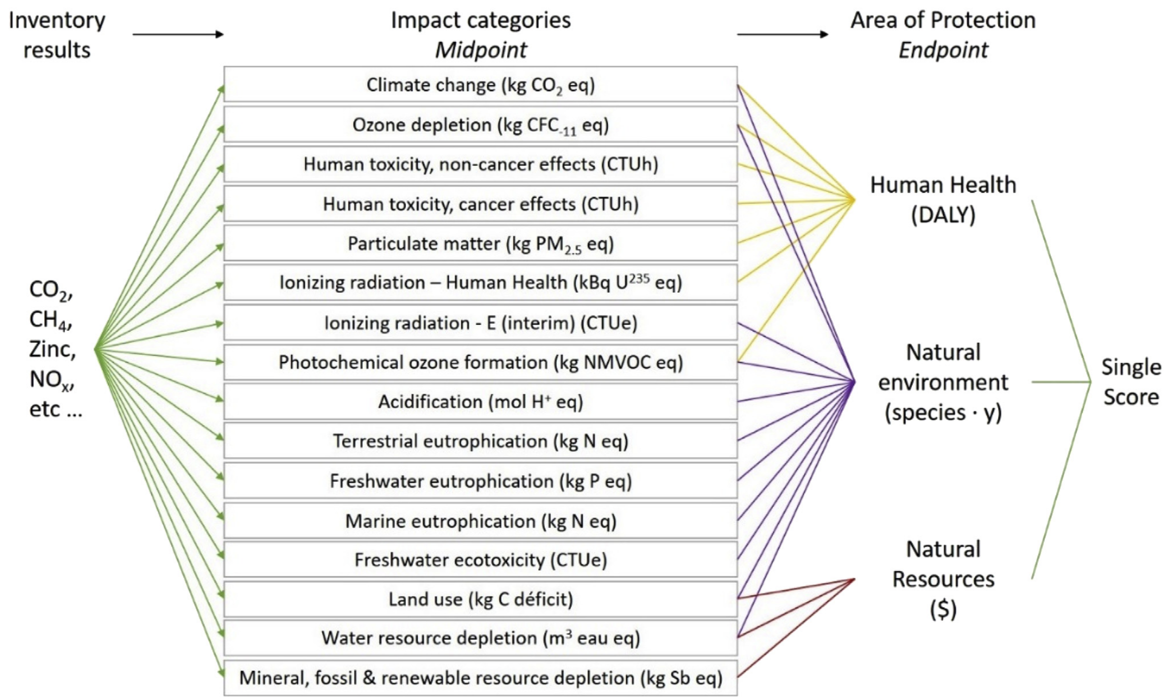

Fig. 4. Representation of the ILCD 2011 Midpoint + evaluation method.

Table 6
Contribution of each life cycle stage (in %) of both panels to the environmental impact categories.RM: Raw Materials; P: Production; U: Use; EOL: End-of-Life; ren.: renewable. N: Negligible.

Impact category	Biocomposite Panel				Conventional Panel			
	RM	P	U	EOL	RM	P	U	EOL
Climate change	N	N	100	N	N	N	100	N
Ozone depletion	N	N	100	N	N	N	100	N
Particulate matter	0.01	N	99.99	N	N	N	100	N
Ionizing radiation HH	N	N	100	N	N	N	100	N
Photochemical ozone formation	N	N	100	N	N	N	100	N
Acidification	N	N	100	N	N	N	100	N
Freshwater eutrophication	N	N	100	N	N	N	100	N
Marine eutrophication	N	N	100	N	N	N	100	N
Mineral, fossil & ren. resource depletion	0.04	N	99.96	N	0.01	N	99.99	N

impact categories, the Raw Materials stage was identified to be responsible for up to 99% of the environmental impact of the biocomposite panel and over 65% for all categories for the conventional panel (Table 7).

Further analysis of the raw materials of both panels showed that for the biocomposite panel, the flame retardant agent and the production of the flax fibre technical textile are the main contributors to the studied environmental impacts (Fig. 6). On the other hand, glass fibre and aramid fibre production are the main contributors to the environmental impacts of the conventional panel, followed by the flame retardant agent and the epoxy resin production (Fig. 7).

From comparing the performance of both panels, results showed (Fig. 8) that the biocomposite panel has a better performance in the environmental impact categories of Climate change and Marine eutrophication than the conventional panel. However, the conventional panel outperforms the biocomposite panel in all the other categories (Ozone depletion, Particulate matter, Ionizing radiation, Photochemical ozone formation, Acidification, Freshwater eutrophication and Mineral, fossil & renewable resources depletion).

To identify the strengths and weaknesses of the biocomposite panel, the main contributors to each of the impact categories were identified. Findings are summarized in Table 8, which presents the performance of the biocomposite panel compared to the conventional panel and the process/main contributors responsible for the potential environmental impacts for each category.

4. Discussion

- *From a Cradle-to-Grave's perspective*

For an application in aeronautics, the critical element of the panel is its mass as it has a direct influence on fuel consumption and therefore on the level of air emissions. This is revealed in Table 6 where the use phase is shown to represent more than 99%