evs 27
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e-light

Life Cycle Assessment

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COOPERATION

earpa
European Automotive Research Partners Association

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What is LCA?

- A method used to quantify the environmental impact of a product.
- LCA analyses the life cycle of the product from the raw materials, through its manufacture and its use phase to its disposal, with all energy/material inputs and all material/emission outputs included from reliable sources.
- It gives quantitative data on the environmental impact of a product's life cycle, concerning a wide range of factors and eco-indicators e.g. global warming and CO_2 emissions, soil pollution and metallic waste emissions.

How was it applied?

- SimaPro LCA software and the EcoInvent database have been used to analyse the environmental impact of manufacturing the body in white (BIW) of a concept electric vehicle using either carbon fibre or aluminium.
- Every stage of the life cycle was considered – this is known as a 'cradle-to-grave' analysis – however capital goods (such as tooling etc.) and other vehicle components were excluded to keep the focus of the analysis on the BIW comparison.

The results…

Figure 1: Environmental impact of the manufacturing stage of the BIW structures (single score).

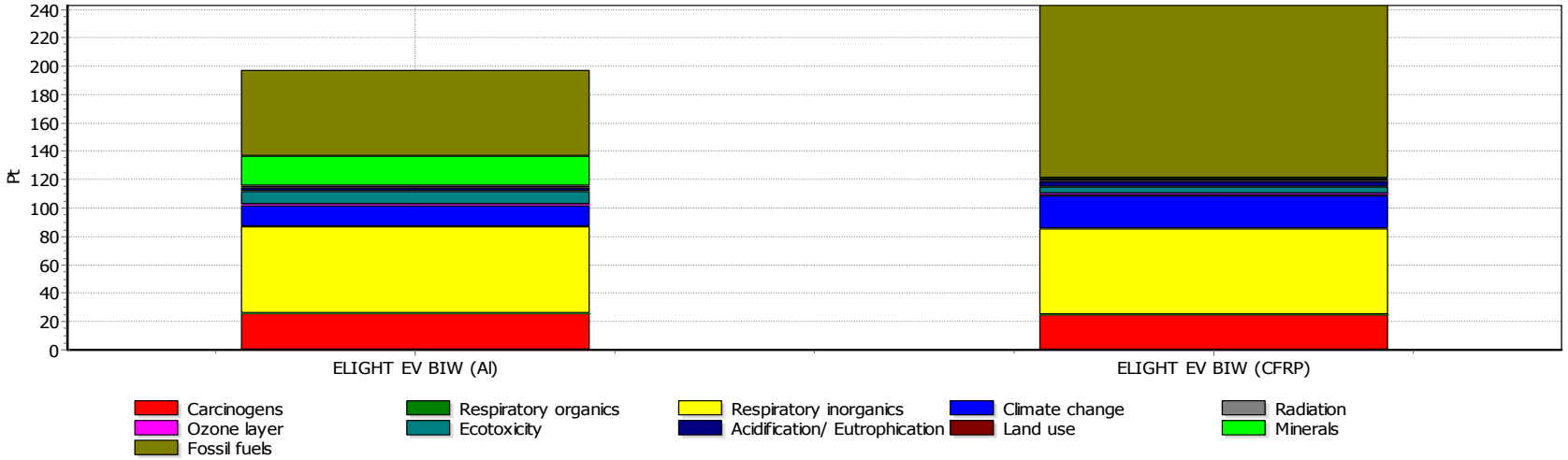


Figure 2: Environmental impact of the manufacturing phase of BIW structures (per impact category).

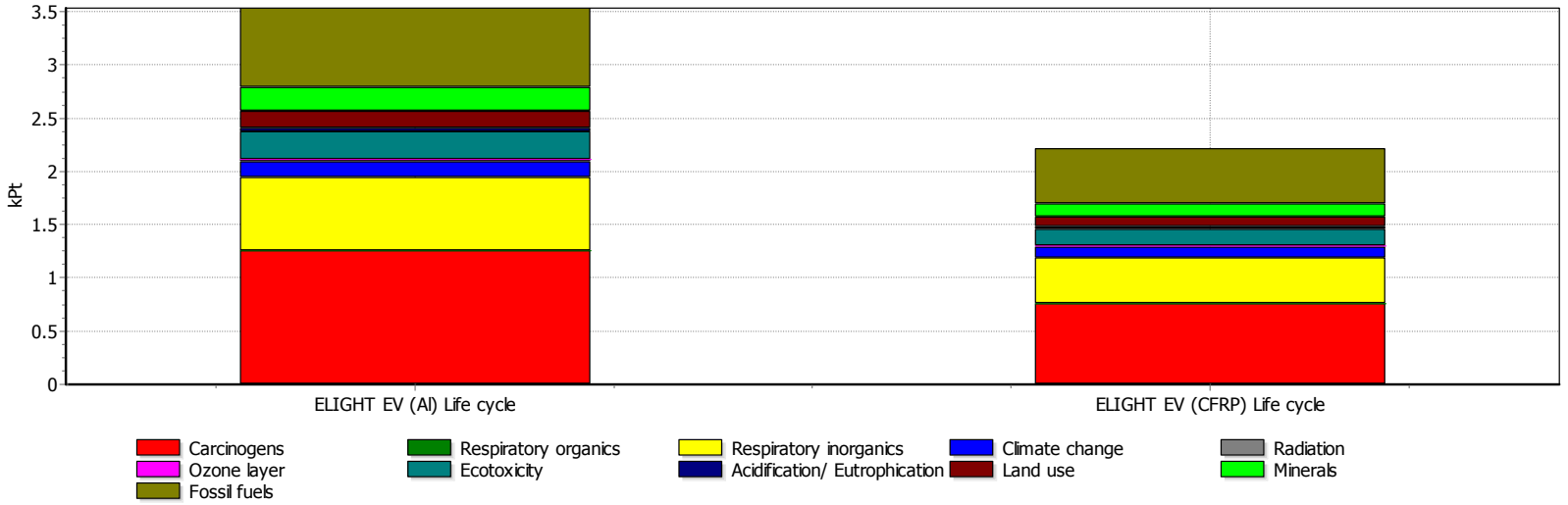


Figure 3: Environmental impact of the full life cycle of the BIW structures (single score).

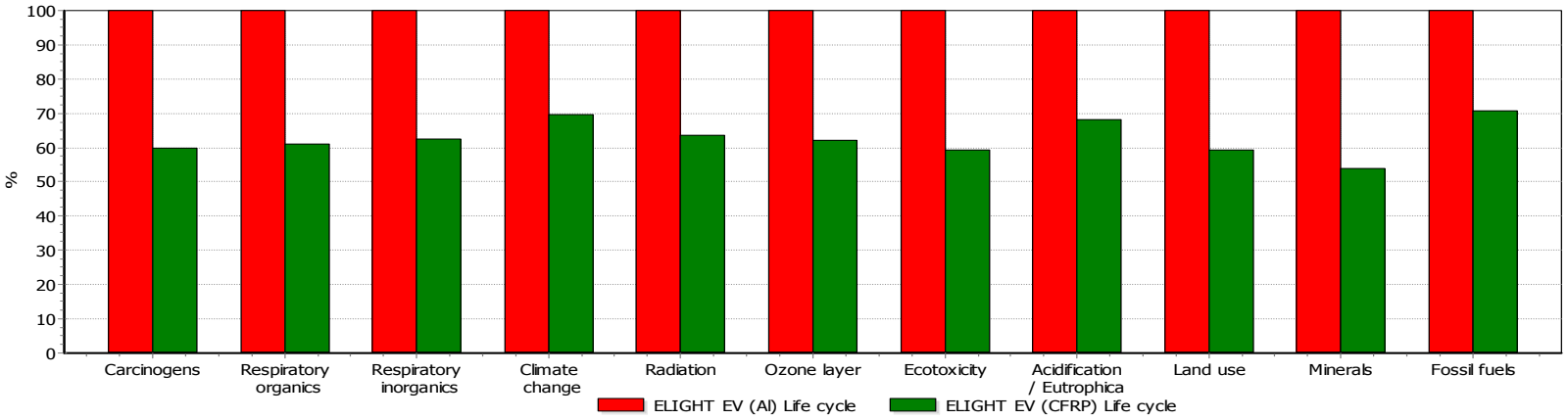
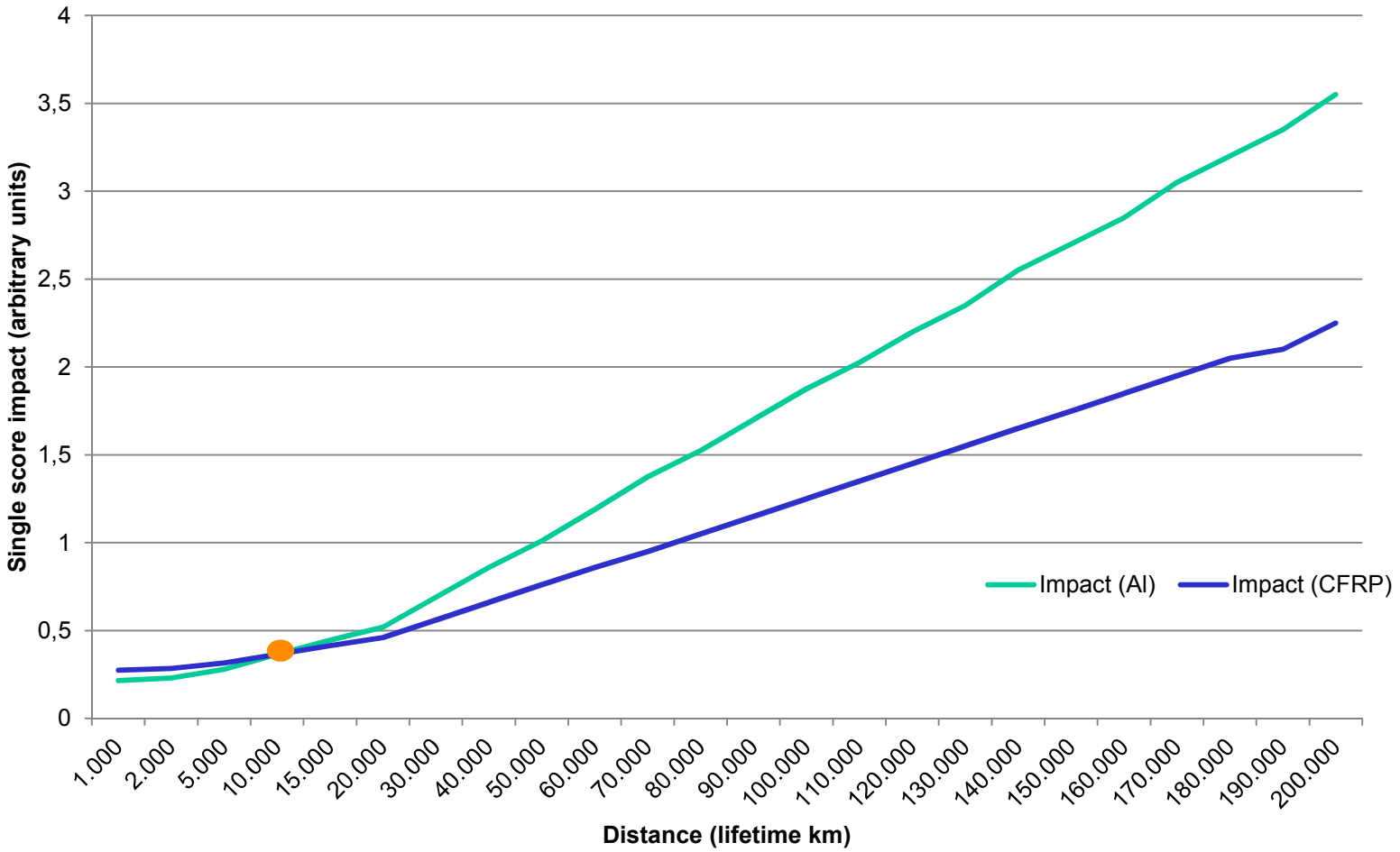
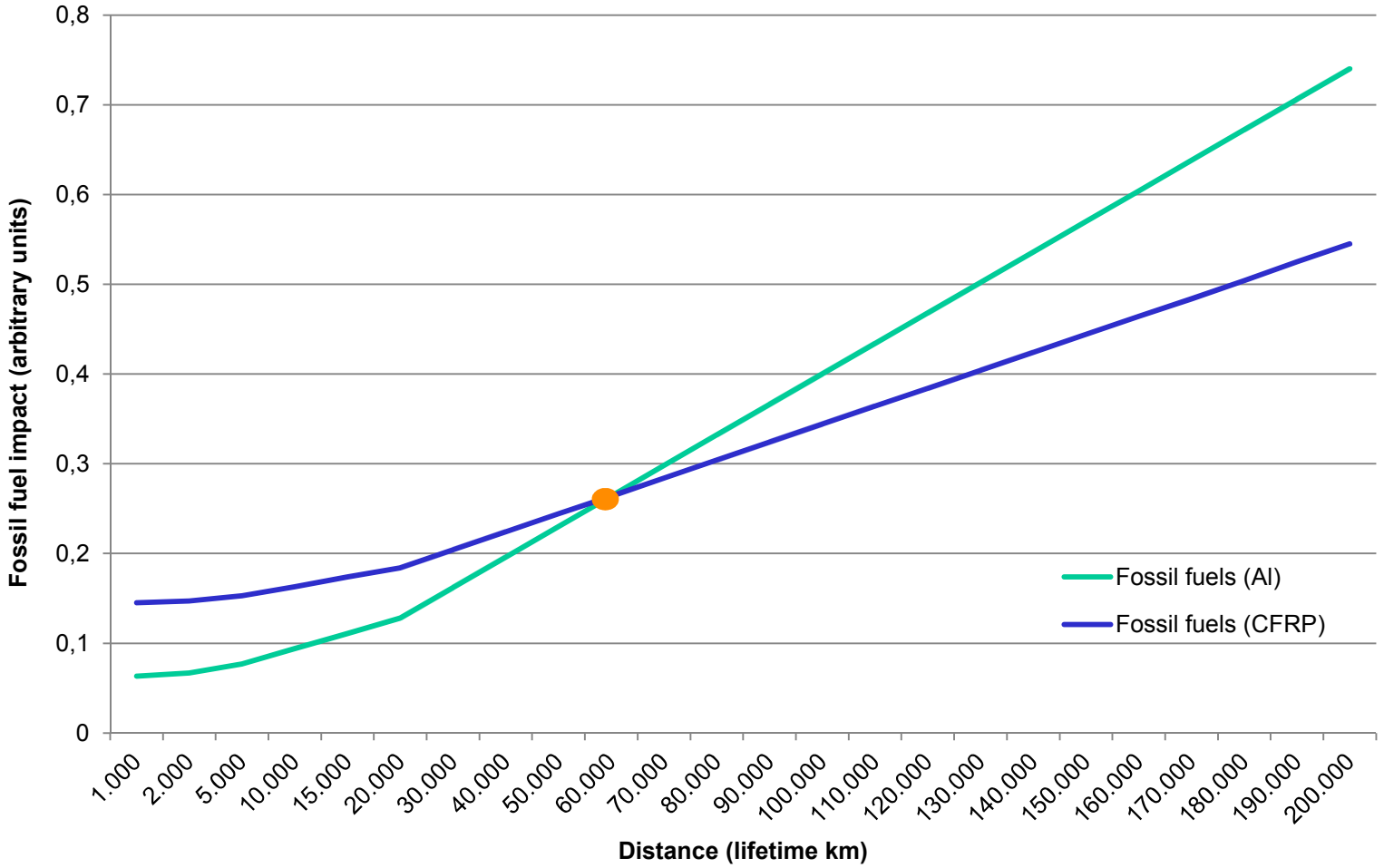


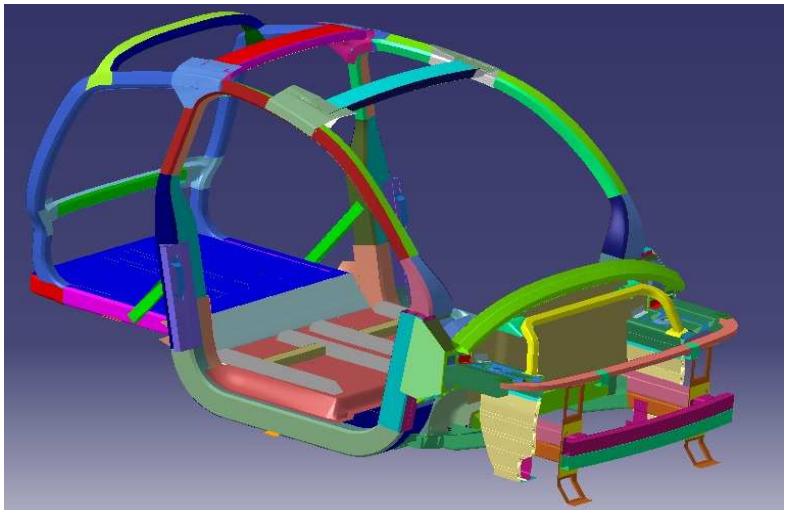
Figure 4: Environmental impact of the full life cycle of the BIW structures (per impact category).

Breakeven plots

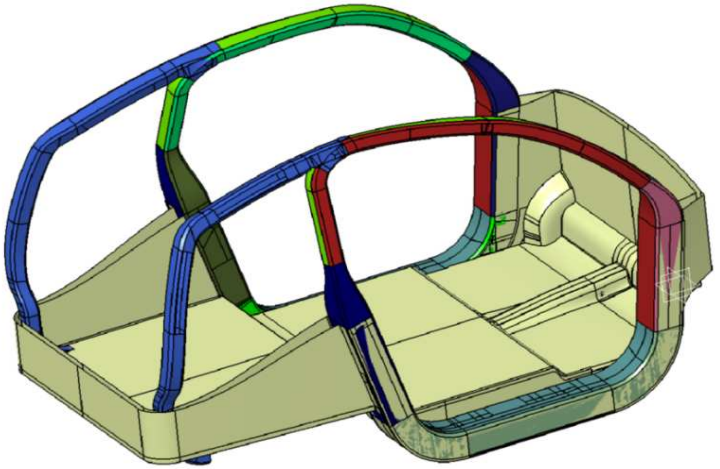



0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
Fossil fuel impact (arbitrary units)
1.000
2.000
5.000
10.000
15.000
20.000
30.000
40.000
50.000
60.000
70.000
80.000
90.000
100.000
110.000
120.000
130.000
140.000
150.000
160.000
170.000
180.000
190.000
200.000
Distance (lifetime km)
Fossil fuels (Al)
Fossil fuels (CFRP)

Effect of structural redesign?



Original design



Redesign (in progress)