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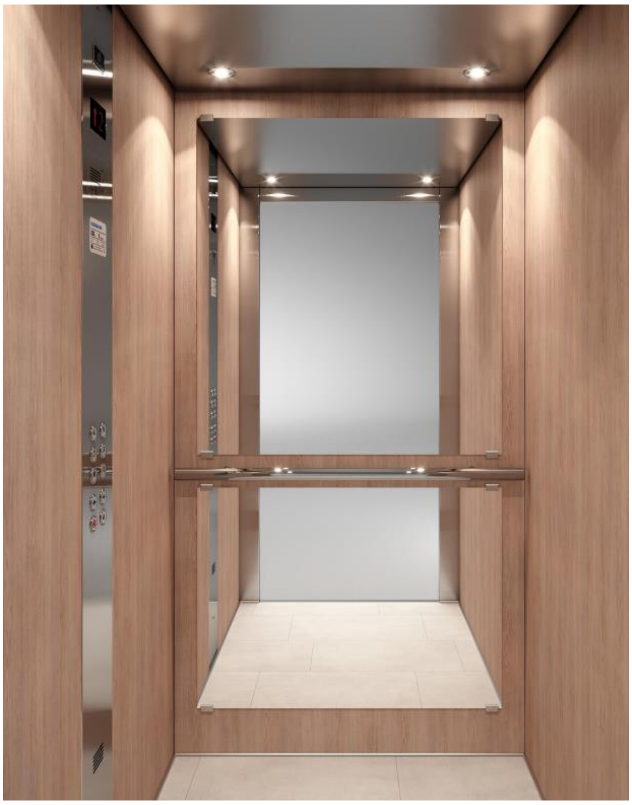

Environmental fact sheet: Purity Cabins

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Foreword

Environmental protection is a practice of protecting the natural environment, for the benefit of both the environment and humans. With awareness of environmental protection increasing worldwide, demand for more efficient products to reduce energy and resource consumption is more urgent than ever. The possible environmental impacts associated with products have sparked interest in developing methods to understand and minimize these impacts. Life-cycle assessment (LCA) is a technique to assess environmental impacts associated with all the stages of a product's life from raw material extraction through materials processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling. LCAs can help avoid a narrow outlook on environmental concerns by compiling an inventory of relevant energy and material inputs and environmental releases; Evaluating the potential impacts associated with identified inputs and releases and also interpreting the results to help make a more informed decision.

An important aspect on the companies' awareness is the ISO 14000 family of standards, which provides practical tools for companies and organizations of all kinds seeking to manage their environmental responsibilities. ISO 14006 provides guidelines to assist organizations in establishing, documenting, implementing, maintaining and continually improving their management of eco-design as part of an environmental management system (EMS).

Vertical – transportation products are indispensable to urban mobility and accessibility. Passenger comfort and attractive design must be integrated into a large, complex system. combining that with an environmental approach is a creative challenge.

Introductory information

KLEEMANN Hellas S.A. is active in the field of construction and design of integrated complete lift systems. It is one of the largest companies in this sector to the European and international market and its distribution network expands to more than 100 countries.

Since 2012, KLEEMANN implements an environmental management system (EMS) for its facilities. This system has been certified according to ISO 14001 and covers the production unit (office facilities and factories) in the industrial area of Kilkis. The company also applies quality management system certified in accordance with ISO 9001 and implements the principle of product eco-design in accordance with ISO 14006 since 2015.

The strategic objective for the company is the sustainable development in full harmonization with the environmental protection, resulting in environmentally superior products. That aim can be achieved by adhering to fundamental rules, criteria and mechanisms for environmental protection, pollution prevention and protection of human health. This ensures preservation of natural resources and the gradual restoration of the environment. The main goal is to redesign all of our products on the basis of eco-design process. The strategy is motivated by three factors: nature, society, economy.

The largest lift company in Greece presents the model of eco-design. The procedure of LCA in our products is constantly a growing part of research and development. This is the main and most important pillar of innovation on technological achievement. It is the most important step on achieving an integrated environmental approach on the products' design.

Description of steps and procedures of eco-design

Scope: Eco-design is an approach of designing products with special consideration for the environmental impacts of the product during its whole lifecycle. In a life cycle assessment, the life cycle of a product is usually divided into procurement, manufacture, use, and disposal. It is a growing responsibility and understanding of our ecological footprint on the planet.

Terminology: The flow of energy and materials, as well as the type of pollutants examined in each system, is the part of a product's life. The system is determined by the boundaries, which are defined in advance. System boundaries in this study are the receipt of raw materials in our facilities up to the final recycling and disposal of the product.

Required data: The data required for the completion of the study are the units of materials and energy required for the entire life cycle of a product as well as the quantification of their effects.

However, in a study of life cycle it is clear that some of the data will be taken from some pertinent cases and are necessarily accepted as they appear in them. As much as we are stretching the limits of the system the analysis of inputs and outputs becomes more difficult. If no suitable data is available, the best estimation is used.

The data relating to the production process are calculated accurately, while the impact of the extraction and production of raw materials have not been addressed.

Procedure description

Upstream procedures
- These are procedures which take place regardless the manufacturing of the product such as mining raw materials, transport within the supply chain. These are processes which will not be examined in this document.

Production and core processes
- These are the principal manufacturing processes of the product. The procedures of carrying materials and waste management resulting from the above, even if carried out by third parties, are also included.

Downstream procedures
- These are the processes no more controlled by the product manufacturer, but by the product owner. This covers the private transportation of the product to the consumer, consumption of the energy or other consumables, adequate maintenance and end of-life processes of the used product.

Calculations and environmental impact assessment

The part of the measurement of environmental impact is the criterion for the improvement actions that are required in order to reduce the first. To calculate these impacts, Software Sima Pro® 8 was used, with the method ReCiPe Endpoint, hierarchist version, for the major part of the Environmental Impact Assessment.

The method of eco-design is applied to two different elevator cabins which are designed, manufactured and distributed by KLEEMANN. The adoption of such a model design contributes as a catalyst to reduce the environmental impact and cost.

1. Raw materials
2. Manufacturing processes
3. Transport & Packaging
4. Installation
5. Operation - Use
6. Maintenance - Repairs
7. Disposal - Recycling

Product structure and reference model

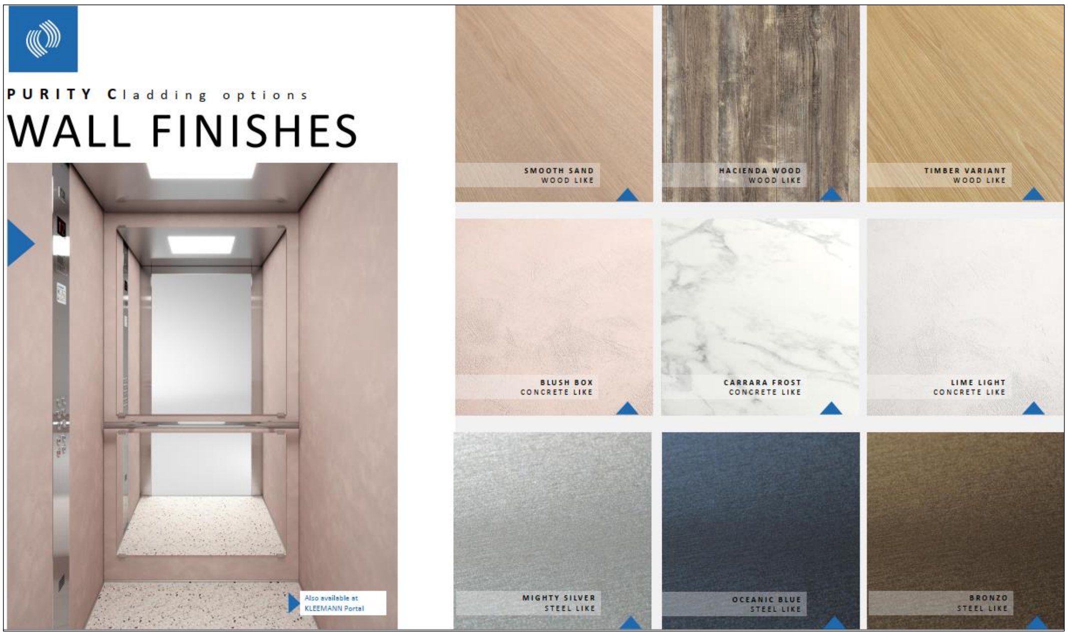
The products that have been assessed on the basis and principles of eco-design are:

1. Uncladded cabin Purity S
2. Cladded cabin Purity E

The reference models are cabins of the dimensions of 1100mm x 1400mm and height of 2100mm. The design of that new models was under the vision of substituting two formerly produced models, namely L310 and A510.

Purity cabins, the new addition to the standard range, combines optimized construction and upgrade of materials. There are new floors and finishes that create an elevator interior that is both functional and visually stunning.

In case of cladded cabin, there is plurality of choices, like wood veneer or timber. Representative examples of cladding choices are presented below:



In case of uncladded cabin, the main material is steel, but there is a variety of choices.

All ceilings are with LED lighting and mirror finishing. There are four types of mirrors with standard dimensions according to panel width and two types of handrails with mirror finishing.

The first scenario concerns the newly designed, under eco-design spirit, uncladded cabin. In the following table are presented the main characteristics and a comparison between the newly designed Purity S and the previously used cabin L310. It should be mentioned that the L310 cabin model has been the company's top-selling product. According to sales statistics, nearly 1650 units of L310 cabins were sold in 2021, and over 1300 units were sold in 2022. In contrast, the company produced a total of approximately 4500 cabins of 33 different models each year. These figures highlight the significant demand for the L310 cabin and its popularity among customers. The Purity model also performed well, with 800 units produced and sold in the first year of release in 2022. In the coming years, the company has plans to fully replace the L310 cabin model with the eco-designed Purity model.

Reference model	Purity S	L310
Width (mm)	1100	1100
Length (mm)	1400	1400
Height (mm)	2100	2100
Maximum weight capacity (kg)	630	630
Number of passengers	8	8
Lighting	LED	LED/Fluorescent
Wall materials	INOX	INOX
Floor	Rubber	Rubber

The second scenario pertains to a newly designed cladded cabin that embodies the principles of eco-design. The table below highlights the main features of this cabin, called Purity E, and compares it to the previously used cabin A510. Notably, A510 has been the company's best-selling cladded cabin, with sales of 120 units in 2022 and nearly 190 units in 2021.

Reference model	Purity E	A510
Width (mm)	1100	1100
Length (mm)	1400	1400
Height (mm)	2100	2100
Maximum weight capacity (kg)	630	630
Number of passengers	8	8
Lighting	LED	LED/Fluorescent
Wall materials	Galvanized steel metal	Galvanized steel metal
Floor	Rubber	Rubber
Clads	Slow-burning black MDF	Slow-burning plywood

The slow-burning black MDF is certified as to be of “Class E1", which is a European standard that sets limits on formaldehyde emissions from wood-based composite materials. It is part of the EN 717-1 standard, which specifies test methods for determining the formaldehyde content of wood-based panels. The term "Class E1" refers to the lowest level of formaldehyde emissions allowed under the standard, with a maximum emission level of 0.124 parts per million (ppm). This means that products labeled as "Class E1" have formaldehyde emissions that are considered safe for use in indoor environments. In summary, if a wood-based composite material is labeled as "Class E1", it meets the European standards for low formaldehyde emissions and is considered safe for use in indoor environments.

Analysis of life cycle parameters of the new products

The life cycle analysis (LCA) is a methodology used to assess the environmental impacts of a product or service throughout its entire life cycle, from raw material extraction to disposal or recycling. The life cycle stages are typically divided into four main categories:

1. Raw materials acquisition and processing: This includes all the activities involved in extracting, refining, and processing the raw materials that are used to manufacture the product.
2. Manufacturing: This includes all the activities involved in transforming the raw materials into the finished product, such as assembly, packaging, and transportation.
3. Use: This includes all the activities involved in using the product, such as energy consumption and emissions associated with operating and maintaining the product.
4. End of life: This includes all the activities involved in disposing of the product, such as recycling, landfilling, or incineration.

By analyzing the environmental impacts of each of these stages, LCA can provide valuable insights into how to reduce the environmental footprint of a product or service over its entire life cycle.

This year's assessed pieces are sub-systems of an elevator. As a sub-system during its use there is no energy consumed, so the LCA is focused only on the other 3 stages, namely raw materials, manufacturing and end-of-life. These are the stages that company takes into account and interfere with the process of eco-design. The service plays also an important role in product's life cycle. The other parameters related to the life cycle of a product, such as packaging, transport and installation shall contribute much lower in overall impact.

The cabins Purity S and Purity E achieve greater efficiency by reducing:

- Quantity of raw materials
- Total unit weight
- Energy consumed during manufacturing
- Easiest disassembling for better disposal scenario.

The eco-designed cabins are about gradually to substitute older cabins. This substitution leads not only to new and eco-designed products, but also to the reduction of the products' range. The additive advantages are the reduction of SKUs (Stock Keeping Units) and their management and storing cost.

Raw materials

The company is gradually trying to co-operate with suppliers who meet the environmental criteria which are set by standards. So up to the present time, at least 50% of the company's suppliers operate with an environmental management system and ISO14001 certification.

The total mass of the cabin for the life cycle inventory without packing is almost 308kg for Purity S and 437kg for Purity E. The sub-assemblies and the materials they are consisted of, are presented in the following figure:

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Purity S 337,26kg

- **Platform** 54.36kg
  - Steel (uncoated) 54.26kg
  - Plastics (mix) 0.1kg
- **Walls** 123,43kg
  - Stainless Steel 123.43kg
- **Floor** 22.98kg
  - Rubber 4.5kg
  - MDF 18.48kg
- **False ceiling** 14.4kg
  - Stainless Steel 14.4kg
- **Handrail & Others** 9.82kg
  - Stainless Steel 1.82kg
  - Steel (uncoated) 8kg
- **Doors** 14kg
  - Steel (uncoated) 4.5kg
  - Steel (zinc coated) 3kg
  - Stainless steel 3.5kg
  - Aluminium 3kg
- **Lighting** 3kg
  - LED 3kg
- **Mirror** 18kg
  - Glass 18kg
- **Ceiling** 45.57kg
  - Steel (uncoated) 45.57kg
- **Paint** 2.7kg
- **Packing** 29kg
  - Wood 20kg
  - Steel (uncoated) 2kg
  - Nylon 2kg
  - Carton 5kg

Purity E 466,35kg

- **Platform** 54.86kg
  - Steel (uncoated) 54.76kg
  - Plastics (mix) 0.1kg
- **Walls & Clads** 250.92kg
  - Stainless Steel 11.15kg
  - Steel (zinc coated) 116.77kg
  - MDF 123kg
- **Floor** 23.78kg
  - Rubber 4.8kg
  - MDF 18.98kg
- **False ceiling** 14.4kg
  - Stainless Steel 14.7kg
- **Handrail & Others** 9.82kg
  - Stainless Steel 1.82kg
  - Steel (uncoated) 8kg
- **Doors** 14kg
  - Steel (uncoated) 4.5kg
  - Steel (zinc coated) 3kg
  - Stainless steel 3.5kg
  - Aluminium 3kg
- **Lighting** 3kg
  - LED 3kg
- **Mirror** 18kg
  - Glass 18kg
- **Ceiling** 46.07kg
  - Steel (uncoated) 46.07kg
- **Paint** 2.5kg
- **Packing** 29kg
  - Wood 20kg
  - Steel (uncoated) 2kg
  - Nylon 2kg
  - Carton 5kg

Manufacturing processes

Listed below are the manufacturing processes through which each component and the individual parts of the product are made. The facilities of the company have been amended as to the production line (lean flow), which ensures low stocks and flexibility at the same time.

Reference model	Ceiling	False ceiling	Doors	Floor	Handrail & Others	Platform	Walls & Clads	Total consumed energy (kWh)
Purity S	12.4	3	3	2	1	4.5	44	69.9
L310	13.43	3	3	2	1	6.5	59.62	88.55
Purity E	13.25	3	3	2	1	4.5	45.67	72.42
A510	14.35	3	3	2	1	6.3	60.62	90.27

Transportation & Packaging

Transportation: Average mileage for the product from the production site to the installation site is 800km (average distance from the factory to the various installations in accordance with the measurements of 2014). The carriage of cargo is up to 16tones.

Packaging: For the packaging of products wood, nylon, nails and cartons are used. The packaging for by-product required is listed below:

Material	Quantity [kg]
Wood pallet	20
Nylon	2
Steel (nails etc)	2
Carton boxes	5

Installation

KLEEMANN provides all the necessary auxiliary tools to the installer so that the time and energy to be spent are reduced to the minimum level. Because of this and because the time and the energy per installation can vary these data are not calculated in detail. An approximation over the installation concerning the man-hours needed is generally 10days and one day for each extra elevator's stop. Present report concerns only the cabin so the installation time only for this sub-system is considered to be 4 - 5 hours.

Operation – Use

This year's evaluation centers around the sub-systems of an elevator, particularly the cabins. As the cabins do not consume any energy during operation, this step of the procedure is not considered in the assessment.

Maintenance - Repairs

KLEEMANN offers all the spare parts that a maintenance requires. The maintenance work is a continuous process throughout the phase of operation of the lift. It consists of (a) the periodic preventive maintenance and (b) the unregulated operations required after a failure.

Preventive maintenance is obligatory by the legislation of each country; however, the frequency varies. In each case the lift can be considered serviced six times a year from a team of two technicians. The maintenance procedure in addition to the transfer of technicians at the spot includes a limited use of tools and materials (light, grease, etc). The ecological footprint of this phase can be estimated from the fuel consumption for the transfer of staff (6 x 15 km per year).

Typically, the elevator cabin does not require any maintenance, aside from the replacement of lamps, over its lifespan of approximately 25 years.

Disposal - Recycling

In the final stage of a lift's life cycle, a crucial factor is the ability to recycle the product as thoroughly and easily as possible. To accomplish this, the optimal design scenario is one that enables the dismantling of the lift's materials into separate categories for recycling.

KLEEMANN lifts comprise a high percentage of recyclable materials such as metal, alloy steel, cast iron, aluminum alloy, and copper, which can be reused directly. The cabin of the lift is particularly easy to dismantle, allowing for efficient recycling of the individual components.

- *Metal:* The walls, platform, ceiling, false ceiling, handrail, screws, doors and other miscellaneous items such as bolts and nuts, can all be recycled, with steel components such as black, galvanized, and stainless steel being particularly valuable in the recycling process. By recycling these materials, we can reduce waste and conserve natural resources, making the lift industry more sustainable and environmentally friendly.
- *Glass:* Concerning the mirror recycling policies and guidelines can vary between countries in Europe, so it's best to check with the corresponding local municipality or waste management facility for specific instructions on how to recycle a mirror. In general, mirrors are considered as recyclable materials in most European countries, and can typically be recycled along with other glass items.
- *LED:* The LED lighting should also follow the proper procedure after being removed. In the European Union (EU), there are regulations in place for the disposal and recycling of electronic waste, including LED lighting. The EU's Waste Electrical and Electronic Equipment (WEEE) Directive requires that manufacturers and importers of electronic equipment take responsibility for the proper disposal of their products. Under the WEEE Directive, consumers can return their used LED lighting to the manufacturer or retailer, who must then ensure that the product is properly recycled. Consumers can also take their used LED lighting to designated collection points or recycling centers, which are typically operated by local governments or private companies. Additionally, the

Restriction of Hazardous Substances (RoHS) Directive restricts the use of certain hazardous substances, such as lead, mercury, and cadmium, in the manufacture of electronic equipment, including LED lighting. This helps to reduce the environmental impact of electronic waste and protect human health.

- *MDF:* When disposing of MDF (Medium-Density Fiberboard), it is important to follow proper disposal procedures to ensure that it is managed in an environmentally responsible manner. In many countries, MDF is considered to be a type of wood waste and can be disposed of through wood waste recycling programs. MDF waste can be taken to wood recycling centers or to construction and demolition waste facilities where it can be sorted and processed for material recovery or energy recovery.

Following the proposed procedures at least 99% of the cabin can be recycled.

Environmental Impact Assessment

Terminology

Materials: For the calculation of the indicator for the production of materials, including all the procedures, from the extraction of raw materials to the final production stage. The calculation includes even the transfers made during the production of the material.

Manufacturing processes: Indicators of production processes represent the emissions both from the production process itself, as well as those which were released during the production of electricity used from each production process.

Transport: Indicators of transport include the effects of emissions caused both for the production of fuels and their combustion during the process of transport of the products.

Power Consumption: Indicators of energy are referred to the mining of various fossil fuels, such as lignite, and their use for the electricity production. These indicators will vary from country to country due to different technology and the energy mix used for the production of electricity. These indicators include a separate indicator for the production of energy in the country of usage.

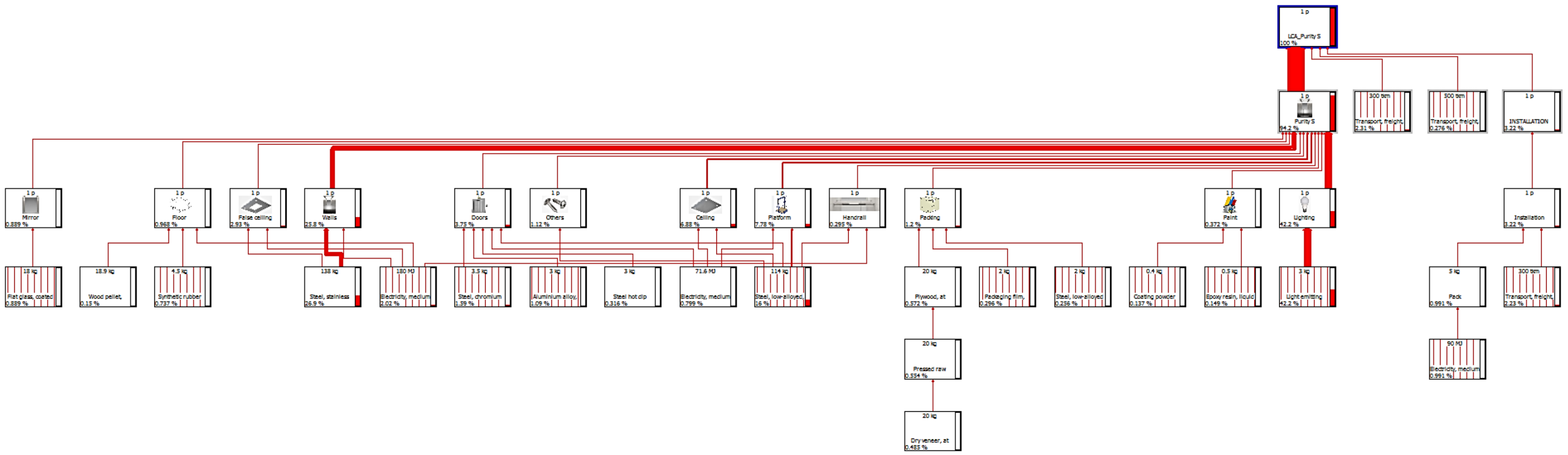
Disposal Procedures and collection: This category includes indicators for the recycling of various materials, incineration, burial at burial site and using biological treatment

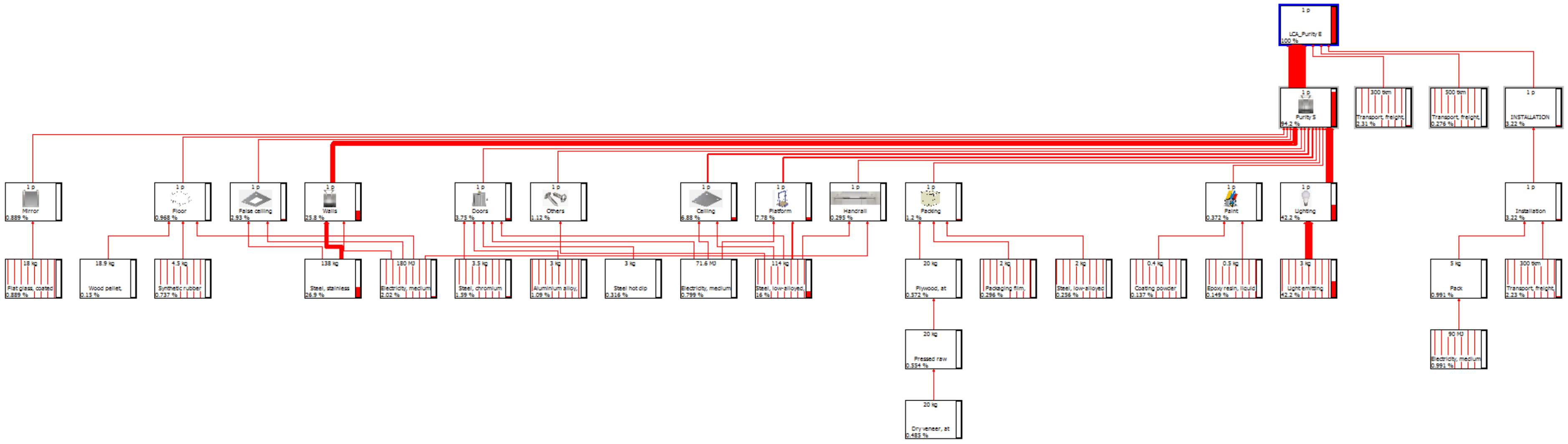
The assessment of operational phase based on system UCTE mix of electricity low voltage.

The results of this study illustrate the environmental impact of the cabins Purity S and Purity E. It is also possible to devise again the study and with other methods of analysis. On the diagrams extracted from the software SimaPro® is illustrated a comparative study between the earlier model L310 to the newly designed Purity S and the earlier model A510 to the newly designed Purity E.

First of all, is shown the Product Structure Tree, where the cabins are presented as function of their life cycle, including the manufacturing part, the transportation, the usage phage, till the disposal scenario. The sub-assemblies that contribute with the major percentage are described through the materials and the processes they are consisted of.

The diagram at the top pertains to Purity S, whereas the one at the bottom pertains to Purity E.





Damage Assessment

To quantify how much impact a product or service has in the different impact categories, we use characterization factors (CFs). CFs express how much a single unit of mass of the intervention contributes to an impact category; how much 1 kg of chemical emission contributes to Eco toxicity, for instance. Next chart compares the pairs of cabins' models according to their contribution to different impact categories.

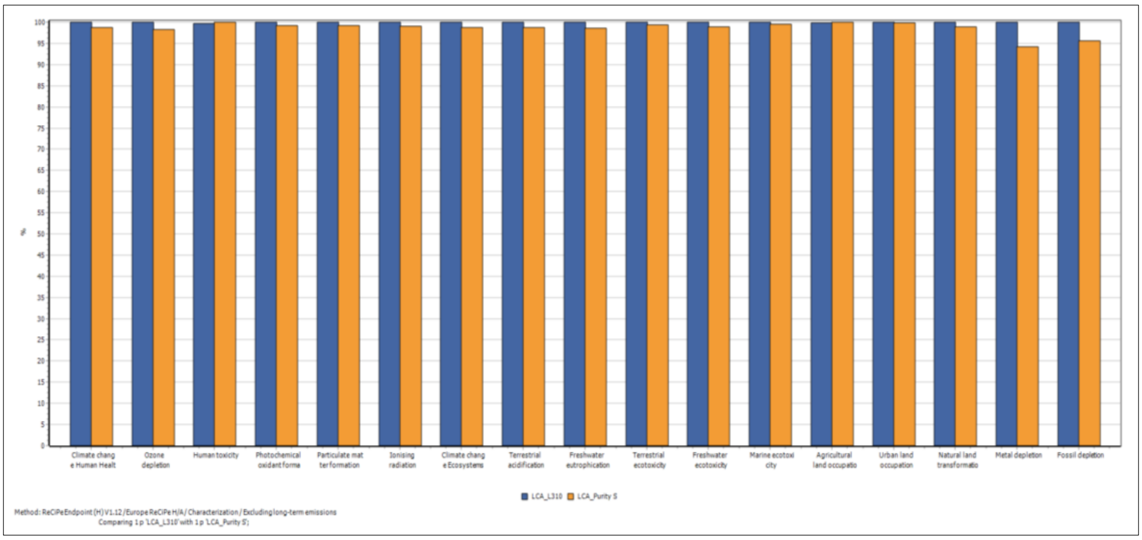


Figure 1: CFs comparison of Purity S and L310

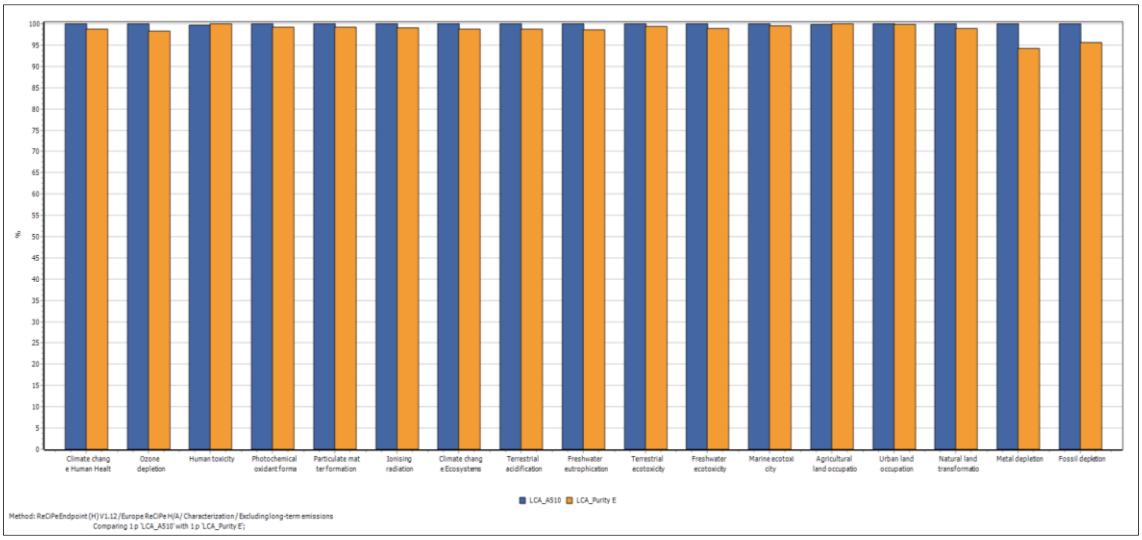


Figure 2: CFs comparison of Purity E and A510

The results of the comparison indicate that both newly designed cabins have similar performance in most categories, with the exception of "metal depletion." This category shows a notable difference between the two designs, which can be attributed to the reduction of raw materials that are predominantly metallic in the eco-designed cabin. Overall, the eco-designed product outperforms the other design in several other categories as well.

In the next chart the total impact per model and comparatively is presented. The purpose of damage assessment is to combine a number of impact category indicators into a damage category. In the damage assessment step, impact category indicators with a common unit can be added. All impact categories that refer to human health are expressed in DALY (disability adjusted life years). DALYs caused by carcinogenic substances can be added to DALYs caused by climate change.

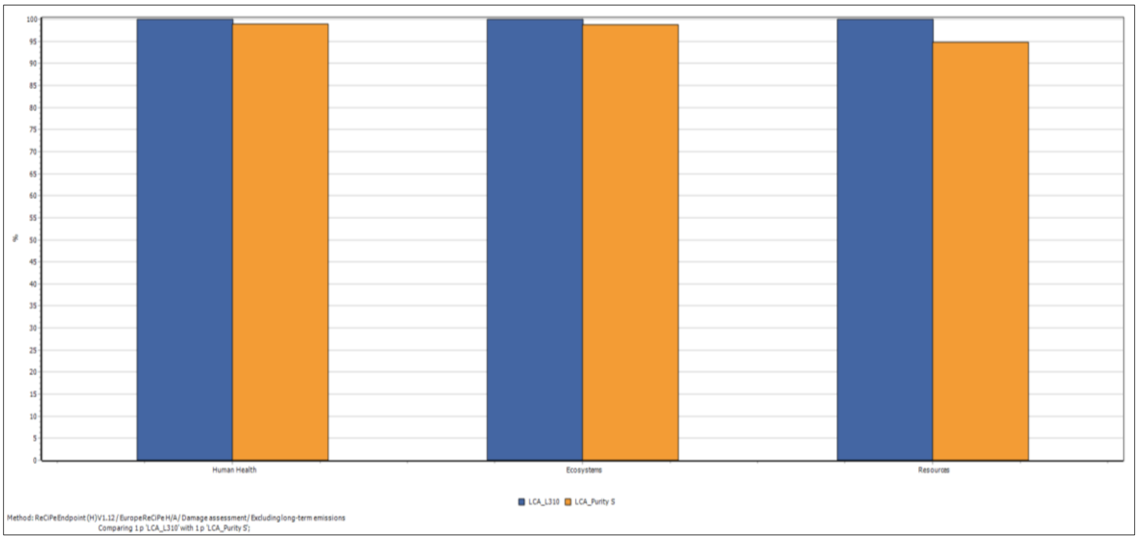


Figure 3: Total impact in damage assessment comparison of Purity S and L310

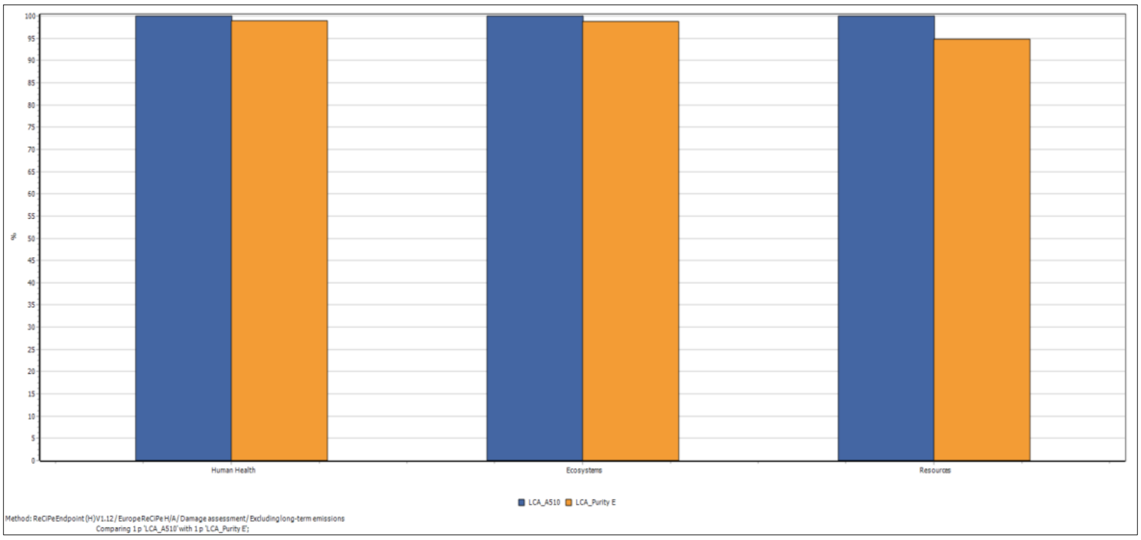


Figure 4: Total impact in damage assessment comparison of Purity E and A510

The comparison between the two pairs of models clearly demonstrates a reduction in environmental impact, particularly in the areas of human health and resource usage. The reduction achieved in the area of human health, while indirect, is particularly significant. Additionally, the new designs have had a positive impact on the deterioration of the environment and the balance of ecosystems affected by the extraction and initial processing of materials. Overall, the results indicate that the new designs have made significant strides towards reducing the negative impacts associated with production and resource usage.

Normalization

There are several methods for comparing impact category indicator results, one of which is normalization using a reference (or normal) value. This involves dividing the impact category indicator by the reference value. A commonly used reference value is the average yearly environmental load in a particular country or continent, divided by the number of inhabitants. By normalizing the impact category indicators, they are transformed into a unit that is comparable across all categories, which simplifies the comparison process.

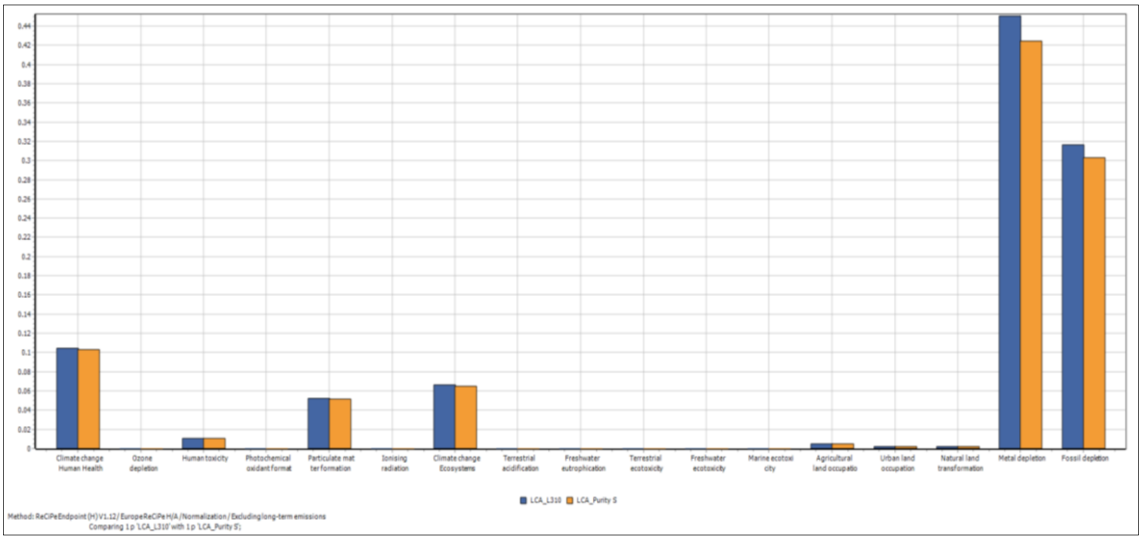


Figure 5: Normalized impact of Purity S compared to L310

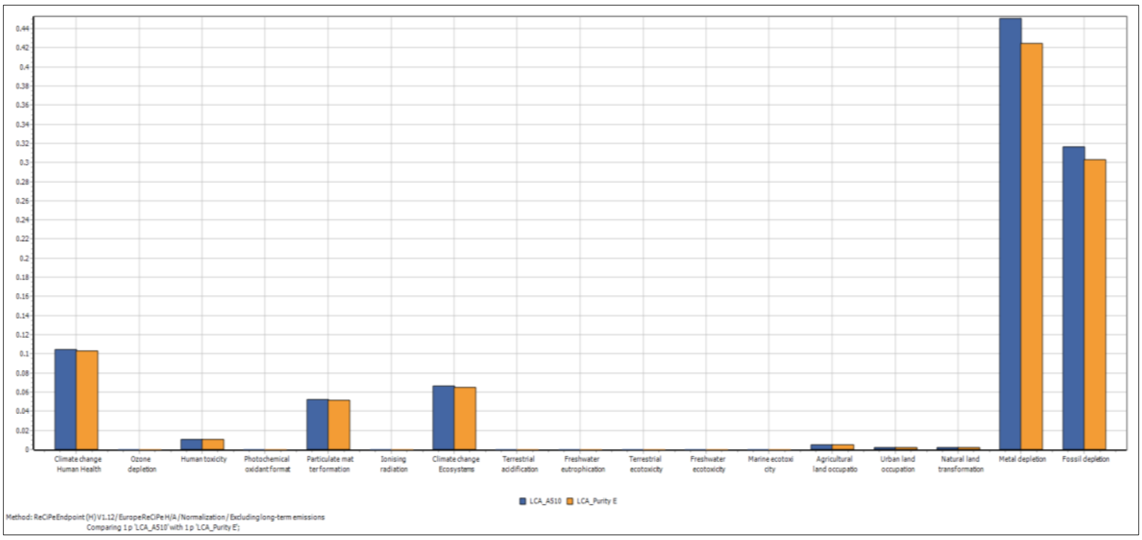


Figure 6: Normalized impact of Purity E compared to A510

From the above figures is revealed that metal depletion and fossil depletion are the most prominent categories impacted by the cabins, while their contribution to climate change (in terms of human health and ecosystem) and particulate matter formation is relatively less significant. Nevertheless, the new cabins, Purity, demonstrate significant improvements across all categories.

Weighting

The weighting method combines different data classes into a single number by assigning weights based on a valuation principle. These weights express the relationship between human values and changes in the environment. The ReCiPe method, the most comprehensive and recently updated life cycle impact assessment method in Europe, employs harmonized category indicators at both the midpoint and endpoint levels, making it particularly well-suited to assessing relevant environmental effects.

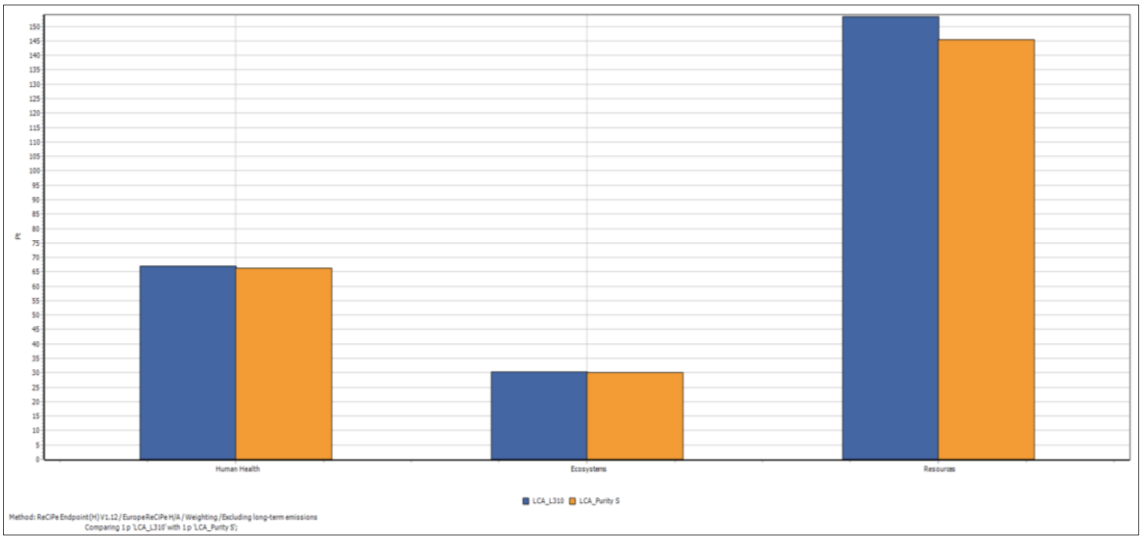


Figure 7: Comparison of Purity S and L310 according to weighting method

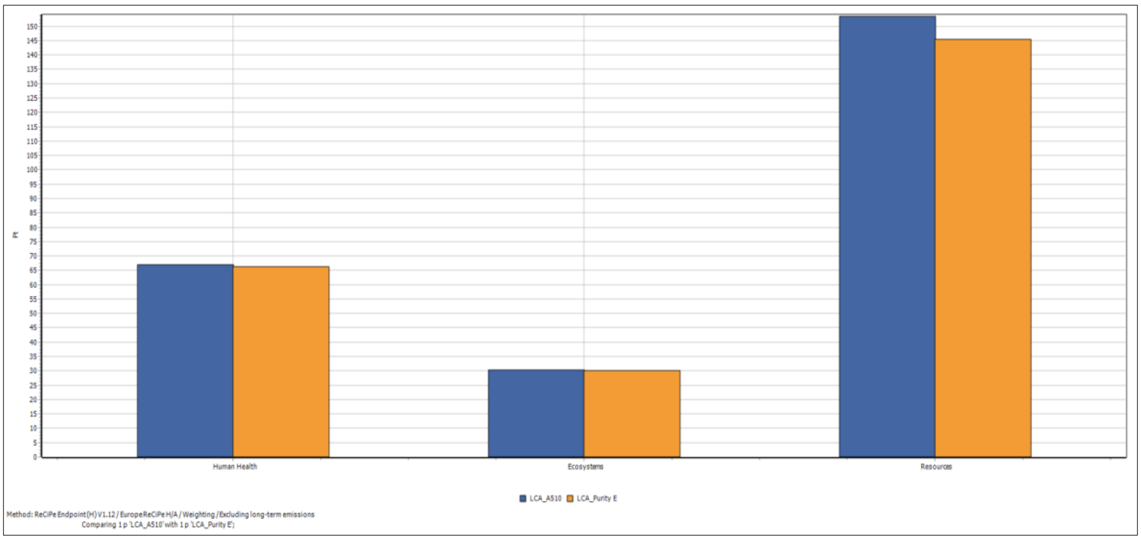


Figure 8: Comparison of Purity E and A510 according to weighting method

Single Score

In order to compare and identify the varying degrees of environmental impacts, a technique called weighting is used. This involves assigning a numerical value to each environmental effect, based on its relative significance, and combining them to create a single score that represents the overall impact. This single score is commonly used as an index to describe the total environmental impact, making it easier to understand and compare the different effects.

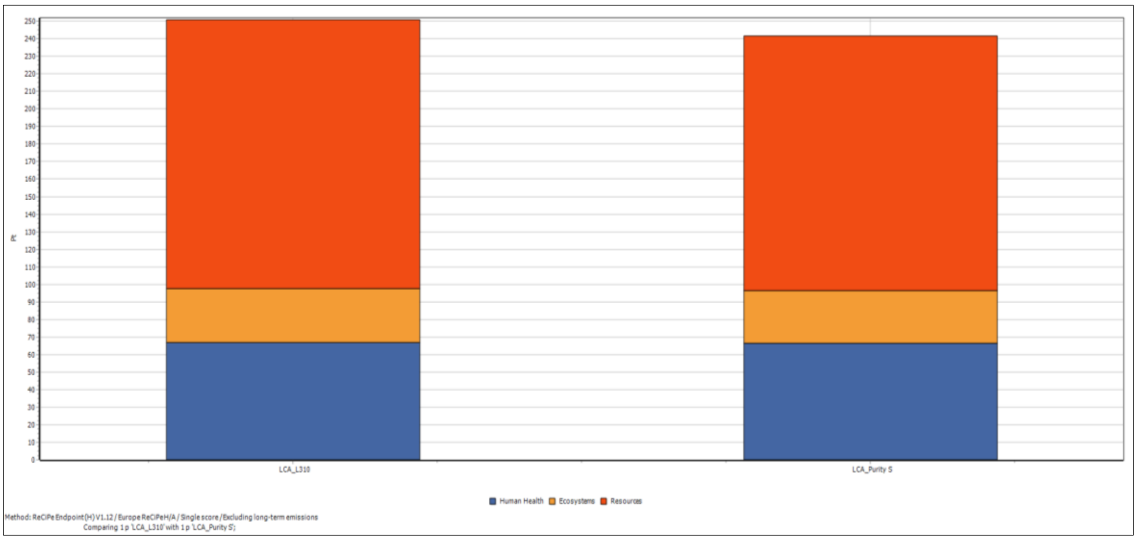


Figure 9: Single score comparison of Purity S and L310

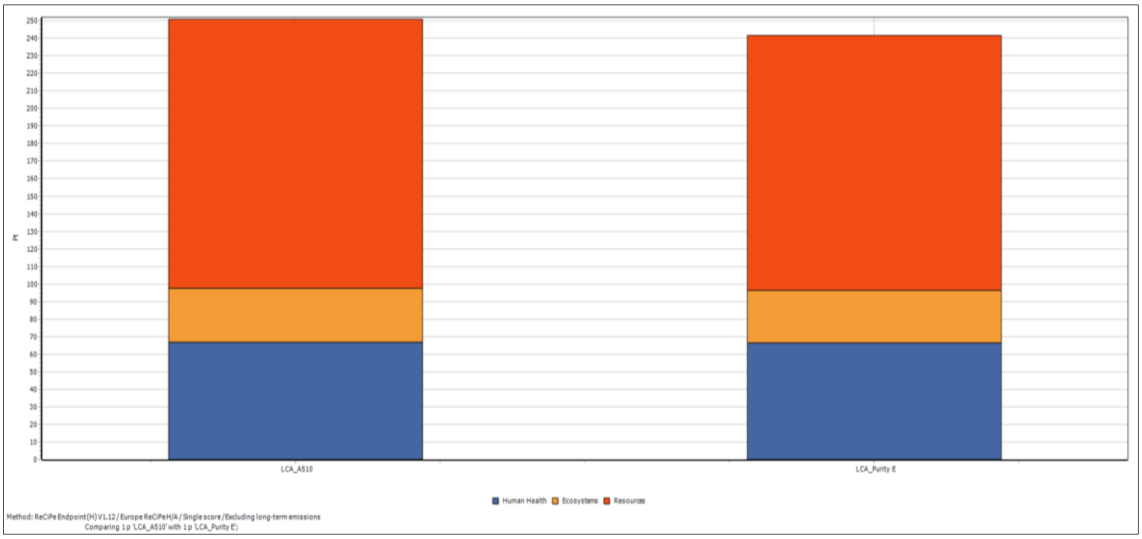


Figure 10: Single score comparison of Purity E and A510

The next two figures present a similar comparison, but in this case the results are presented per impact category.

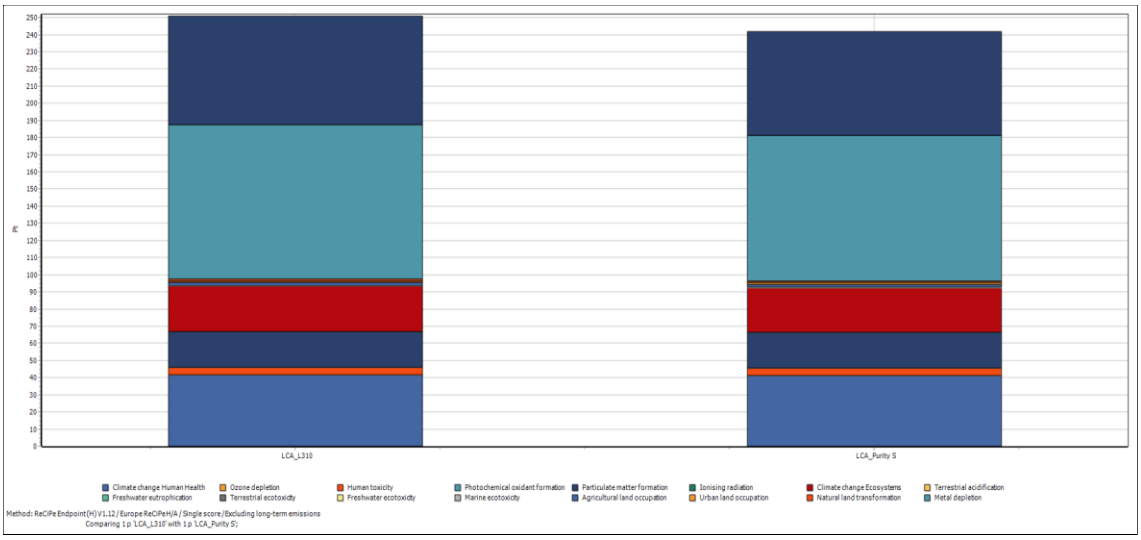


Figure 11: Single score per impact category comparison of Purity S and L310

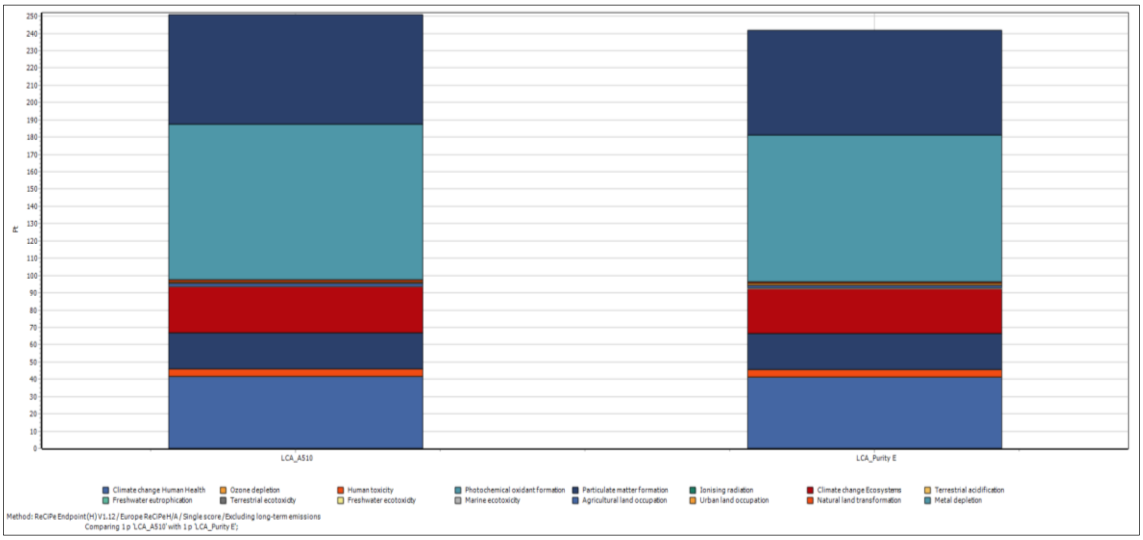


Figure 12: Single score per impact category comparison of Purity E and A510

The data presented above provides strong evidence that the newly designed products are more environmentally friendly, particularly in terms of reducing the impact on resources affected by raw materials. The figures clearly demonstrate a significant decrease in the use of these resources, underscoring the positive impact of the new designs on the environment.

The impact of Purity S and Purity E on each of their subassemblies is presented separately in the following figures, with each subassembly's impact represented by a single score.

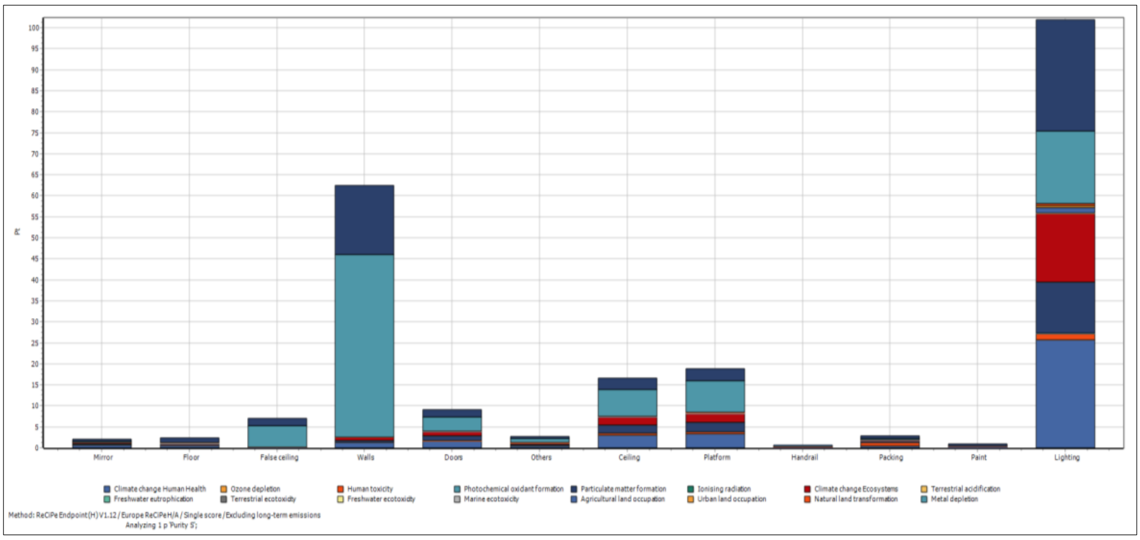


Figure 13: Single score per impact category of Purity S subassemblies

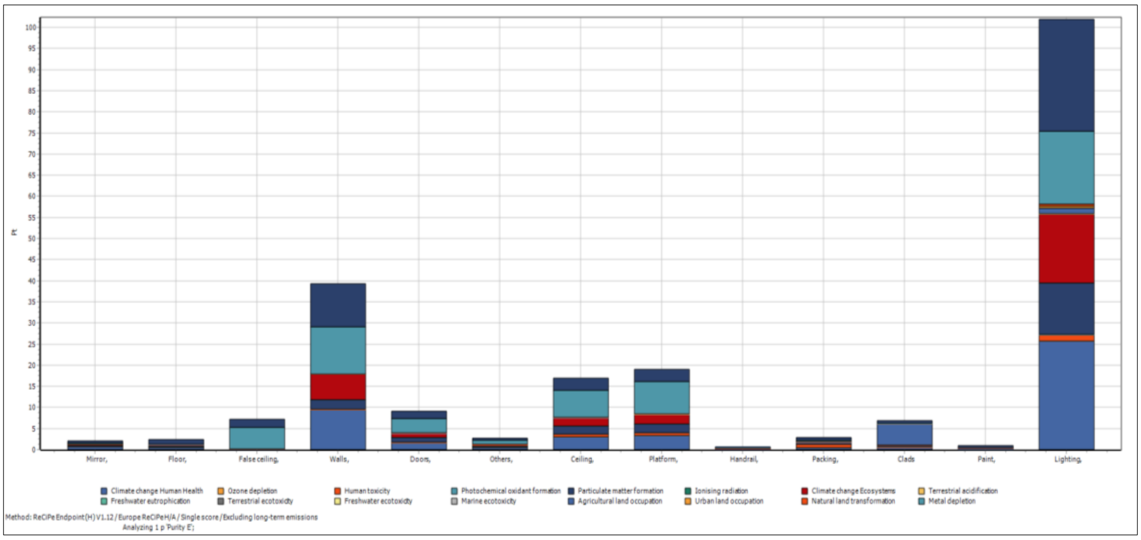


Figure 14: Single score per impact category of Purity E subassemblies

The burden of land for its use is expressed through the units of Potentially Disappeared Fraction (PDF) * m^2 * year/m^2. The raw materials, which are mined, are quantified as to the surplus of energy per kg of minerals. Finally, the fossil fuels in excess are quantified as energy per exported MJ, kg or m^3.

Three more methods were applied in order to compare different impact indicators. The following table presents these results.

Impact category	Unit	EPD		IPCC		CML - IA	
		Purity S	**L310**	**Purity S**	**L310**	**Purity S**	**L310**
Acidification	*kg SO_2 eq*	9.24	9.11			9.3	9.43
Eutrophication	*kg PO_4^{-3} eq*	1.43	1.45			1.43	1.45
Global warming (GWP100a)	*kg CO_2 eq*	1370	1350	1350	1370	1350	1370
Photochemical oxidation	*kg C_2H_4 eq*	0.49	0.486			0.486	0.49
Ozone layer depletion (ODP)	*kg CFC-11 eq*	0.000101	0.0000986			0.0000986	0.000101
Abiotic depletion	*kg Sb eq*	0.0303	0.0322			0.0303	0.0322
Abiotic depletion (fossil fuels)	*MJ*					23100	24300

Impact category	Unit	EPD		IPCC		CML - IA	
		Purity E	**A510**	**Purity E**	**A510**	**Purity E**	**A510**
Acidification	*kg SO_2 eq*	10.1	10.2			10.3	10.3
Eutrophication	*kg PO_4^{-3} eq*	1.5	1.52			1.5	1.52
Global warming (GWP100a)	*kg CO_2 eq*	1670	1670	1670	1670	1670	1670
Photochemical oxidation	*kg C_2H_4 eq*	0.615	0.621			0.621	0.615
Ozone layer depletion (ODP)	*kg CFC-11 eq*	0.000106	0.000104			0.000104	0.000106
Abiotic depletion	*kg Sb eq*	0.0233	0.0237			0.0237	0.0233
Abiotic depletion (fossil fuels)	*MJ*					20900	21000

BEAR IN MIND: If required a corresponding study with other methods in addition to the ReCiPe Endpoint, hierarchist version, can be carried out by the company for any proper use.

Our commitment to sustainable development involves continuously redesigning all of our products with eco-design principles, as well as conducting life cycle analysis and impact assessment. We strive to offer products and services that prioritize the well-being of both people and the environment, and we are dedicated to achieving this through ongoing improvement and innovation.

Appendix

Acidification potential: Phenomenon by which atmospheric rainfall has a pH which is lower than average. This may cause damage in forests and cultivated fields, as well as in water ecosystems and objects in general. This phenomenon is due to the emissions of SO_2, of NO_x, and NH_3, which are included in the Acidification Potential (AP) index expressed in masses of SO_2 produced.

Eutrophication potential: Enrichment of the watercourses by the addition of nitrates and phosphates. This causes imbalance in water ecosystems due to the overdevelopment encouraged by the excessive presence of nourishing substances, so is increased the growth of aquatic plants and can produce algal blooms that deoxygenate water and smother other aquatic life. In particular, the Eutrophication Potential (EP) includes phosphorous and nitrogen salts and it is expressed in grams of oxygen (kg O_2).

Global warming potential (GWP100): Phenomenon by which the IR irradiation emitted by the earth's surface are absorbed by the molecules in the atmosphere, as a result of solar warming, and then re-emitted in the form of heat, thus giving rise to a process of global warming of the atmosphere. The indicator used for this purpose is GWP (Global Warming Potential). This mainly includes the emissions of carbon dioxide, the main greenhouse gas, as well as other gases with a lower degree of absorption of infrared rays, such as ethane (CH_4), nitrogen protoxide (N_2O), chlorofluorocarbons (CFC), which are expressed according to the degree of absorption of CO_2 (kg CO_2).

Ozone depletion potential (ODP): Degradation and depletion of the ozone layer in the stratosphere, which has the property of blocking the UV components of sunlight thanks to its particularly reactive compounds, originated by chlorofluorocarbons (CFC) or by chlorofluoromethanes (CFM). The substance used as a point of reference for assessing the ODP (Ozone Depletion Potential) is trichlorofluoromethane, or CFC-11. ODPs are calculated as the change that would result from the emission of 1kg of a substance to that from emission of 1 kg of CFC-11 (a Freon).

Photochemical oxidation: The index used to translate the level of emissions of various gases into a common measurement to compare their contributions to the change of ground-level ozone concentration. POCPs are calculated as the change that would result from the emission of 1 kg of a gas to that from emission of 1 kg of ethylene.

Depletion of abiotic resources: Two impact categories: Abiotic depletion (elements, ultimate reserves) and abiotic depletion (fossil fuels). Abiotic depletion (elements, ultimate reserves) is related to extraction of minerals due to inputs in the system. The Abiotic Depletion Factor (ADF) is determined for each extraction of minerals (kg antimony equivalents/kg extraction) based on concentration reserves and rate of deaccumulation. Abiotic depletion of fossil fuels is related to the Lower Heating Value (LHV) expressed in MJ per kg of m^3 fossil fuel. The reason for taking the LHV is that fossil fuels are considered to be fully substitutable.

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