***Design V- Cost and Sustainability Report***

**Bill of Materials**

The following pages contain the bought parts and made parts (with detailed processes) that go into making the High Voltage battery and Battery Management System

Some notes for Mass manufacture

* While it may be viable to assemble the Printed circuit boards by hand for the prototypes, it becomes cost prohibitive and excessively time consuming in the case of mass manufacture hence it would be better to outsource this process to a contract manufacturer.
* It would be better to used bent sheet metal for the battery box as opposed to riveted parts when it comes to mass manufacturing.

**Sustainability Report**

Sustainability report was carried out on the battery box and the assembled battery sections which will go into the box (the bricks). The box was set to be manufactured and used in Europe while the battery section was set to be manufactured in Asia and used in Europe. The results are shown below:

|  |  |  |  |
| --- | --- | --- | --- |
| Map | |  |  | | --- | --- | | Description: Description: suse | Manufacturing Region  The choice of manufacturing region determines the energy sources and technologies used in the modeled material creation and manufacturing steps of the product’s life cycle. | |
| |  |  | | --- | --- | | Description: Description: seol | Use Region  The use region is used to determine the energy sources consumed during the product’s use phase (if applicable) and the destination for the product at its end-of-life. Together with the manufacturing region, the use region is also used to estimate the environmental impacts associated with transporting the product from its manufacturing location to its use location. | |

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| --- | --- |
| **Environmental Impact (calculated using TRACI impact assessment methodology)** | |
| |  |  | | --- | --- | | **Carbon Footprint** | | | circleCarbon | |  |  |  | | --- | --- | --- | | Description: Description: smaterial | Material: | 990 kg CO2e | | Description: Description: smanufacturing | Manufacturing: | 45 kg CO2e | | Description: Description: suse | Use: | 0.00 kg CO2e | | Description: Description: Purple | Transportation: | 23 kg CO2e | | Description: Description: seol | End of Life: | 130 kg CO2e | | | 1200 kg CO2e |  | | |  |  | | --- | --- | | **Total Energy Consumed** | | | circleEnergy | |  |  |  | | --- | --- | --- | | Description: Description: smaterial | Material: | 1.2E+4 MJ | | Description: Description: smanufacturing | Manufacturing: | 750 MJ | | Description: Description: suse | Use: | 0.00 MJ | | Description: Description: Purple | Transportation: | 350 MJ | | Description: Description: seol | End of Life: | 95 MJ | | | 1.3E+4 MJ |  | |
| |  |  | | --- | --- | | **Air Acidification** | | | circleWater | |  |  |  | | --- | --- | --- | | Description: Description: smaterial | Material: | 320 mol H⁺ e | | Description: Description: smanufacturing | Manufacturing: | 15 mol H⁺ e | | Description: Description: suse | Use: | 0.00 mol H⁺ e | | Description: Description: Purple | Transportation: | 9.4 mol H⁺ e | | Description: Description: seol | End of Life: | 5.1 mol H⁺ e | | | 350 mol H⁺ e |  | | |  |  | | --- | --- | | **Water Eutrophication** | | | circleAir | |  |  |  | | --- | --- | --- | | Description: Description: smaterial | Material: | 0.086 kg N e | | Description: Description: smanufacturing | Manufacturing: | 5.4E-3 kg N e | | Description: Description: suse | Use: | 0.00 kg N e | | Description: Description: Purple | Transportation: | 9.0E-3 kg N e | | Description: Description: seol | End of Life: | 0.033 kg N e | | | 0.133 kg N e |  | |
| |  |  |  | | --- | --- | --- | | **Material Financial Impact** | 176.10 USD |  | | |
| |  | | --- | | Comments | | |

**Component Environmental Impact**

Top Ten Components Contributing Most to the Four Areas of Environmental Impact

| Component | Carbon | | | | | | | | | | Water | | | | | | | | | | Air | | | | | | | | | Energy | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| box\_TopCover | 37 |  | | | | | | | |  | 3.3E-3 |  | | | | | | | |  | 11 |  | | | | | | |  | 460 | |  | | | | | | | |  |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| box\_base | 33 |  | | | | | | |  | | 2.9E-3 |  | | | | | | |  | | 10 |  | | | | | |  | | 400 | |  | | | | | | |  | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| box\_back | 20 |  | | | | | |  | | | 1.8E-3 |  | | | | | |  | | | 6.3 |  | | | | |  | | | 250 | |  | | | | | |  | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| box\_side | 20 |  | | | | |  | | | | 1.8E-3 |  | | | | |  | | | | 6.2 |  | | | | |  | | | | 250 | |  | | | | |  | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| box\_sidemirrored | 20 |  | | | |  | | | | | 1.7E-3 |  | | | |  | | | | | 6.1 |  | | | |  | | | | 240 | |  | | | | |  | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| box\_frontdivider | 17 |  | | |  | | | | | | 1.5E-3 |  | | |  | | | | | | 5.4 |  | | |  | | | | | 220 | |  | | | |  | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| box\_inner | 12 |  | |  | | | | | | | 1.1E-3 |  | |  | | | | | | | 3.9 |  | |  | | | | | | 150 | |  | | |  | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| box\_front | 5.7 |  |  | | | | | | | | 5.0E-4 |  |  | | | | | | | | 1.8 |  |  | | | | | | | 71 | |  | |  | | | | | | |