**Sustainability Report**

A Sustainability report was carried out on the battery box and the assembled battery sections which will go into the box (the bricks). This was done using the Solidworks Sustainability function. 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. | |

**Sustainability report for battery box**

|  |  |
| --- | --- |
| **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 | |  | |  | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sustainability Report for Section Assembly** | | | | | | | | |
|  |  | |  | | |  | |  |
| Model Name: | | SectionAssembly |  |  | | Weight: | 21597.07 g |  |
|  |  | | Built to last: | 5.0 year |  |
|  |  | | Duration of use: | 5.0 year |  |
|  |  | |  |  |  |
|  | | | | | | | | |
| |  |  | | --- | --- | | **Carbon Footprint** | | | circleCarbon | |  |  |  | | --- | --- | --- | | Description: Description: smaterial | Material: | 280 kg CO2e | | Description: Description: smanufacturing | Manufacturing: | 91 kg CO2e | | Description: Description: suse | Use: | 0.00 kg CO2e | | Description: Description: Purple | Transportation: | 6.2 kg CO2e | | Description: Description: seol | End of Life: | 12 kg CO2e | | | 390 kg CO2e |  | | | | | | |  |  | | --- | --- | | **Total Energy Consumed** | | | circleEnergy | |  |  |  | | --- | --- | --- | | Description: Description: smaterial | Material: | 3700 MJ | | Description: Description: smanufacturing | Manufacturing: | 910 MJ | | Description: Description: suse | Use: | 0.00 MJ | | Description: Description: Purple | Transportation: | 82 MJ | | Description: Description: seol | End of Life: | 8.7 MJ | | | 4700 MJ |  | | | | |
| |  |  | | --- | --- | | **Air Acidification** | | | circleWater | |  |  |  | | --- | --- | --- | | Description: Description: smaterial | Material: | 57 mol H⁺ e | | Description: Description: smanufacturing | Manufacturing: | 61 mol H⁺ e | | Description: Description: suse | Use: | 0.00 mol H⁺ e | | Description: Description: Purple | Transportation: | 8.5 mol H⁺ e | | Description: Description: seol | End of Life: | 0.408 mol H⁺ e | | | 130 mol H⁺ e |  | | | | | | |  |  | | --- | --- | | **Water Eutrophication** | | | circleAir | |  |  |  | | --- | --- | --- | | Description: Description: smaterial | Material: | 0.359 kg N e | | Description: Description: smanufacturing | Manufacturing: | 0.023 kg N e | | Description: Description: suse | Use: | 0.00 kg N e | | Description: Description: Purple | Transportation: | 5.2E-3 kg N e | | Description: Description: seol | End of Life: | 3.7E-3 kg N e | | | 0.391 kg N e |  | | | | |
| |  |  |  | | --- | --- | --- | | **Material Financial Impact** | 102.70 USD |  | | | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Sustainability Report** | | | | | | | |
|  |  | |  | |  | |  |
| Model Name: | | SectionAssembly |  |  | Weight: | 21597.07 g |  |
|  |  | Built to last: | 5.0 year |  |
|  |  | Duration of use: | 5.0 year |  |
|  |  |  |  |  |

**Component Environmental Impact**

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

| Component | Carbon | | | | | | Water | | | | | | | Air | | | | | | Energy | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DummyPCBForSection | 1.3 |  | | | |  | 3.2E-4 |  | | | |  | | 0.598 |  | | | |  | 18 |  | | | | |  |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HB2 | 0.520 |  | | |  | | 5.0E-4 |  | | | | |  | 0.164 |  | |  | | | 6.0 |  | | | |  | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DummyPCB | 0.444 |  | |  | | | 1.1E-4 |  | | |  | | | 0.199 |  | | |  | | 6.0 |  | | | |  | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CopperConductor | 0.034 |  |  | | | | 9.3E-6 |  |  | | | | | 0.014 |  |  | | | | 0.439 |  | | |  | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | |
| pan slot head\_am | 7.5E-3 |  | | | | | 3.7E-5 |  | |  | | | | 1.4E-3 |  | | | | | 0.074 |  | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EndCap | 0.016 |  | | | | | 5.2E-6 |  | | | | | | 5.1E-3 |  | | | | | 0.285 |  | |  | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EndCapWithM3 | 0.015 |  | | | | | 4.8E-6 |  | | | | | | 4.8E-3 |  | | | | | 0.266 |  |  | | | | |

It should be noted that these are just rough estimates of the Environmental Impact of the parts. For example the battery itself was analysed as a stainless steel part as there is no specific battery material available.