

Life Cycle Assessment

SODAQ Track Active (LiPo, AA) & Solar

Product Report Summary

CO2 Emissions

2.75 kg

Cradle-to-gate carbon emissions per unit of SODAQ TRACK LiPo device.

Sustainability



Key UN SDGs affected.



Water Use

0.03 m3

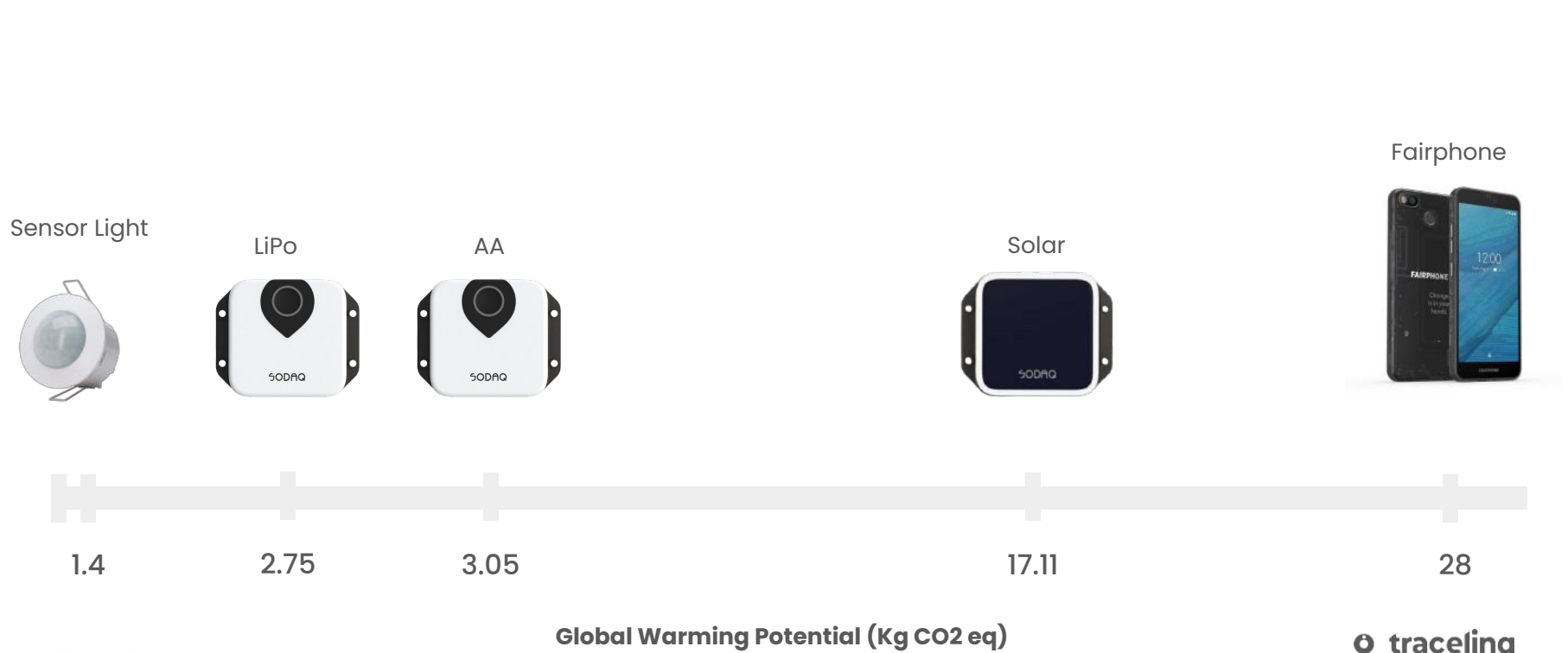
Plastic granulates production consume water in their manufacturing.

Mineral Resource Scarcity

0.32 kg Cu eq

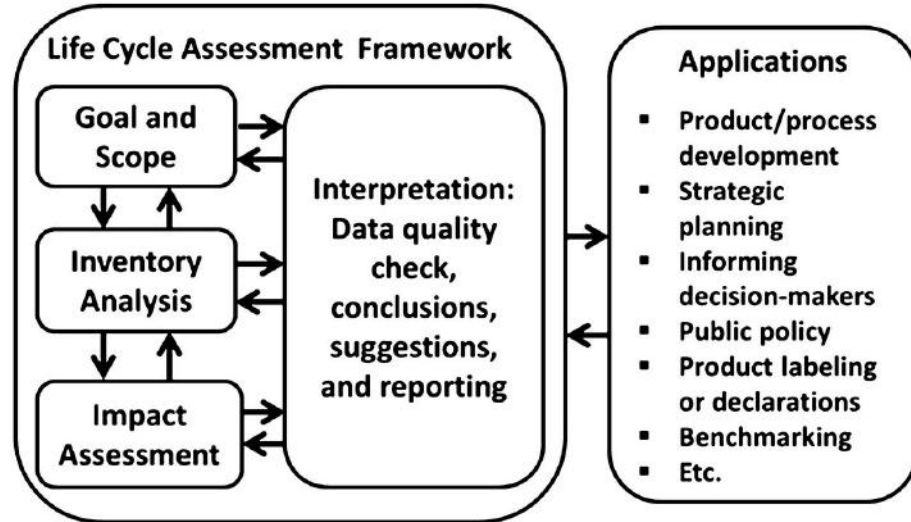
PCB and Battery production requires extraction of key mineral ores.

Where does it stand?*



Life Cycle Assessment

A Life Cycle Assessment (LCA) is an analysis of the *environmental impact* a product object has on the world around it.



LCA framework and its application

Objective

To assess SODAQ Tracker device's LCA (Cradle to Gate)

Map and analyse of LCA on United Nation's Sustainable Development Goals

Provide strategic recommendations for sustainability strategy development



SODAQ tracker devices

TRACK Active LiPo

Asset tracking solution for indoor and outdoor operations



SODAQ TRACK Active Lithium Polymer battery version

Power

Rechargeable Lithium Polymer 2400 mAh battery. Battery replacement required after a period.

Components

Plastic casings, LiPo battery and PCB with electrical components.

Key Features

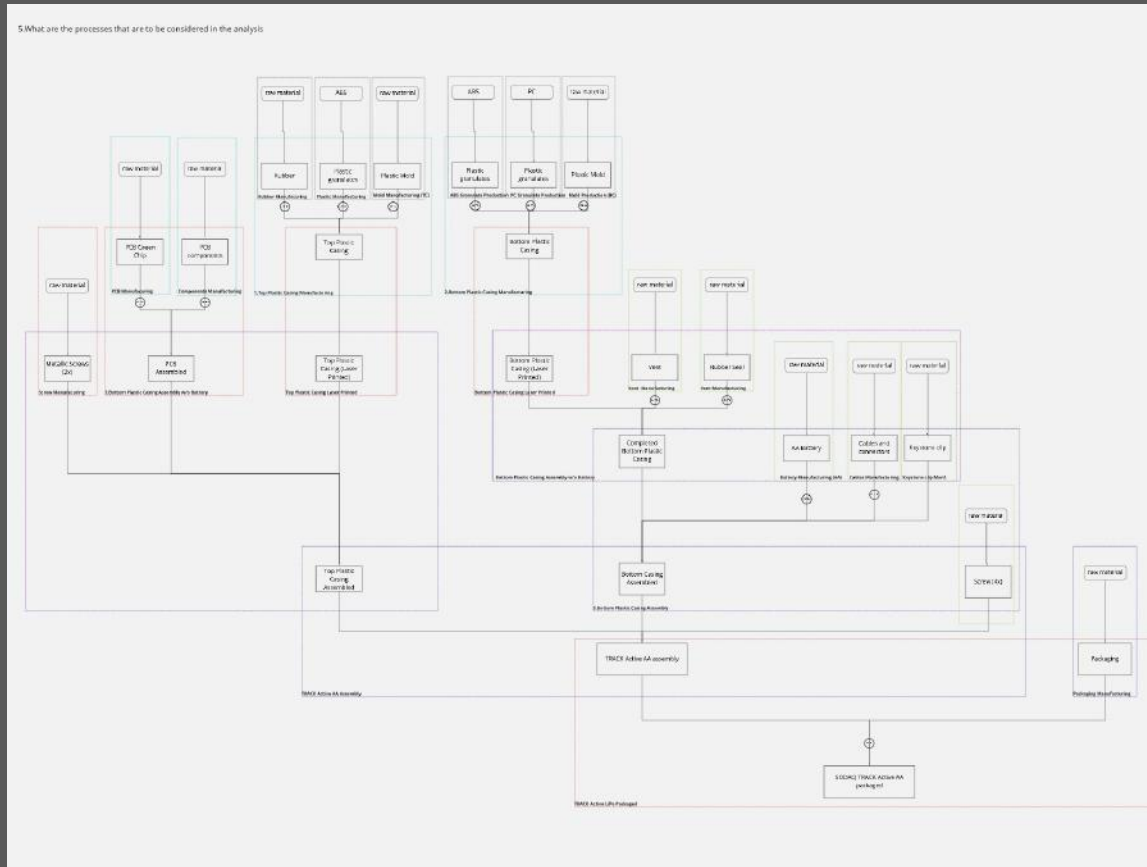
Programmable button, IP67 casing, USB-C Recharging

Methodology (1/3)

This study is based on LCA methodology as outlined by ISO 14001 and impact categories from covers cradle-to-gate.

Keeping in focus the primary data collection for production state Interviews were conducted with Project Manager, Sustainability Manager and Production company (4mod).

OpenLCA software has been used as a modelling tool for this study and as a source for secondary data the data sets from Eco-invent as well as online research was used.



Tool used: Miro

Methodology (2/3)

Process Mapping

- Interview w/ Project Manager, Sustainability Manager and 4MOD

Data Collection

- Tool for capturing supply chain data
- Shared with SODAQ and 4MOD

PROCESS	Emission ref used	Resource Used (Input Flows)										Output Generated													
		Energy / Water					Raw Material					Waste (Solid/Liquid)					Recycled					Emissions (Gas)			
S.No	INPUT	Quantity	Units	S.No	Raw Material / Component	Quantity	Units	S.No	Product / Sub-product	Qty	Units	S.No	Waste	Quantity	Units	S.No	Waste	Quantity	Units	S.No	CO2	Quantity	Units	%age	
1. TPC granulates mfg																						302	44 mt		
2. PCABS granulate mfg																									
3. Mold Top casing mfg																									
4. Top Plastic Casing Manufacturing		1	Electricity	1.27	KWh/Kg	1	TPC Plastic Granulate	85	g	1	Top Plastic Casing	1	pc												
5. PCABS granulates mfg							2	ABS Plastic Granulate	87.6	g															
6. TPC granulates mfg																									
7. Mold Bottom Casing mfg																									
8. Bottom Plastic Casing mfg		1	Electricity	1.27	KWh/Kg	1	TPC Plastic Granulate	85	g	1	Top Plastic Casing	1	pc												
9. PCB mfg							2	ABS Plastic Granulate	87.6	g															
10. PCB component mfg																									
11. PCB assembly																									
12. Screw manufacturing																									
13. Top plastic casing laser printing																									
14. Bottom Plastic casing laser printing																									
15. Vern mfg																									
16. Rubber seal mfg																									
17. Bottom plastic casing assembly w/o battery																									

S.No	Process No.	Process Name	Raw Material	Input Type	P/NO	REACH	Other Product and By-Products	Specification Document	Special Instructions	Registration #	Packaging (Primary)		Supplier Name	Supplier Origin City and Country	Certification
											Type	Unit (kg)			
1	1	TPC granulates mfg	TPC granulates mfg	Unrecycled	1										
2	2	PCABS granulate mfg	PCABS granulate mfg	Unrecycled	2										
3	3	Mold Top Casing mfg	Mold Top Casing mfg	Sub-product	3										
4	4	TPC granulates mfg	TPC granulates mfg	Sub-product	4										
5	5	PCABS granulates mfg	PCABS granulates mfg	Sub-product	5										
6	6	Mold Top Casing mfg	Mold Top Casing mfg	Unrecycled	6										
7	7	TPC granulates mfg	TPC granulates mfg	Sub-product	7										
8	8	Mold Bottom Casing mfg	Mold Bottom Casing mfg	Sub-product	8										
9	9	PCABS granulates mfg	PCABS granulates mfg	Unrecycled	9										
10	10	TPC granulates mfg	TPC granulates mfg	Sub-product	10										
11	11	Mold Bottom Casing mfg	Mold Bottom Casing mfg	Sub-product	11										
12	12	PCABS granulates mfg	PCABS granulates mfg	Unrecycled	12										
13	13	TPC granulates mfg	TPC granulates mfg	Sub-product	13										
14	14	Mold Bottom Casing mfg	Mold Bottom Casing mfg	Sub-product	14										
15	15	PCABS granulates mfg	PCABS granulates mfg	Unrecycled	15										
16	16	TPC granulates mfg	TPC granulates mfg	Sub-product	16										
17	17	Mold Bottom Casing mfg	Mold Bottom Casing mfg	Sub-product	17										
18	18	PCABS granulates mfg	PCABS granulates mfg	Unrecycled	18										
19	19	TPC granulates mfg	TPC granulates mfg	Sub-product	19										
20	20	Mold Bottom Casing mfg	Mold Bottom Casing mfg	Sub-product	20										
21	21	PCABS granulates mfg	PCABS granulates mfg	Unrecycled	21										
22	22	TPC granulates mfg	TPC granulates mfg	Sub-product	22										
23	23	Mold Bottom Casing mfg	Mold Bottom Casing mfg	Sub-product	23										
24	24	PCABS granulates mfg	PCABS granulates mfg	Unrecycled	24										
25	25	TPC granulates mfg	TPC granulates mfg	Sub-product	25										
26	26	Mold Bottom Casing mfg	Mold Bottom Casing mfg	Sub-product	26										
27	27	PCABS granulates mfg	PCABS granulates mfg	Unrecycled	27										
28	28	TPC granulates mfg	TPC granulates mfg	Sub-product	28										
29	29	Mold Bottom Casing mfg	Mold Bottom Casing mfg	Sub-product	29										

Tool used: Google Sheets



Methodology (3/3)

Process Mapping

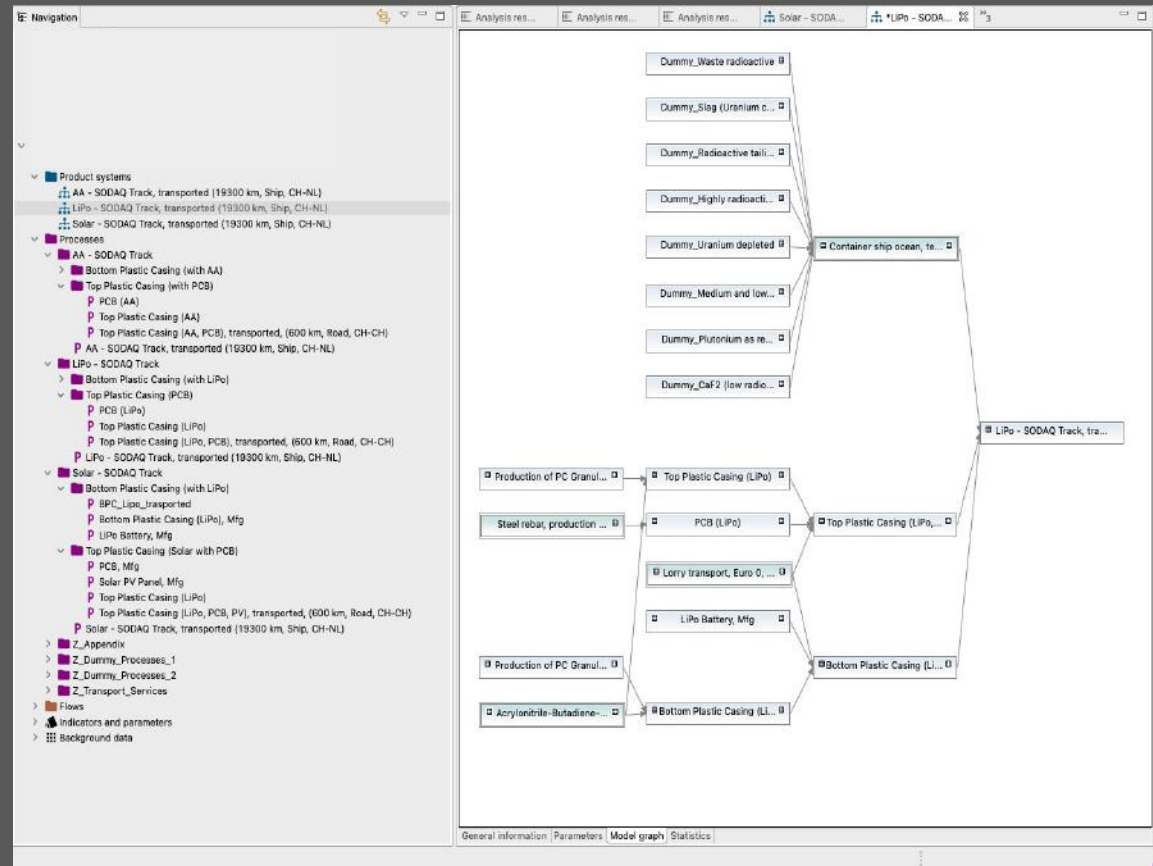
- Interview w/ Project Manager, Sustainability Manager and 4MOD

Data Collection

- Tool for capturing supply chain data
- Shared w/ SODAQ and 4MOD

LCA modelling & analysis

- Software and on UN SDG framework

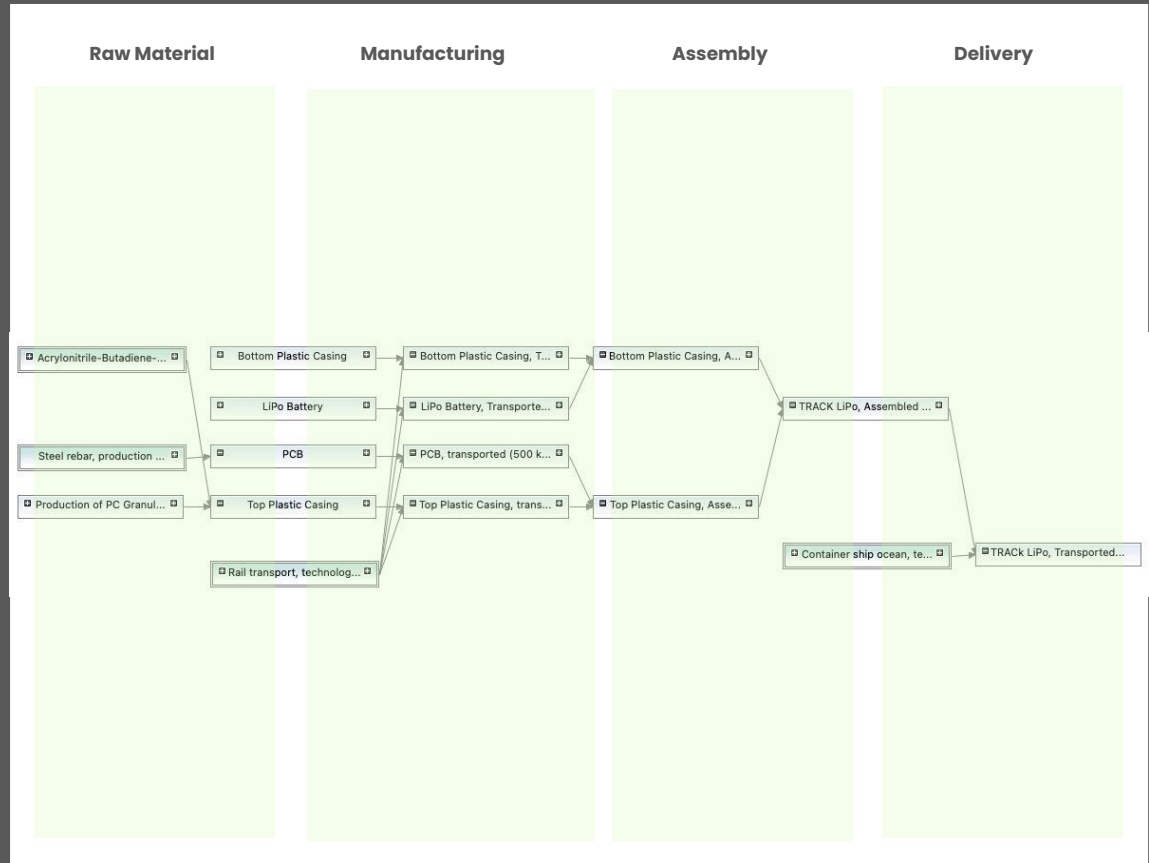


Tool used: Open LCA

LCA Scope

'Cradle-to-gate' methodology used for assessment of impact.

ReCiPe 2016 (I) Impact indicators covering air, water and land impact for 20 years.

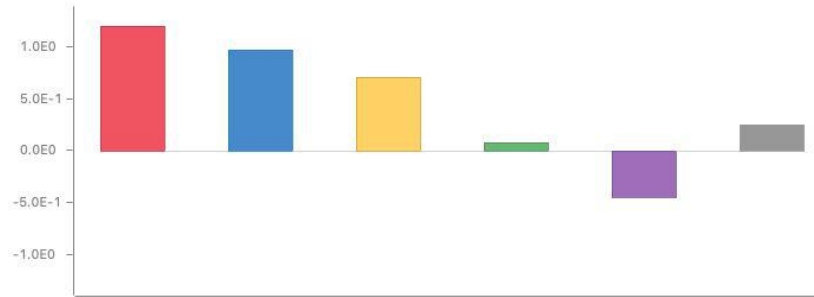


Tool used: Open LCA

Results

Manufacturing of Top and Bottom plastic casing contribute to 70% of the CO2 emissions.

The circuit board and electronics add 25% of the remaining emissions.



- 1.200 kg CO2 eq: Polycarbonate granulate (PC), production mix, at plant - RER
- 0.973 kg CO2 eq: Acrylonitrile-Butadiene-Styrene granulate (ABS), production mix, at plant - RER
- 0.707 kg CO2 eq: PCB (LiPo)
- 0.080 kg CO2 eq: Bottom Plastic Casing (LiPo), Mfg
- 0.452 kg CO2 eq: Polyethylene terephthalate (PET) granulate, production mix, at plant, am...
- 0.248 kg CO2 eq: Other

Global Warming Potential
2.75 kg CO2e

Mineral Resource Scarcity
0.44 kg Cu eq

Water Consumption
0.02 m3

Terrestrial Acidification
0.004 kg SO2e

Terrestrial ecotoxicity
0.05 kg 1,2-DCB

Product Impact and Sustainability *(SODAQ Track Active LiPo)*

Environmental Cost

€1.65

Cradle-to-gate carbon emissions
per 10 unit of device.*

Trees

72 Devices = 1 Tree

1 Tree fixes 200 kg of CO2
emission in its lifetime

Passenger Vehicle




14 Km driving








251g of CO2 emitted per km



* See slide 22 in Appendix for more information

Measuring Track's Impact on UN SDGs

-  Major challenges remain; Need to act
-  Some challenges remain; Need to investigate
-  On track; Promote further

Life Cycle Activities	Indicators	Impact Category	UN SDG	Potential Contribution to Achievement of UN SDG
Transportation, Manufacturing	Global Warming Potential	Climate change		
Manufacturing	Terrestrial Ecotoxicity, Terrestrial acidification	Terrestrial ecosystem		
Manufacturing	Marine Eutrophication, Marine Ecotoxicity	Aquatic Ecosystem		
Extraction, Manufacturing, Transportation	Energy Consumption, Job creation, Risks of accidents, Trainings	Economic, Health & Safety		Not captured

Source: Google Sheets

Transitioning towards sustainability: SODAQ's impact on SDGs



	Prosperity		People	Planet
	Circular Economy	Good Business	Fulfilling Experience	Zero Carbon Footprint
Company	Zero Waste Product Design Reuse, Repair	Transparency Certifications Business Ethics	Health & Safety Diversity & Inclusion Personal Development	Energy Consumption Scope 1, 2 LCA
Suppliers	Material Selection	Carbon Footprint of Supply Transportation	Health & Safety Labour Conditions	Transportation, Packaging Scope 3 LCA
Customer & Society	Circular Ecosystem	Social Responsibility	Social Empowerment	Carbon Compensation



Concluding

Insights

- Plastics, transportation – major polluter
- Need for more data for more accuracy
- Comparison with other IoT devices

Recommendations

- Develop a sustainability transition plan w/ targets
- Enforce transparency upstream
- Set vision for sustainability certifications, and standards alignment



Contact Details



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Thank You

Partlist

Battery

Track AA

Track LiPo

Track Solar

Alkaline (3X)

Lithium Polymer

Lithium Polymer

PCB

Yes

Yes

Yes

Casing

PC, ABS and TPE plastics
Gore Vent

PC, ABS and TPE plastics
Gore Vent

PC, ABS and TPE plastics
Gore Vent

Solar Panel

-

-

Monocrystalline
4.5V

Peripherals

Connectors and Keystone

Connectors and Keystone

Connectors and Keystone

LCA

Global Warming Potential

Track AA

3.05 kg CO2 eq

Track LiPo

2.75 kg CO2 eq

Track Solar

17.11 kg CO2 eq

Mineral Resource Scarcity

0.32 kg Cu eq

0.44 kg Cu eq

0.68 kg Cu eq

Water Consumption

0.02 m3

0.05 m3

0.03 m3

Terrestrial Acidification

0.004 kg SO2 eq

0.004 kg SO2 eq

0.003 kg SO2 eq

Terrestrial Ecotoxicity

0.06 kg 1,4-DCB

0.05 kg 1,4-DCB

0.06 kg 1,4-DCB

Environmental Cost

Environmental prices per impact category, for use in LCA

Impact category	Unit	Environmental price as weighting factor	Environmental price as external cost
Climate change	€/kg CO ₂ -eq.	€ 0.057	€ 0.057
Ozone layer depletion	€/kg CFC-eq.	€ 123	€ 30.4
Human toxicity	€/kg 1,4 DB-eq.	€ 0.158	€ 0.214
Photochemical oxidant formation	€/kg NMVOC-eq.	€ 2.1	€ 2.1
Particulate matter formation	€/kg PM ₁₀ -eq.	€ 69	€ 69
Ionizing radiation	€/kg kBq U ₂₃₅ -eq.	€ 0.0473	€ 0.0473
Acidification	€/kg SO ₂ -eq.	€ 8.12	€ 5.4
Freshwater eutrophication	€/kg P-eq.	€ 1.9	€ 1.9
Marine eutrophication	€/kg N	€ 3.11	€ 3.11
Terrestrial ecotoxicity	€/kg 1,4 DB-eq.	€ 8.89	€ 8.89
Freshwater ecotoxicity	€/kg 1,4 DB-eq.	€ 0.0369	€ 0.0369
Marine ecotoxicity	€/kg 1,4 DB-eq.	€ 0.00756	€ 0.00756
Land use	€/m ² a	€ 0.037	€ 0.0261

Source

1. [Environmental Pricing handbook 2017](#)
2. [LCA assessment of smartphone](#)