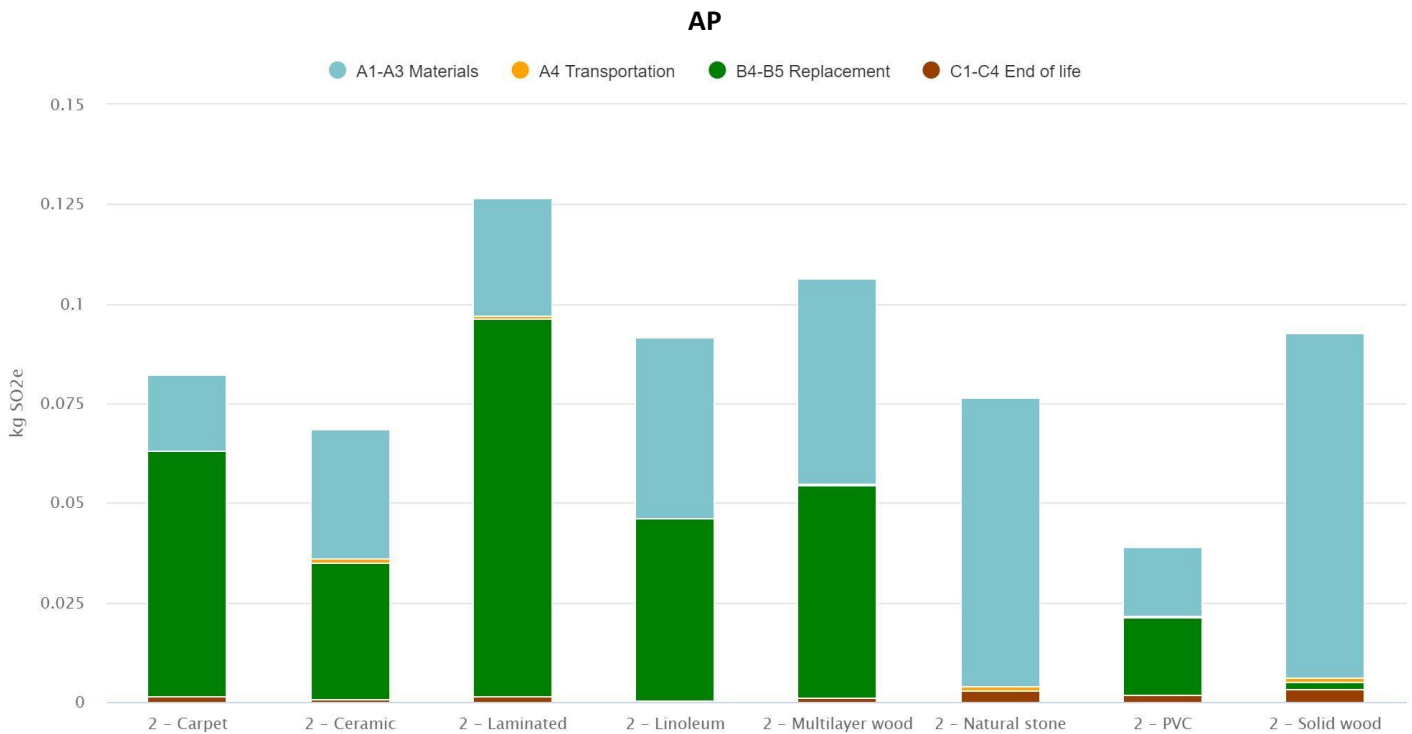
- Carpet and Laminated floor:** These materials have the shortest estimated life time (15 yr) among the floor finishing alternatives. The effect of their replacement during the 50 yr analysed time period is very significant. This is the main reason for their high GWP results.
- PVC, Multilayer wood, Linoleum:** These materials have longer estimated life time (25-30 yr) and the replacement during the 50 yr period does not penalize them very much in this comparative assessment, meaning a relatively lower GWP results.
- Stone, Solid wood, Ceramic:** These options have similar, relatively low GWP results. We estimated that natural stone and solid wood do not need replacement during 50 yr. For ceramic tiles, a replacement is planned after 30 yr. It would be realistic to foresee even longer life for ceramic tiles, which could still lead to lower GWP. Please note that the actual service life depends very much on the users.

## Other Hotspots

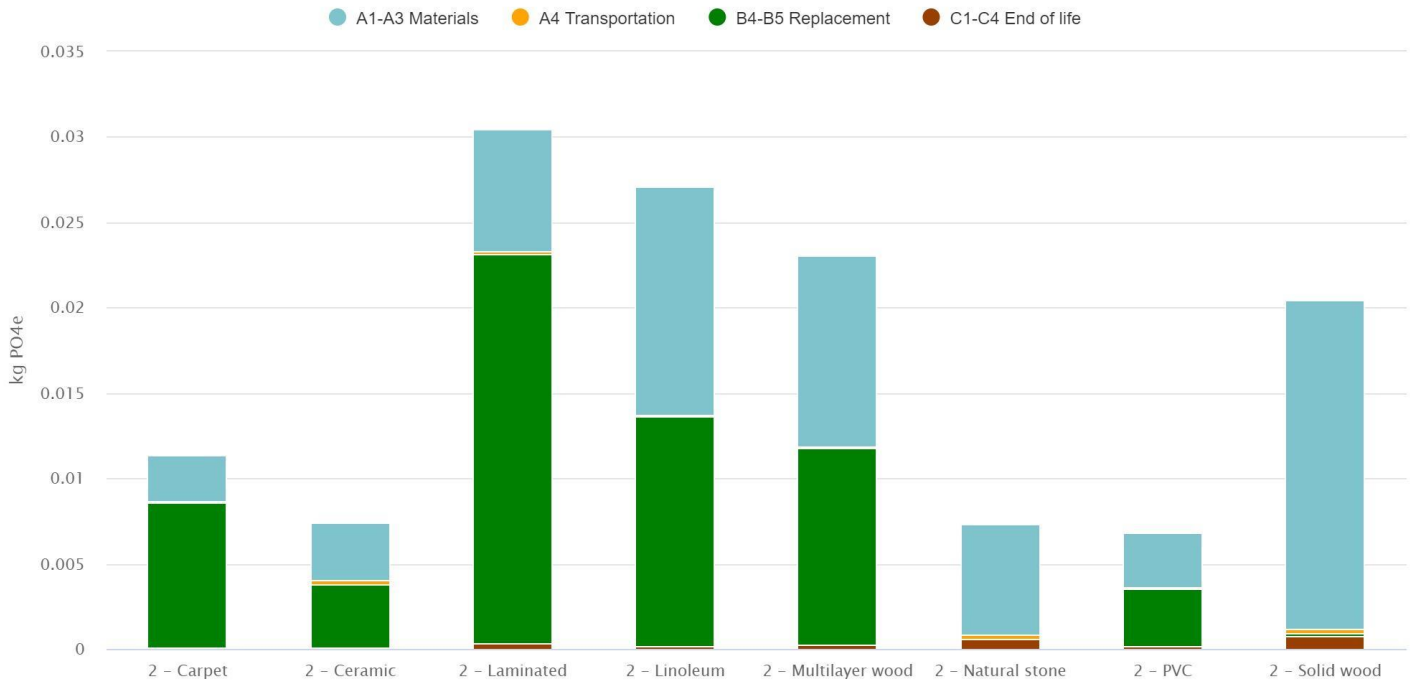
GWP is the most important indicator in the building industry.

However, other categories can identify some additional hot-spots and conclusions.

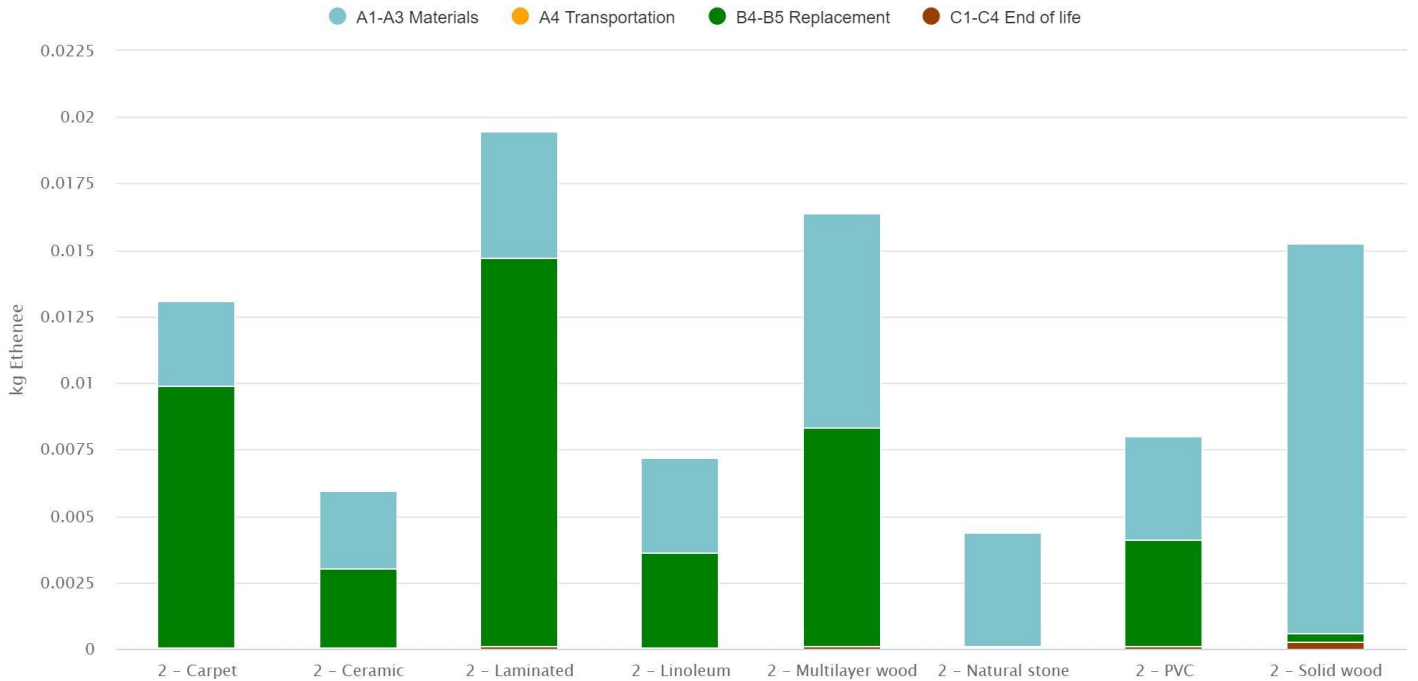
- **Linoleum:** While this option has relatively low GWP, it is less advantageous in other impacts, such as if Acidification and Eutrophication Potentials (AP and EP) are assessed.
- **Solid wood:** This option is less beneficial in other impact categories than in GWP, mainly due to the emissions of drying processes when wood is burned.
- **Stone, Ceramic and PVC:** These solutions have lower results not only in GWP but also in other impact categories. Concerning PVC it has to be highlighted that potential toxic impacts of its life cycle are not quantified in this case study.



### EP



### POCP



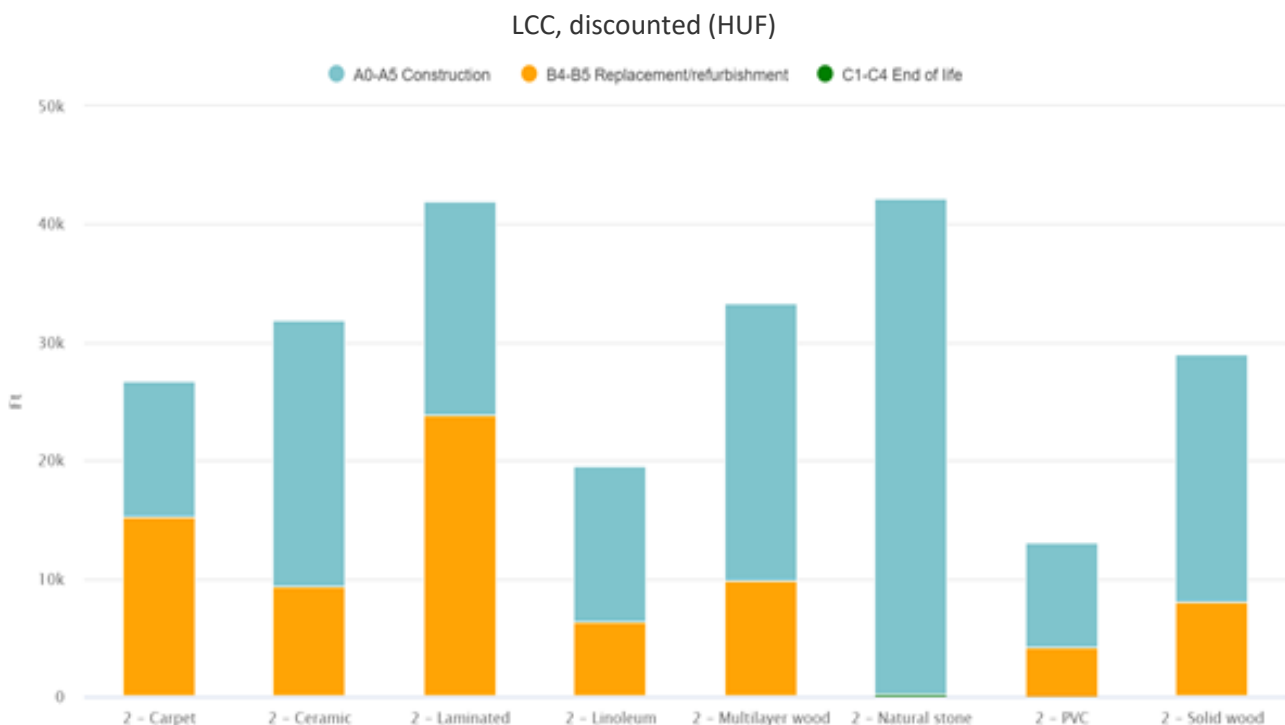
## Cost

Floor finish has 8 designs. The cost of floor finish covers both materials and labour cost, without tax. As prices fluctuate, the costs are indicative only and show the cost ratio of each design variation. The discounted life cycle cost in the case study was made with a 3% discount rate and 0% inflation.

At the first investigation, the cheapest solution of the floor finish is the PVC, and the most expensive is the natural stone. The differences compared to natural stone range from 70% (PVC) to 1% (Laminated).

The average cost of the solutions is 25000 HUF per m<sup>2</sup>.

The next figure shows the differences of in the LCC cost of floor finish scenarios by life cycle stage.



In the A1-A5 life cycle stage the natural stone has the highest cost and the PVC has the cheapest cost. But the replacement/refurbishment cost is very variable:

- It is the highest in case of laminated floor finish: it is about 56 % of total LCC, but the cost of replacement is also 56 % for carpet flooring. Both need to be replaced every 15 years, but laminate flooring is more expensive, so there will be a higher life cycle cost under fifty years.
- The natural stone does not have replacement/refurbishment cost.
- The replacement cost is low in case of PVC (22 %) but in another cases (Ceramics, Linoleum, Multilayer and Solid wood) it takes about 20 %, (5000-10000 HUF) depending on price of floor element.