READY TO BOARD WITH THE SUSTAINABILITY PASSPORT

This passport provides insight into the CO_2 impact and material usage of the CTOUCH RIVA touchscreen.

In co-operation with Dispersed

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PREFACE

As a designer and manufacturer of touchscreen solutions for education and corporate businesses, we often receive questions about sustainability in relation to our products. Most of those questions are related to the recycling of product packaging and the usage of raw materials. Although these topics are important in the industry's mission to limit excessive usage of (scarce) resources, we believe sustainability is much more than recycling. The environmental footprint and circularity of the electronics that make our lives so much better should become a key topic on the agenda of the industry.

CTOUCH has conducted a Life Cycle Assessment (LCA) in order to calculate the CO_2 impact of the manufacturing, transport, use and end-of-life stages of the CTOUCH Riva touchscreen. This research provides many insights regarding the sustainability of our products and has led to the creation of new innovative projects that benefit the environment, our partners and end-users.

This passport gives a transparent insight into CO_2 impact and material usage, which enables us to create awareness about the CO_2 impact of touchscreens. It also triggers dialogs with CTOUCH partners about re-usage of these electronics, creating environmental and customer benefits.

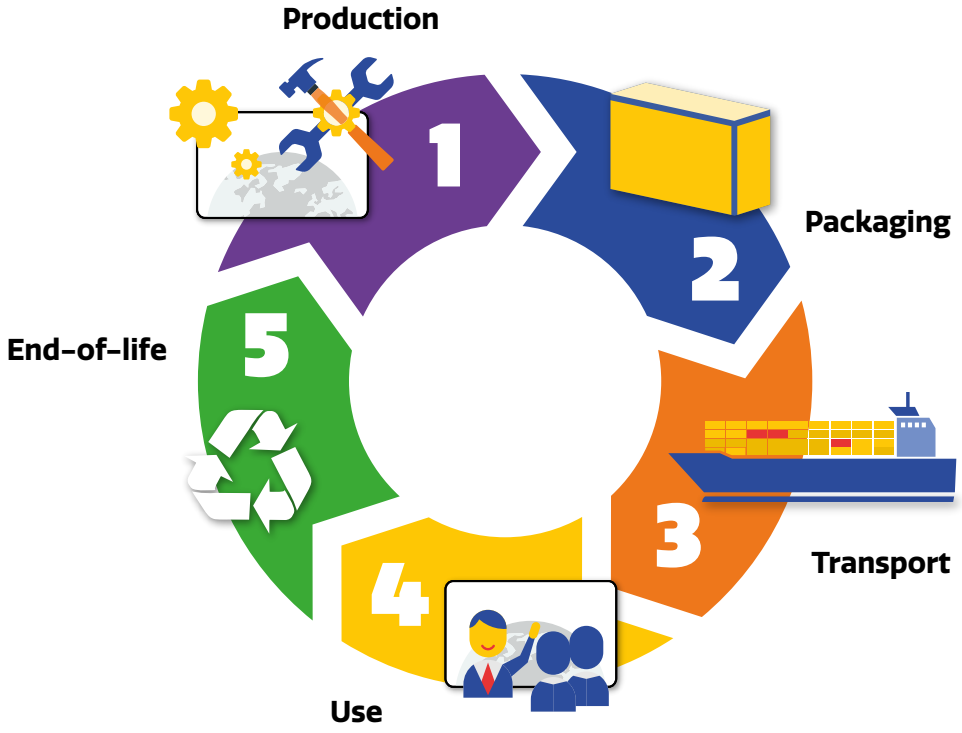
CONTENT

INTRODUCTION

This sustainability passport gives a transparent overview of the CO_2 impact of the four-life cycle stages and explores in detail the material composition and CO_2 impact related to the manufacturing of the CTOUCH Riva. In this way, CTOUCH is transparent regarding the impacts of its products, which enables us to create awareness about the CO_2 impact of touchscreens. It also triggers dialogs with CTOUCH partners about re-usage of these electronics, creating environmental and commercial benefits.

The results presented in this product passport have been calculated by means of a Life Cycle Assessment (LCA) which has been performed according in accordance with ISO 14040 and 14044 guidelines. LCA is the most widely used scientific method to map the ecological impacts of products. The ecological impact of products can consist of many indicators, but this passport focusses specifically on CO_2-emissions, in accordance with CTOUCH's sustainability strategy.

At CTOUCH, we strive to reach 60% CO_2 reduction. The Key Performance Indicator (KPI) we use to track our CO_2 reduction is "CO_2 impact per product per year". By using this KPI, we can ensure that we encompass the positive effects that lifetime extension has on the CO_2 impact of our products into the equation. Using this KPI also ensures that CO_2 emissions do not increase when sales of products increase. This means that we would not be able to meet



our target if our sales increase, which we consider unreasonable. With this KPI, we can focus purely on the CO_2 impact of our displays and the reductions, without being affected by sales. For these reasons, we choose to work with the KPI "CO_2 impact per product per year". This KPI will appear several times in this sustainability report.

LIFE CYCLE ASSESSMENT METHODOLOGY

The CO_2 footprint has been calculated using the Life Cycle Assessment (LCA) methodology in accordance with ISO 14040 and 14044. The LCA identifies key materials, processes and activities that cause environmental impacts within the life cycle of products. In accordance with the ISO 14040 and 14044 standards, the LCA consists of four phases.

Goal and Scope Definition

Here, it is explicitly defined what is included and excluded from the analysis. Since the environmental impact KPIs of CTOUCH are based around the reduction of CO2 emissions, the LCA in this study is primarily focused on the assessment of life-cycle CO2 emissions. This sustainability passport considers the manufacturing, transport, usage, and end-of-life treatment of a single CTOUCH Riva. We as CTOUCH promise that at least 50% of our Riva products should still be in use after 10 years and positively rated by our customers.

Inventory Analysis

The inventory analysis consists of collecting material and process (inventory) data associated with all life cycle activities within the scope. With regards to the manufacturing of the CTOUCH Riva, detailed data regarding the material composition was collected from the manufacturer. Subsequently, this data was modelled in the OpenLCA software, using this inventory data. Data inputs were taken from the renowned EcoInvent database (version 3.7.1).

The impacts resulting from the transportation phase, use phase and end-of-life phase are modelled separately in Microsoft Excel. The impact models are based on EcoInvent data and supplemented with literature from academic and industry papers.

LIFE CYCLE ASSESSMENT METHODOLOGY

Impact Assessment

During the impact assessment, inventory data is translated into quantitative environmental impacts. In this process, input quantities of materials or processes are multiplied with emissions factors which relate to the impact of that material or process. The result is a figure that explains the total environmental impact of a material or process.

Interpretation

In this stage, a critical reflection on results is provided and the results are translated into actionable conclusions. First, an assessment of CO2 outputs was conducted. Subsequently, these results are analysed and put into context. A detailed overview of impacts, life cycle hot-spots, and key materials and processes is provided. Moreover, the results are validated by analysing the most relevant academic literature and industry reports. Finally, recommendations for future improvements of environmental impacts are provided.

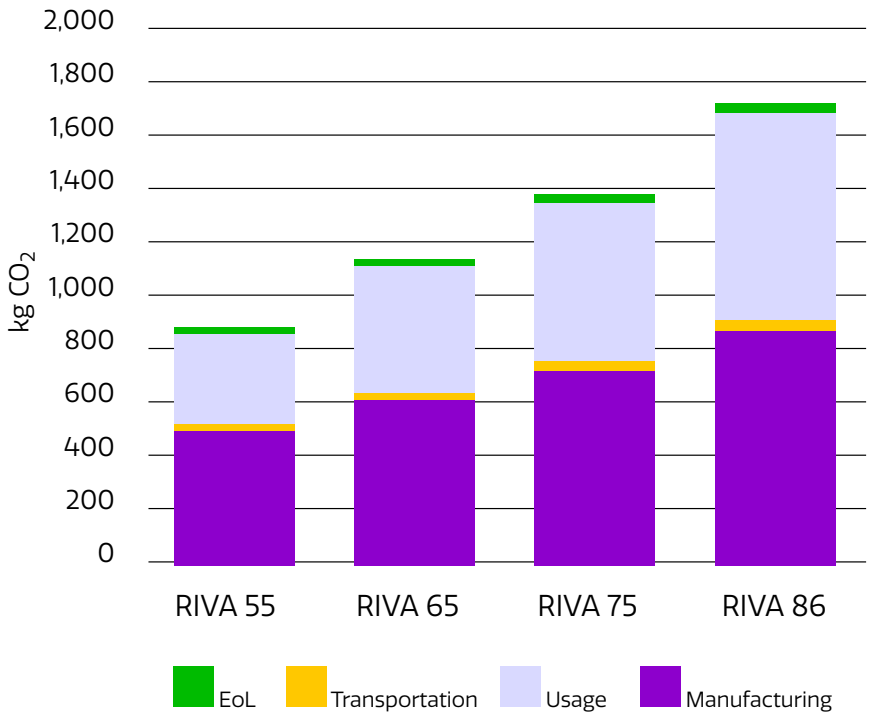
Life cycle stages

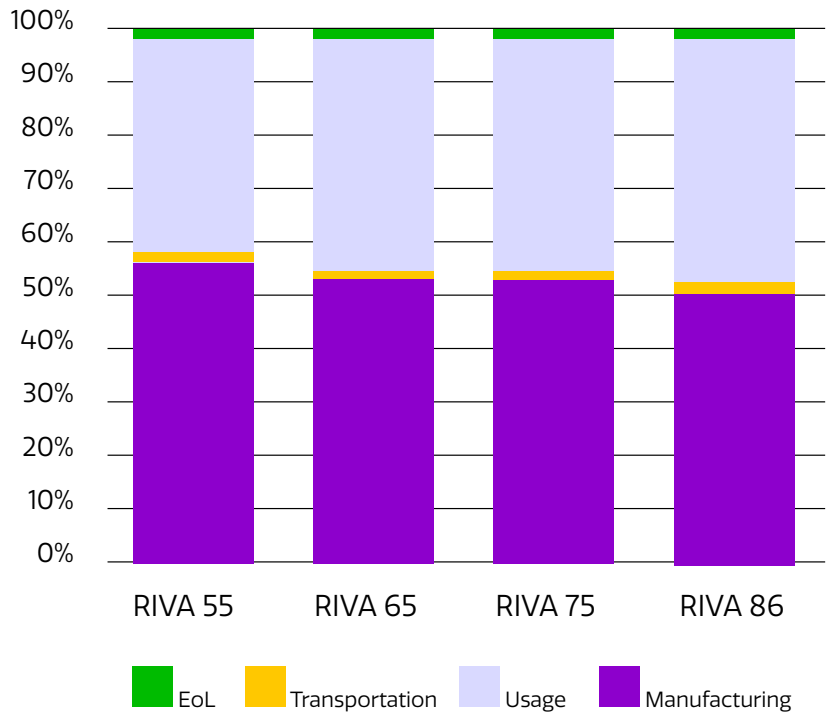
In this material passport, four life cycle stages are considered: production, transport, usage, and end-of-life. Environmental impact, expressed in terms of CO2 emissions, occurs in all these stages. Impact in the production stage stems from all processes that are related to the production of our displays, such as the mining of materials, the making of components for our displays and the use of energy during product assembly. Environmental impact in the production phase naturally stems from the transport movements of our displays, from our manufacturer in China all the way to our customers in Europe. Environmental impact of product usage is calculated based on the average energy use of our displays, and their average lifetime. Lastly, the impacts of the End-of-Life phase are caused by the different treatment options that our products can receive at their End-of-Life, such as recycling.

Total CO_2 footprint

It can be observed that there is a clear trend in our product footprints, as with increasing product size, the CO2 emissions increase. Furthermore, it can be noted that the manufacturing phase is the largest contributor to the total CO2 emissions caused during the products' lifetimes. The usage phase of the displays has the 2nd largest CO_2 impact. The transport and end-of-life (EoL)-phases have a relatively low impact compared to the other two life cycle stages.

This material passport presents the results of all four life cycle stages, the material composition of the products as well as the CO_2 impact of production will be presented last because this is the most elaborate.

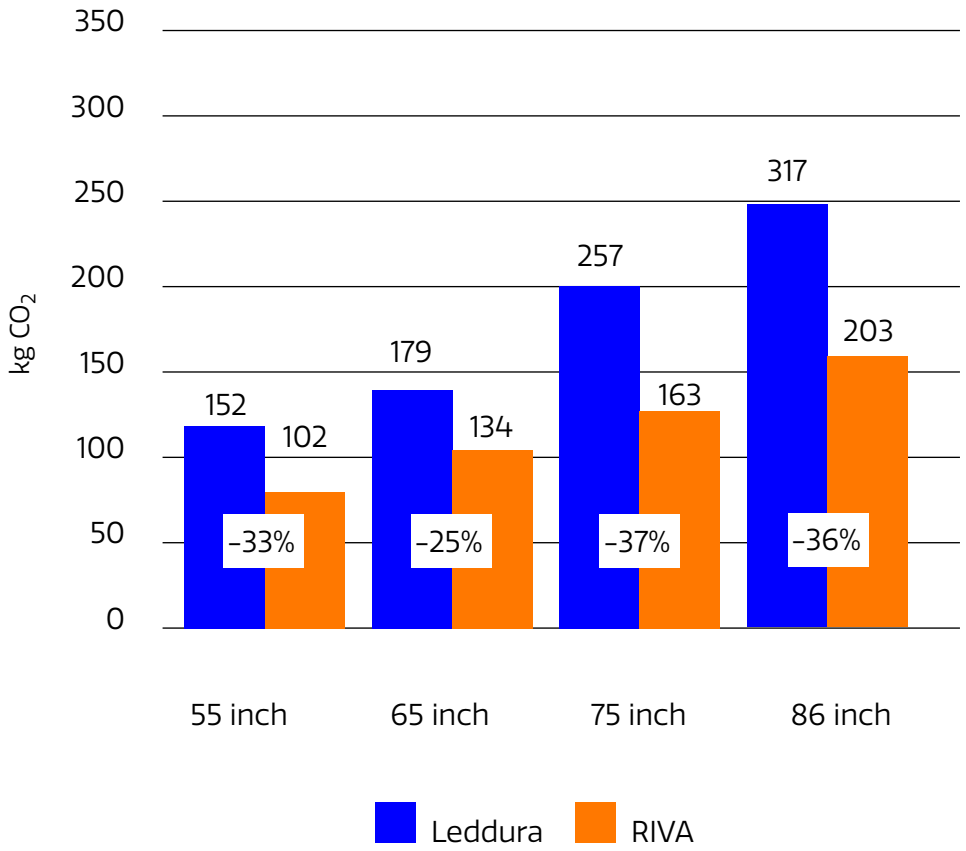




RESULTS

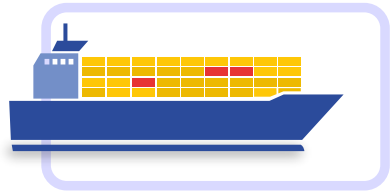
CO_2 footprint per year

We as CTOUCH promise that at least 50% of our screens is still functioning and positively rated by customers after 10 years. This means that 50% of our products will reach at least a lifetime of 10 years, and 50% will reach at least a lifetime of 7 years. Thus, the average lifetime of our Riva products is 8.5 years. As such, if we divide the total CO_2 footprint shown on the previous page by the expected lifetime of 8.5 years, we get the CO_2 footprint per year, shown in the figure on the right. This yearly CO_2 impact is between 25% and 37% lower compared to the yearly CO_2 impact of the CTOUCH laser, its predecessor.



RESULTS

Transport



The transport of the CTOUCH Riva, from the factory to the final customer, accounts for approximately 2% of the total CO_2 footprint. The transport has been broken down into several stages. First, the product travels from the factory to a port. From this port it is (usually) shipped to the Netherlands. Subsequently, it is transported to our warehouse by truck, from which it is distributed to customers by truck or van. For the different phases of transport, different emissions factors have been used to accurately represent the emissions of different modes of transport. Subsequently, the emissions that occur in all different transport phases are summed to retrieve to total transport emissions.

Usage

With regards to product usage, measurements have been performed on the energy consumption of the CTOUCH Riva. Subsequently, the average daily energy consumption was determined and translated into CO_2 impact data. Furthermore, a lifetime of 10 years is the CTOUCH promise for the Riva.

The analysis of the energy consumption over this period shows that the emissions in the use phase are roughly dependent on three factors: the product specifications of the touchscreen, the user-profile (the way in which the screen is used), and the emissions intensity (emissions factor) of the electricity grid. The CTOUCH Riva includes human presence detection with automatic power down, as well as an eco-mode. This ensures that our products' energy use is lower than ever! However, due to the products lifetime, the use phase is still responsible for a large portion of emissions, simply because it consumes electricity for an extensive amount of time. CTOUCH is continuously developing new innovations to reduce energy consumption and spread awareness amongst our products' users.

RESULTS

End-of-Life

The CO_2 impact of this life cycle phase was estimated based on findings from academic literature (Amato et al., 2017; Baxter et al., 2016). The end-of-life phase accounts for roughly 2% of total life-cycle emissions of the CTOUCH Riva. The values used in this study represent a worst-case scenario, as the study has assumed that not a single touchscreen receives a circular end-of-life treatment. Gaining more insight in the real end-of-life treatment is crucial to estimate end-of-life scenarios more accurately. Therefore, we are collaborating with Renewi, WEEE and MVO NL to expand our knowledge and control over the end-of-life phase, so that we can take more responsibility and ensure that our products are properly handled at their end of life!

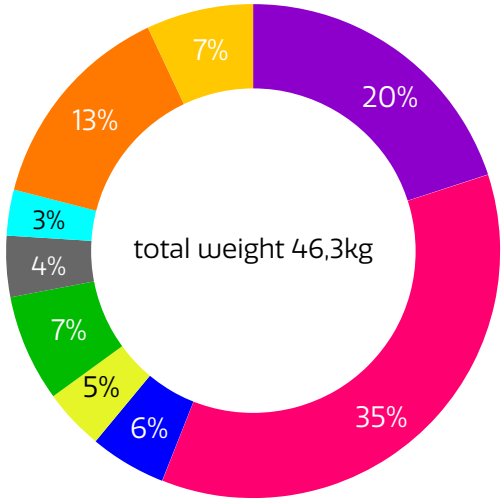
Manufacturing

Since the largest amount of CO_2 emissions of the CTOUCH Riva is caused during the manufacturing phase, these emissions will be explored in more detail on the next pages.

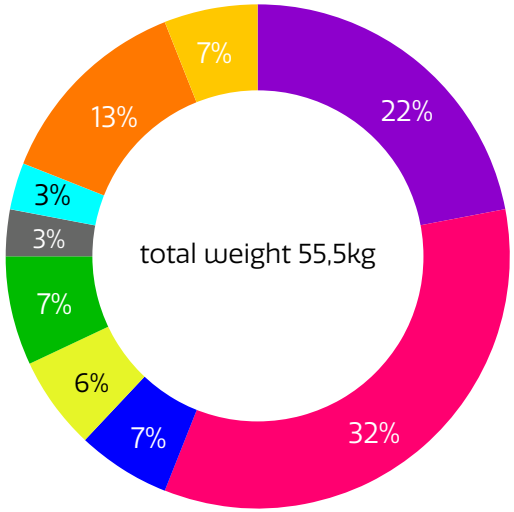
RESULTS

Material composition

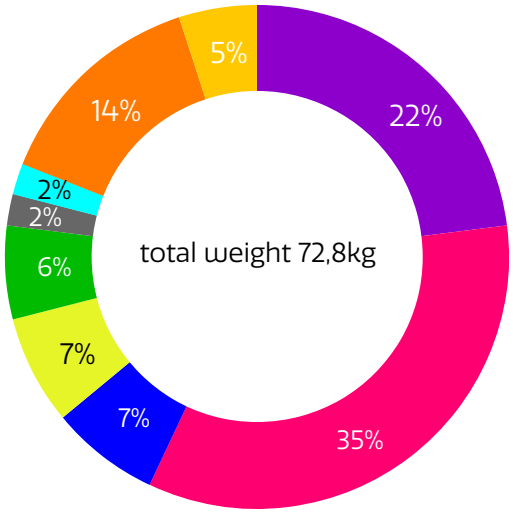
RIVA 55 inch



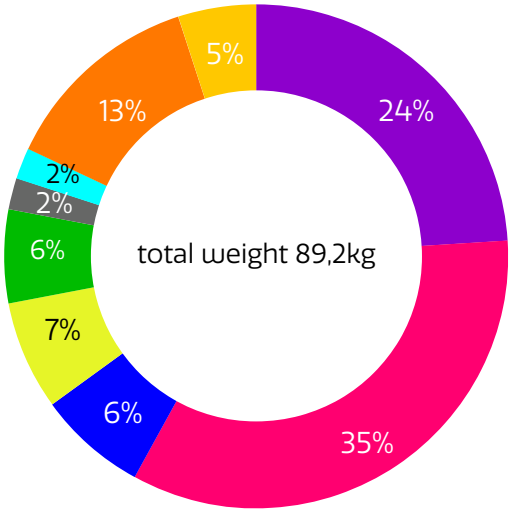
RIVA 65 inch



RIVA 75 inch



RIVA 86 inch



Anti-glare glass
Steel (back cover + back cabinet + hardware + screws)
LCD cell
Module Film
Alumnium
Cables
Boards
Packaging
Other components (< 1kg each)

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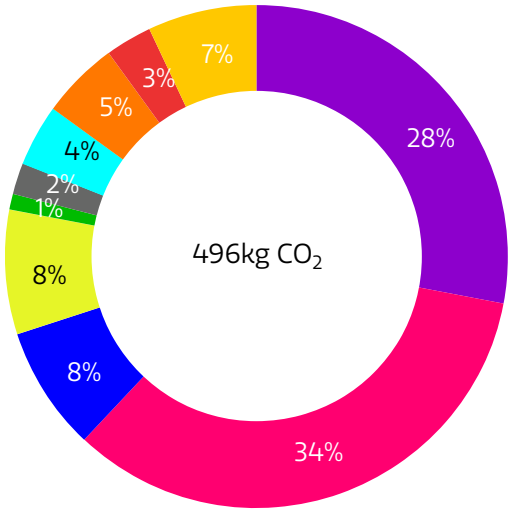
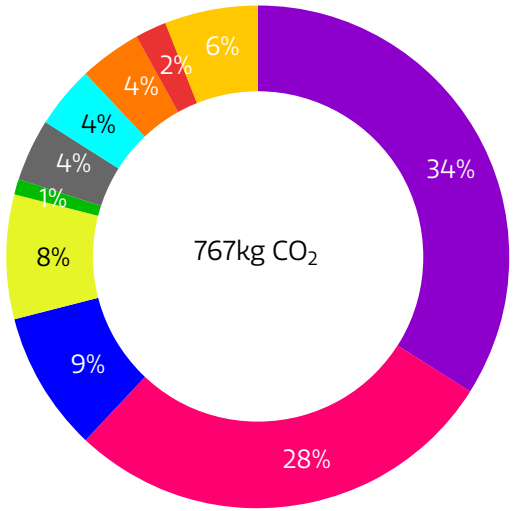
RESULTS

CO_2 Footprint during production

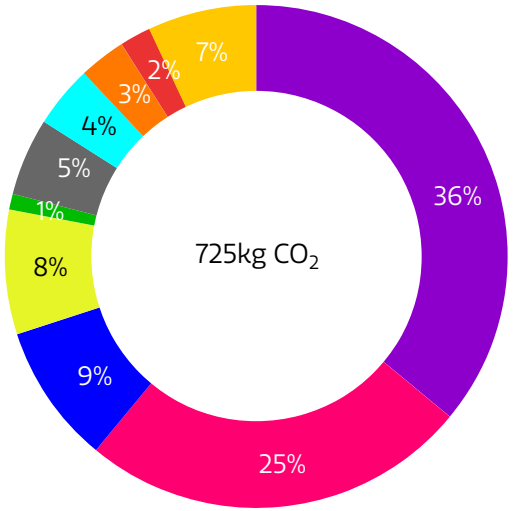
RIVA 55 inch



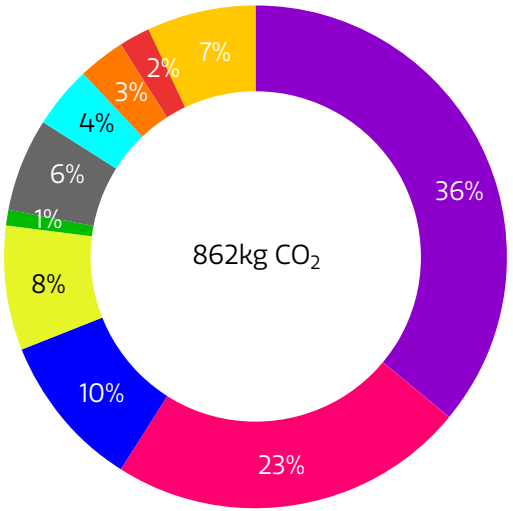
RIVA 65 inch



RIVA 75 inch



RIVA 86 inch



LCD cell | Boards | Anti-glare glass pane | Aluminium front frame | Touch corner | Steel back cover | Cardboard box | Speakers | Steel back cabinet | Other components (< 1kg each)

CONCLUSIONS

The LCA demonstrated that life-cycle emissions of the CTOUCH Riva strongly depends on the size of the touchscreen. Larger screens require more materials, process energy, and operational energy compared to smaller touchscreens of the same type. The LCA also demonstrated an overwhelming contribution of the production phase and use phase to total life-cycle emissions. Together, production and product use account for a total of 96% of all life-cycle emissions. Transportation and end-of-life each account for only 2% of life-cycle emissions. Reducing CO_2 emissions in the production and use phases is thus the most sensible and promising strategy for reducing total life-cycle emissions.

With respect to the production phase, we have developed sustainability requirements for our strategic suppliers and are collaborating to investigate the use of alternative materials and to increase the use of recycled materials, specifically steel and aluminium. We are also conducting more detailed research into the impacts of the LCD module and PWBs.

Furthermore, the LCA has shown that energy use plays a crucial role in the emissions of upstream processes. Collaborating with manufacturers and supply-chain partners that use 100% renewable energy is thus a very effective way of reducing upstream emissions. Therefore, we are collaborating with our suppliers to determine if renewable energy can be used in the production of components.

Additionally, we promise that at least 50% of our screens is still functioning and positively rated by customers after 10 years, an increase over the traditional functional lifetime of 7 years. This reduces the replacement rate of touchscreens, which reduces the consumption of raw materials and processing energy to produce new screens. It also reduces CO_2 emissions of the production phase because the impacts are spread over a longer period of time. To be able to reach the 10-year functional lifetime, we are designing products that are easier to repair and upgrade, with our BRIX concept. With our CTOUCH Heartbeat As A Service programme we offer an expansive set of services, all aimed to prolong the lifetime of our touchscreens and make usage safe and enjoyable. By ensuring proper maintenance, we can guarantee the quality standards required for lifetime extension.

CONCLUSIONS

Additionally, we are looking into expanded product recycling and re-use, as this reduces the demand for virgin materials. We are collaborating with WEEE and Renewi to investigate the end-of-life scenarios of our products, and to work towards a higher rate of recycling and to create a second life for our products. We are also working on several different innovative packaging concepts, which improve the reuse of our packaging and decreases the environmental impact of packaging materials and product transport even more.

With respect to the use-phase, energy consumption data suggests that the IFPDs are largely used in their default energy mode. We are creating more incentives for using energy-saving features, by introducing elements of gamification or direct feedback. Moreover, additional energy saving features have already been introduced in our products. Including a human presence detection feature, which includes a timer that automatically turns off the IFPDs when it is not being used, as well as an eco-modus, which reduces display brightness and thereby significantly reduces the power consumption of the displays.

Hi, we are CTOUCH

At CTOUCH we strive for interactive education with a fun twist. Vibrant education that shapes the 21st century skills of students. No boring lessons, but fun and interactive learning experiences. A piece of cake with our touchscreens. We know how important 21st century skills are.

Creative thinking, collaboration and solid ICT skills; which 21st century child can be successful without mastering these and the 8 other skills? That's why we tailor our touchscreen innovation to these crucial skills. Our ambition: to co-form the leaders of the future. We are certainly ready for this challenge!

Or feel free to contact us via
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www.ctouch.eu

Contact

Literature sources

Amato, A., Rocchetti, L., & Beolchini, F. (2017). Environmental impact assessment of different end-of-life LCD management strategies. Waste Management, 59, 432–441.

Baxter, J., Lyng, K. A., Askham, C., & Hanssen, O. J. (2016). High-quality collection and disposal of WEEE: Environmental impacts and resultant issues. Waste Management, 57, 17–26.

Life Cycle Assessment report executed by Dispersed

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