Dimensions of carbon footprint reduction in the lifecycle of a thermomixer

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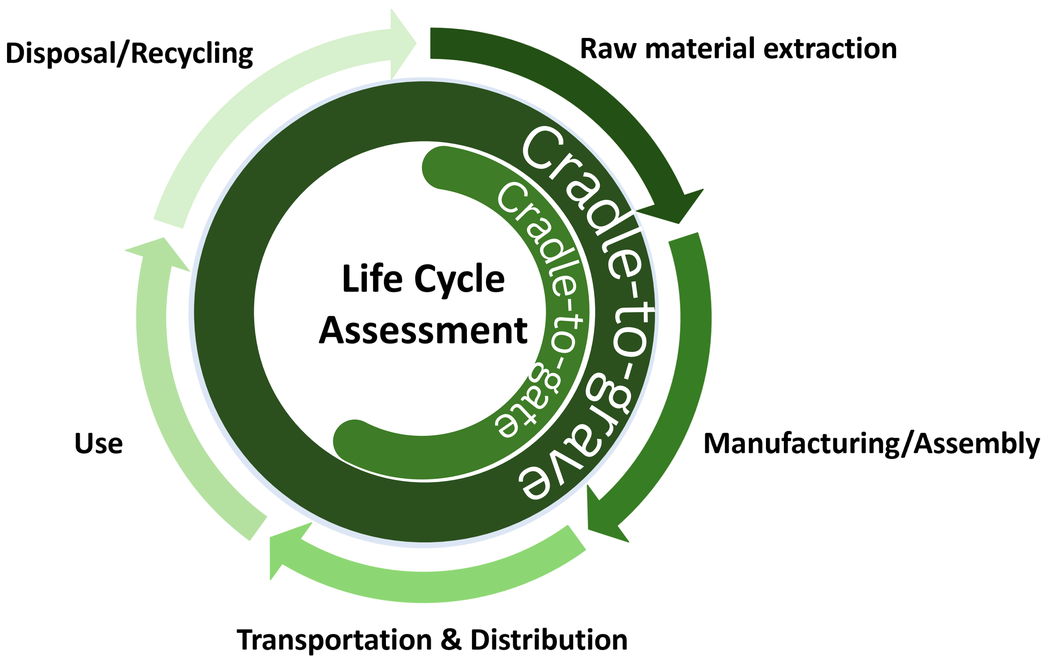
Introduction



Research questions:

1. Which are the most significant contributors to carbon emissions?
2. What measures can be taken to reduce the carbon footprint?

Status quo
Eppendorf has historically focused on the energy consumption during a thermomixer's operation to measure and reduce carbon emissions. This is representative of the "Use" phase, which constitutes just one of the five life cycle stages of the device.

Need
Since the other four life cycle stages also contribute significantly to the carbon footprint of the thermomixer, it is necessary to measure the carbon emissions resulting from these stages and identify the biggest contributors. Subsequently, Eppendorf can work to reduce carbon emissions along the entire life cycle of a thermomixer.

Methodology

The methodology follows the Product Life Cycle Accounting and Reporting Standard of the GHG Protocol. The GHG protocol is a global standard for measuring and managing greenhouse gas emissions. Established in 1990, the GHG Protocol is used by businesses, governments, and other institutions to account and report GHG emissions. It has 4 overarching stages:

1. Goal and Scope Definition:
   - Cradle-to-gate analysis of the HC plate of the Thermomixer C model
   - Raw material (cradle) to distribution centre (gate)
2. Inventory Analysis:
   - Accounting for inputs and outputs across all processes
3. Impact Assessment:
   - Calculating carbon emissions (kg CO2-equivalent) from the analyzed life cycle stages.
   - Tools: openLCA (open source LCA software) with ecoinvent database (provides comprehensive data sets for inventory and impact assessment)
4. Interpretation:
   - Identifying processes and related inputs/outputs with the highest carbon emissions.

Project management tools used:

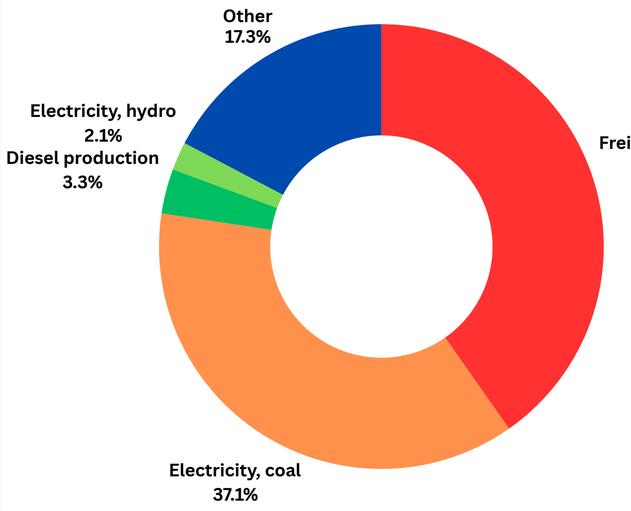
- Jira - Project tracking
- Confluence - Documentation
- MS Teams - Meetings
- Conceptboard - Visualizing ideas

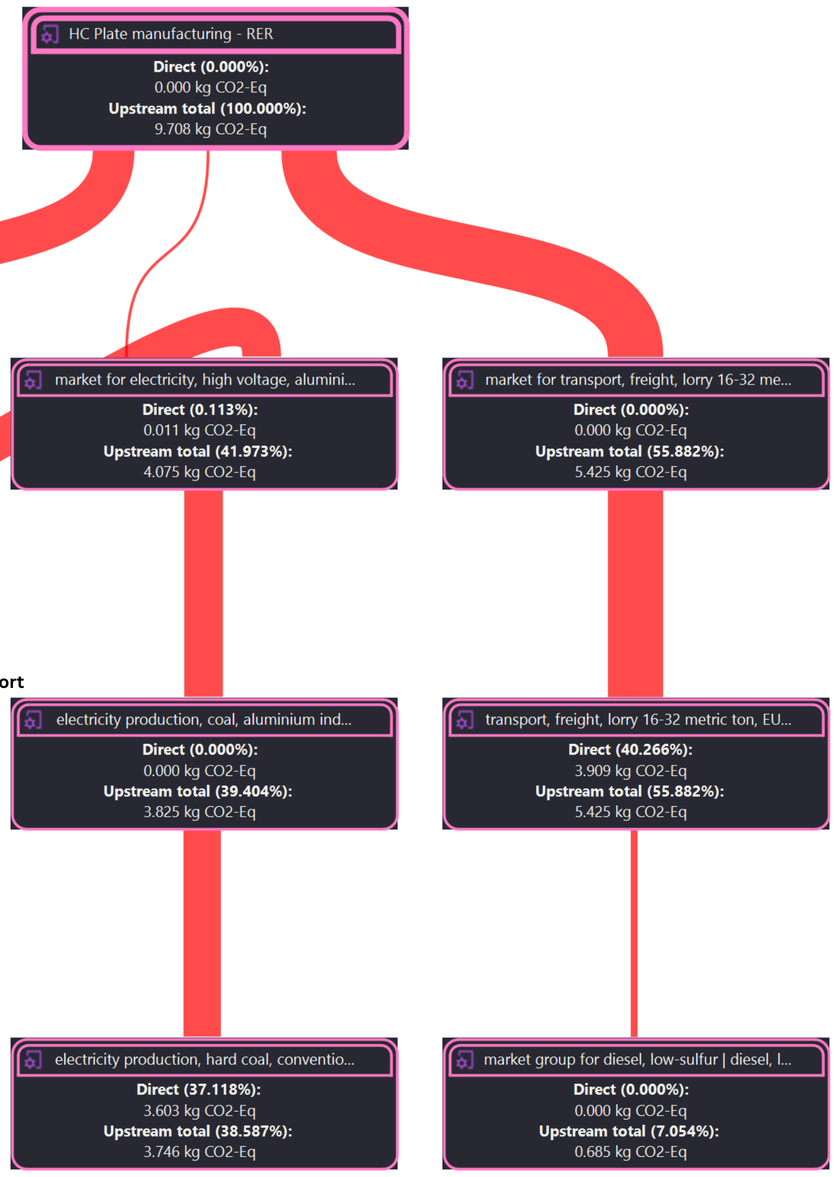
Future Scope

- A cradle-to-grave analysis of the entire thermomixer, particularly parts made of different materials and manufactured by suppliers outside Europe. The "Disposal/Recycle" stage has not yet been studied, and would be enlightening.
- Many assumptions were made to account for unavailable data. Further research could be made into finding actual facts and figures for all involved processes.

Results & Discussion

HC plate characteristics:
Material - Aluminium
Weight - 111.86g





Impact assessment method: IPCC 2021, GWP 100

Lifecycle stage	CO2-eq emitted (kg)
Aluminium production	4.051
Manufacturing/Assembly	0.232
Transportation & Distribution	5.425
Total	9.708

- Switching to greener sources of fuel for transport (battery electricity, natural gas, hydrogen, etc.) has a significant impact on reducing carbon emissions. These sources do not just reduce direct emissions from trucks, but also have a smaller footprint in their production, thereby further reducing carbon emissions.
- Furthermore, supplier qualifications can be made more stringent so as to allow for more accountability by adherence to certain criteria and standards.

References

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