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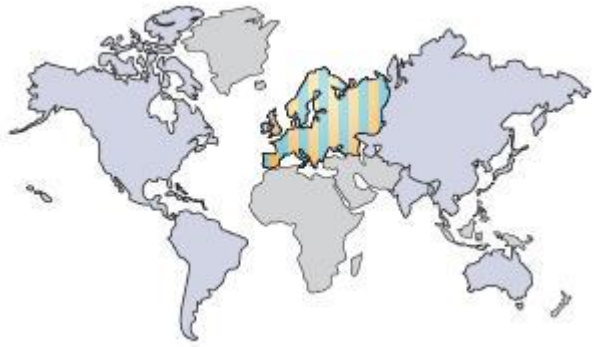
Programme & Part: Electrical Engineering Part 4
Project Role: Electric Vehicle Battery System
Subgroup: Electric Vehicle
Frontline Task: EV Team Lead

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:



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.

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

1200 kg CO_2e

Material:	990 kg CO_2e
Manufacturing:	45 kg CO_2e
Use:	0.00 kg CO_2e
Transportation:	23 kg CO_2e
End of Life:	130 kg CO_2e

Total Energy Consumed

1.3E+4 MJ

Material:	1.2E+4 MJ
Manufacturing:	750 MJ
Use:	0.00 MJ
Transportation:	350 MJ
End of Life:	95 MJ

Air Acidification

350 mol H^+ e

Material:	320 mol H^+ e
Manufacturing:	15 mol H^+ e
Use:	0.00 mol H^+ e
Transportation:	9.4 mol H^+ e
End of Life:	5.1 mol H^+ e

Water Eutrophication

0.133 kg N e

Material:	0.086 kg N e
Manufacturing:	5.4E-3 kg N e
Use:	0.00 kg N e
Transportation:	9.0E-3 kg N e
End of Life:	0.033 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

390 kg CO_2e

Material:	280 kg CO_2e
Manufacturing:	91 kg CO_2e
Use:	0.00 kg CO_2e
Transportation:	6.2 kg CO_2e
End of Life:	12 kg CO_2e

Total Energy Consumed

4700 MJ

Material:	3700 MJ
Manufacturing:	910 MJ
Use:	0.00 MJ
Transportation:	82 MJ
End of Life:	8.7 MJ

Air Acidification

130 mol H^+ e

Material:	57 mol H^+ e
Manufacturing:	61 mol H^+ e
Use:	0.00 mol H^+ e
Transportation:	8.5 mol H^+ e
End of Life:	0.408 mol H^+ e

Water Eutrophication

0.391 kg N e

Material:	0.359 kg N e
Manufacturing:	0.023 kg N e
Use:	0.00 kg N e
Transportation:	5.2E-3 kg N e
End of Life:	3.7E-3 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.