**Additional file for “Life Cycle assessment of electric kick scooters – consolidating environmental impact quantification and concluding climate-friendly use options”**

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This Additional file contains the Life Cycle inventories (LCI) for the plastic e-scooter (Tables S1 – S5) and the aluminium e-scooter (Tables S6 – S9) of the related study. Tables include all life cycle phases (production, use phase and end-of-life) and the LCI of modelled and modified processes. For the classification of data quality see Table S10.

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| **Table S1:** Life cycle Inventory (LCI) for the production of 1 plastic e-scooter incl. components/materials and associated production processes, weights, used ecoinvent 3.5 unit processes, data quality and sources. Unit process name: E-floater production {GLO}| production | APOS, U. | | | | | | |
| **Component** | | **Material** | **Weight [kg]** | **Ecoinvent 3.5 unit processes** | **Data quality** | **Data sources** |
| Motor controller | | Diverse | 0.19 | Controller, for electric scooter {GLO}| production | APOS, U | A | Floatility 2019, 2020 |
| Motor | | Diverse | 3.12 | Electric motor, for electric scooter {GLO}| production | APOS, U | A | Floatility 2019, 2020 |
| Battery | | Diverse | 1.98 | Battery, Li-ion, rechargeable, prismatic {GLO}| production | APOS, U | A | Floatility 2019, 2020 |
| Telematic unit with SOC | | Diverse | 0.48 | Internet access equipment {CH}| production | APOS, U | A | Floatility 2019, 2020 |
| Cable harness | | Copper | 0.1 | Cable, unspecified {GLO}| production | APOS, U | A | Floatility 2019, 2020 |
| Wheels (2) front | | Rubber | 2.66 | Synthetic rubber {RoW}| production | APOS, U | A | Floatility 2019, 2020 |
| 2.66 | Blow moulding Rubber {CN}| blow moulding | APOS, U | C |
| Compression spring | | Steel | 0.05 | Steel, low-alloyed {GLO}| market for | APOS, U | A | Floatility 2019, 2020 |
| Solenoid | | Copper | 0.05 | Copper {GLO}| market for | APOS, U | A | Floatility 2019, 2020 |
| 0.05 | Metal working, average for copper product manufacturing {GLO}| market for | APOS, U | C |
| Cellastos | | Foam | 0.016 | Polyurethane, flexible foam {GLO}| market for | APOS, U | A | Floatility 2019, 2020 |
| Bell | | Aluminium | 0.018 | Aluminium, primary, ingot {RoW}| market for | APOS, U | A | Floatility 2019, 2020 |
| 0.018 | Metal working, average for aluminium product manufacturing {RoW}| processing | APOS, U | C |
| Acceleration throttle | Printed circuit board |  | 0.086 | Electronics, for control units {RoW}| production | APOS, U | Value: A Grade of detail: D | Floatility 2019, 2020 |
| Magnets |  |
| Hall sensor |  |
| Torison spring |  |
| Throttle housing |  |
| JST 4 pos connectors (M+F) |  |
| Rosenberger (1x) | | Plastics | 0.014 | Polyethylene, high density, granulate {GLO}| market for | APOS, U | A | Floatility 2019, 2020 |
| 0.014 | Injection moulding {GLO}| market for | APOS, U | C |
| Disc brake | Disc breake leaver with lock | Aluminum | 0.11 | Aluminium, primary, ingot {RoW}| market for | APOS, U | A | Floatility 2019, 2020 |
| 0.11 | Metal working, average for aluminium product manufacturing {RoW}| processing | APOS, U | C |
| Brake caliper | Stainless steel | 0.286 | Steel, chromium steel 18/8 {GLO}| market for | APOS, U | A | Floatility 2019, 2020 |
| 0.286 | Metal working, average for chromium steel product manufacturing {RoW}| processing | APOS, U | C |
| Disc | Stainless steel | 0.132 | Steel, chromium steel 18/8 {GLO}| market for | APOS, U | A | Floatility 2019, 2020 |
| 0.132 | Metal working, average for chromium steel product manufacturing {RoW}| processing | APOS, U | C |
| Brake wire | Stainless steel and plastic | 0.133 | Cable, Steel {GLO}| production | APOS, U | A |  |
| Bushing for folding mechanism | | Plastics | 0.002 | Polyethylene, high density, granulate {GLO}| market for | APOS, U | A | Floatility 2019, 2020 |
| 0.002 | Injection moulding {GLO}| market for | APOS, U | C |
| Spherical bearings (tilt connector + block) | | 3D printed plastics | 0.021 | Polyethylene, high density, granulate {GLO}| market for | APOS, U | A | Floatility 2019, 2020 |
| 0.021 | Injection moulding {GLO}| market for | APOS, U | C |
| Sleeve bearing with flange (tierod, FBB+FBT) | | Stainless steel | 0.042 | Steel, chromium steel 18/8 {GLO}| market for | APOS, U | A | Floatility 2019, 2020 |
| 0.042 | Metal working, average for chromium steel product manufacturing {RoW}| processing | APOS, U | C |
| Folding pin, center axis, Tie rod, folding block insert, folding pin insert | | Stainless steel | 0.407 | Steel, chromium steel 18/8 {GLO}| market for | APOS, U | A | Floatility 2019, 2020 |
| 0.407 | Metal working, average for chromium steel product manufacturing {RoW}| processing | APOS, U | C |
| Folding block, Rosenberger holder, electronics compartment | | Aluminium | 0.396 | Aluminium, primary, ingot {RoW}| market for | APOS, U | A | Floatility 2019, 2020 |
| 0.396 | Metal working, average for aluminium product manufacturing {RoW}| processing | APOS, U | C |
| Folding, housing, Dust cover top + bottom, front body top + bottom, deck right + left + cover, mudguard front + back, back handle, reinforcment top + bottom, battery case, + case cover | | Ultramid B3 | 4.904 | Nylon 6 {RoW}| production | APOS, U | A | Floatility 2019, 2020 |
| 4.904 | Injection moulding {GLO}| market for | APOS, U | C |
| Deck Pad L+R, Brake Pad | | Elastollan 1170A-U | 0.247 | Polyurethane, flexible foam {RoW}| production | APOS, U | A | Floatility 2019, 2020 |
| Tie rod holder L+R, tilt connector | | PA 66 GF45 | 0.1275 | Nylon 6-6, glass-filled {RoW}| market for nylon 6-6, glass-filled | APOS, U | A | Floatility 2019, 2020 |
| 0.1275 | Injection moulding {GLO}| market for | APOS, U | C |
| Ultraminate B2WG13 | | Ultramid N6 GF60 | 0.0364 | Nylon 6-6, glass-filled {RoW}| market for nylon 6-6, glass-filled | APOS, U | A | Floatility 2019, 2020 |
| 0.0364 | Injection moulding {GLO}| market for | APOS, U | C |
| Bottom + Steering lights | | Polycarbonate clear | 0.055 | Polycarbonate {GLO}| market for | APOS, U | A | Floatility 2019, 2020 |
| 0.055 | Injection moulding {GLO}| market for | APOS, U | C |
| Steering | | Polyamid (Ultramid B3) | 1.265 | Nylon 6 {RoW}| production | APOS, U | A | Floatility 2019, 2020 |
| 1.265 | Injection moulding {GLO}| market for | APOS, U | C |
| Front body pin front solenoid holder, lock shell | | Aluminium | 0.105 | Aluminium, primary, ingot {RoW}| market for | APOS, U | A | Floatility 2019, 2020 |
| 0.105 | Metal working, average for aluminium product manufacturing {RoW}| processing | APOS, U | C |
| KVT bearings | | Plastics | 0.13 | Polyethylene, high density, granulate {GLO}| market for | APOS, U | A | Floatility 2019, 2020 |
| 0.13 | Injection moulding {GLO}| market for | APOS, U | C |
| Diverse small parts (screws, sockets etc.: 17 pieces) | | Stainless steel | 0.063 | Steel, chromium steel 18/8 {GLO}| market for | APOS, U | A | Floatility 2019, 2020 |
| 0.063 | Metal working, average for chromium steel product manufacturing {RoW}| processing | APOS, U | C |
| **Total** | | | **17.2259** |  |  |  |

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| **Table S2a:** Life cycle Inventory (LCI) for transportation modes and distances of components of 1 plastic e-scooter incl. associated ton kilometre (tkm), used ecoinvent 3.5 unit processes, data quality and sources. | | | | | | | | |
| **Component** | | **Origin** | **Destination** | **Mode of transportation** | **Distance [km]** | **Freight Distance [tkm]** | **Data quality** | **Data sources** |
| Motor controller | | China | Jakarta | Ship | 3313.23 | 0.6295 | B | Sea Distances 2022 |
| Motor | | China | Jakarta | Ship | 3313.23 | 10.3373 | B | Sea Distances 2022 |
| Battery | | Japan | a. Poland (PL) b PL to Hamburg | a. Ship b. Lorry Europe | a. 22240.67 b. 700 | a. 44.0365 b. 1.386 | B | Sea Distances 2022 Google Maps 2022 |
| Telematic unit with SOC | | Berlin | Hamburg | Lorry Europe | 289.00 | 0.1387 | B | Sea Distances 2022 |
| Cable harness | | Indonesia | Jakarta | Lorry Asia | 100.00 | 0.0100 | D | Google Maps 2022 |
| Wheels (2) front | | China | Jakarta | Ship | 3313.23 | 8.8132 | B | Sea Distances 2022 |
|  |
| Compression spring | | Singapore | Jakarta | Ship | 1296.40 | 0.0648 | B | Sea Distances 2022 |  |
| Solenoid | | Unknown: ecoinvent market process for material used | | | | | NA | NA |  |
|  |
| Cellastos | | Unknown: ecoinvent market process for material used | | | | | NA | NA |  |
| Bell | | Unknown: ecoinvent market process for material used | | | | | NA | NA |  |
|  |
| Acceleration throttle | Printed circuit board | China | Jakarta | Ship | 3313.23 | 0.20 | D | Sea Distances 2022 |  |
| Magnets | China | Jakarta | Ship | 3313.23 | D | Sea Distances 2022 |  |
| Hall sensor | Singapore | Jakarta | Ship | 1296.40 | D | Sea Distances 2022 |  |
| Torison spring | Singapore | Jakarta | Ship | 1296.40 | D | Sea Distances 2022 |  |
| Throttle housing | Germany | Hamburg | Lorry Europe | 100.00 | D | Google Maps 2022 |  |
| JST 4 pos connectors (M+F) | Singapore | Jakarta | Ship | 1296.40 | D | Sea Distances 2022 |  |
| Rosenberger (1x) | | Germany | Hamburg | Lorry Europe | 100.00 | 0.0014 | D | Google Maps 2022 |  |
|  |
| Disc brake | Disc breake leaver with lock | China | Jakarta | Ship | 3313.23 | 0.3645 | B | Sea Distances 2022 |  |
|  |
| Brake caliper | 0.9476 |  |
|  |
| Disc | 0.4373 |  |
|  |
| Brake wire | 0.4407 |  |
| Bushing for folding mechanism | | Germany | Hamburg | Lorry Europe | 100.00 | 0.0002 | D | Google Maps 2022 |  |
|  |
| Spherical bearings (tilt connector + block) | | Germany | Hamburg | Lorry Europe | 100.00 | 0.0021 | D | Google Maps 2022 |  |
|  |
| Sleeve bearing with flange (tierod, FBB+FBT) | | Singapore | Jakarta | Ship | 1296.40 | 0.0544 | B | Sea Distances 2022 |  |
|  |
| Folding pin, center axis, Tie rod, folding block insert, folding pin insert | | Indonesia | Jakarta | Lorry Asia | 100.00 | 0.0407 | D | Google Maps 2022 |  |
|  |
| Folding block, Rosenberger holder, electronics compartment | | Indonesia | Jakarta | Lorry Asia | 100.00 | 0.0396 | D | Google Maps 2022 |  |
|  |
| Folding, housing, Dust cover top + bottom, front body top + bottom, deck right + left + cover, mudguard front + back, back handle, reinforcment top + bottom, battery case, + case cover | | China/Thailand/Japan | Jakarta | Ship | 3000.00 | 14.7120 | B | Sea Distances 2022 |  |
|  |
| Deck Pad L+R, Brake Pad | | Unknown: ecoinvent market process for material used | | | | | NA | NA |  |
| Tie rod holder L+R, tilt connector | | Unknown: ecoinvent market process for material used | | | | | NA | NA |  |
|  |
| Ultraminate B2WG13 | | Unknown: ecoinvent market process for material used | | | | | NA | NA |  |
|  |
| Bottom + Steering lights | | Unknown: ecoinvent market process for material used | | | | | NA | NA |  |
|  |
| Steering | | China/Thailand/Japan | Jakarta | Ship | 3000.00 | 3.7950 | B | Sea Distances 2022 |  |
|  |
| Front body pin front solenoid holder, lock shell | | Indonesia | Jakarta | Lorry Asia | 100.00 | 0.0105 | D | Google Maps 2022 |  |
|  |
| KVT bearings | | Germany | Hamburg | Lorry Europe | 100.00 | 0.0130 | D | Google Maps 2022 |  |
|  |
| Diverse small parts (screws, sockets etc.: 17 pieces) | | Indonesien | Jakarta | Lorry Asia | 100.00 | 0.0063 | D | Google Maps 2022 |  |
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| **Table S2b:** Total transport distances and used ecoinvent 3.5 processes for 1 plastic e-scooter according to component distances in Table S2a. | | | |
| **Mode of transportation** | **Amount** | **Unit** | **ecoinvent 3. 5 process** |
| Ship | 84.83 | tkm | Transport, freight, sea, transoceanic ship {GLO}| processing | APOS, U |
| Lorry Europe | 1.54 | tkm | Transport, freight, lorry 16-32 metric ton, euro6 {RER}| market for transport, freight, lorry 16-32 metric ton, EURO6 | APOS, U |
| Lorry Asia | 0.11 | tkm | Transport, freight, lorry 16-32 metric ton, euro4 {RoW}| market for transport, freight, lorry 16-32 metric ton, EURO4 | APOS, U |

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| **Table S3:** Life Cycle Inventory (LCI) of the use phase for travelling with the plastic e-scooter. The corresponding mileage scenarios of this study have been calculated based on these values. | | | | | | | |
| **Process** | **Location** | **Amount** | **Unit /FU** | **Ecoinvent 3.5 unit processes** | **Data quality** | **Data sources** | **Remarks** |
| Transportation efloater from Jakarta by ship | to Europe | 240.68 | tkm/e-scooter | Transport, freight, sea, transoceanic ship {GLO}| processing | APOS, U | B | Sea Distances 2022 | Distance Jakarta to Hamburg by ship:16'299.45 km; Weight Efloater without battery and telematics:14.8 kg; |
| Transportation efloater within Hamburg | Europe | 0.086 | tkm / e-scooter | Transport, freight, lorry 16-32 metric ton, euro6 {RER}| market for transport, freight, lorry 16-32 metric ton, EURO6 | APOS, U | D | Google Maps 2022 | Transportation of 5 km within Hamburg |
| Energy use and operations emissions | Switzerland | 14.00 | Wh / km | Electricity, low voltage {CH}| market for | APOS, U | A/D | Floatility 2019, 2020 | 14 Wh/km, max. distance 20 km |
| 1.40 | Wh / km | Electricity, low voltage {CH}| market for | APOS, U | Distance for driving back autonomously: 2 km (rough estimation) |
| Maintenance, eFloater | Switzerland | 3.704E-06 | p / km | E-floater production {GLO}| production | APOS, U | D | NA | Estimation: 1% of complete eFloater in 6 month |
| Road use | Switzerland | 1.713E-09 | my / km | Road {CH}| construction | APOS, U | D | ecoinvent 3.5 | Values taken from E-Bike in ecoinvent |
| Decommissioned road | Global | 1.713E-09 | my / km | Decommissioned road {GLO}| market for | APOS, U | D | ecoinvent 3.5 | Values taken from E-Bike in ecoinvent |

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| **Table S4:** Life Cycle Inventory (LCI) of the end-of-life (EOL) phase of 1 plastic e-scooter. | | | |
| **Process** | **Location** | **Weight [kg]** | **Ecoinvent 3.5 unit processes** | **Data quality** | **Remarks** |
| Treatment of Li-Ion battery | Global | 1.9800 | Used Li-ion battery {GLO}| market for | APOS, U | D |  |
| Treatment of plastics | Global | 0.2220 | Mixed plastics (waste treatment) {GLO}| recycling of mixed plastics | APOS, U | D |  |
| Treatment of rubber | Switzerland | 2.6600 | Waste rubber, unspecified {CH}| market for waste rubber, unspecified | APOS, U | D |  |
| Treatment of Telematics unit | Global | 0.4800 | Used IT accessory {GLO}| market for | APOS, U | D |  |
| Treatment of Aluminium | Global | 0.6290 | Aluminium (waste treatment) {GLO}| recycling of aluminium | APOS, U | D |  |
| Treatment of Copper | Switzerland | 0.1500 | Scrap copper {CH}| market for scrap copper | APOS, U | D |  |
| Treatment of steel | Global | 0.9800 | Steel and iron (waste treatment) {GLO}| recycling of steel and iron | APOS, U | D |  |
| Waste incineration of polyurethane | Switzerland | 0.2630 | Municipal solid waste {CH}| treatment of, municipal incineration with fly ash extraction | APOS, U | D |  |
| Treatment of brake wire, motor and acceleration throttle | Global | 3.3390 | Waste electric and electronic equipment {GLO}| market for | APOS, U | D |  |
| Treatment of control unit | Europe | 0.1900 | Electronics scrap from control units {RER}| treatment of | APOS, U | D |  |
| Treatment of Ultramid | Switzerland | 6.3329 | Waste Ultramid, for recycling, unsorted {CH}| recycling of waste Ultramid, unsorted | APOS, U | D | Own modelling,  see Table S5 |
| **Total weight** |  | **17.2259** |  |  |  |

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| **Table S5:** Modelled and modified processes for the Life Cycle Inventory (LCI) of the plastic e-scooter | | | | | |
| **No.** | **Modelled and modified process** | **Amount** | **Original ecoinvent 3.5 process** | **Modelling / Changes** | **Remarks** |
| 1 | Waste Ultramid, for recycling, unsorted {CH}| recycling of waste Ultramid, unsorted | APOS, U | 1 kg | Waste polyethylene, for recycling, unsorted {CH}| treatment of waste polyethylene, for recycling, unsorted, sorting | APOS, U | Additional in "Outputs to technosphere. Avoided products": 0.9 kg *Nylon 6 {RoW}| production | APOS, U* | Corresponding to 90% recycling rate |
| Change of amount in "outputs to technosphere. Waste treatment": 0.1 kg *Waste plastic, mixture {CH}| treatment of, municipal incineration | APOS, U* | Corresponding to 10% waste in recycling process |
| All other "inputs to technosphere: materials/fuels" have been taken from the original ecoinvent process |  |
| 2 | Cable, Steel {GLO}| production | APOS, U | 1 kg | Cable, unspecified {GLO}| production | APOS, U | Original material "*Copper {GLO}| market for | APOS, U" has been replaced* by "*Chromium steel pipe {GLO}| market for | APOS, U"* | Amounts of original processes have not been changed. |

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| **Table S6:** Life cycle Inventory (LCI) for the production of 1 aluminium e-scooter incl. components/materials and associated production processes, weight, used ecoinvent 3.5 unit processes, data quality and resources. Unit process name: E-Trotti production {GLO}| production | APOS, U | | | | | | | | |
| **Component** | | **Material** | **Amount** | **Unit** | **Ecoinvent 3.5 unit processes** | **Data quality** | **Data sources** | **Remarks** |
| Battery |  | Li-Ion | 1.9400 | kg | Battery, Li-ion, rechargeable, prismatic {GLO}| market for | APOS, U | B | Adam 2019 |  |
| Front wheel | Hub | Aluminium | 1.1930 | kg | Aluminium, cast alloy {GLO}| market for | APOS, U | B | Adam 2019 |  |
| 1.1930 | kg | Casting, aluminium, lost-wax {CN}| casting, aluminium, lost-wax | APOS, U | C | Adam 2019 | Own modelling, see Table S9 |
| Tyre and tube | Rubber | 0.2000 | kg | Synthetic rubber {GLO}| market for | APOS, U | B | Adam 2019 |  |
| 0.2000 | kg | Blow moulding Rubber {CN}| blow moulding | APOS, U | C | Adam 2019 | Own modelling, see Table S9 |
| Brake disc and screws | Steel | 0.1500 | kg | Steel, low-alloyed, hot rolled {GLO}| market for | APOS, U | B | Adam 2019 |  |
| 0.1500 | kg | Hot rolling, steel {CN}| processing | APOS, U | C | Adam 2019 | Own modelling, see Table S9 |
| Rear wheel | Tyre and tube | Rubber | 0.2000 | kg | Synthetic rubber {GLO}| market for | APOS, U | B | Adam 2019 |  |
| 0.2000 | kg | Blow moulding Rubber {CN}| blow moulding | APOS, U | C | Adam 2019 | Own modelling, see Table S9 |
| Brake disc and screws | Steel | 0.1500 | kg | Steel, low-alloyed, hot rolled {GLO}| market for | APOS, U | B | Adam 2019 |  |
| 0.1500 | kg | Hot rolling, steel {CN}| processing | APOS, U | C | Adam 2019 | Own modelling, see Table S9 |
| Motor |  | Material mix | 3.5500 | kg | Electric motor, vehicle {RoW}| production | APOS, U | B | Adam 2019 |  |
| Controller |  | Material mix | 0.1840 | kg | Controller, for electric scooter {GLO}| market for | APOS, U | B | Adam 2019 |  |
| Footboard board (frame) |  | Aluminium | 2.6650 | kg | Aluminium, wrought alloy {GLO}| market for | APOS, U | B | Adam 2019 |  |
| 2.6650 | kg | Section bar extrusion, aluminium {CN}| processing | APOS, U | C | Adam 2019 | Own modelling, see Table S9 |
| Disc brake caliper (2x) |  | Aluminium | 0.1900 | kg | Aluminium, cast alloy {GLO}| market for | APOS, U | B | Adam 2019 |  |
| 0.1900 | kg | Casting, aluminium, lost-wax {CN}| casting, aluminium, lost-wax | APOS, U | C | Adam 2019 | Own modelling, see Table S9 |
|  | Steel | 0.0300 | kg | Steel, low-alloyed, hot rolled {GLO}| market for | APOS, U | B | Adam 2019 |  |
| 0.0300 | kg | Hot rolling, steel {CN}| processing | APOS, U | C | Adam 2019 | Own modelling, see Table S9 |
| Footboard reinforcement | Folding mechanism | Steel | 0.4500 | kg | Steel, low-alloyed, hot rolled {GLO}| market for | APOS, U | B | Adam 2019 |  |
| 0.4500 | kg | Hot rolling, steel {CN}| processing | APOS, U | C | Adam 2019 | Own modelling, see Table S9 |
| Front structure | Handlebar and pole | Aluminium | 2.7410 | kg | Aluminium, wrought alloy {GLO}| market for | APOS, U | B | Adam 2019 |  |
| 2.7410 | kg | Section bar extrusion, aluminium {CN}| processing | APOS, U | C | Adam 2019 | Own modelling, see Table S9 |
| Fork, reinforcement | Steel | 1.5410 | kg | Steel, low-alloyed, hot rolled {GLO}| market for | APOS, U | B | Adam 2019 |  |
| 1.5410 | kg | Hot rolling, steel {CN}| processing | APOS, U | C | Adam 2019 | Own modelling, see Table S9 |
| Handles | Rubber | 0.1660 | kg | Synthetic rubber {GLO}| market for | APOS, U | B | Adam 2019 |  |
| 0.1660 | kg | Blow moulding Rubber {CN}| blow moulding | APOS, U | C | Adam 2019 | Own modelling, see Table S9 |
| Fittings, horn switch | Plastic | 0.1000 | kg | Polyethylene, high density, granulate {GLO}| market for | APOS, U | B | Adam 2019 |  |
| 0.1000 | kg | Injection moulding {CN}| processing | APOS, U | C | Adam 2019 | Own modelling, see Table S9 |
| Cable harness |  | Copper | 5.1284 | m | Cable, connector for computer, without plugs {GLO}| production | APOS, U | B | Adam 2019 | 0.0195 kg copper per m leads to 5.1284m of cable |
| Brake cable |  | Chromium steel | 0.1500 | kg | Steel, chromium steel 18/8 {GLO}| market for | APOS, U | B | Adam 2019 |  |
| 0.1500 | kg | Sheet rolling, chromium steel {CN}| processing | APOS, U | C | Adam 2019 | Own modelling, see Table S9 |
| 0.1500 | kg | Wire drawing, steel {CN}| processing | APOS, U | C | Adam 2019 | Own modelling, see Table S9 |
|  | Plastic | 0.0150 | kg | Polyethylene, high density, granulate {GLO}| market for | APOS, U | B | Adam 2019 |  |
| 0.0150 | kg | Injection moulding {CN}| processing | APOS, U | C | Adam 2019 | Own modelling, see Table S9 |
| Screws and connections |  | Chromium steel | 0.2190 | kg | Steel, chromium steel 18/8 {GLO}| market for | APOS, U | B | Adam 2019 |  |
| 0.2190 | kg | Sheet rolling, chromium steel {CN}| processing | APOS, U | C | Adam 2019 | Own modelling, see Table S9 |
| Fender and kick protection cover |  | Plastic | 0.4720 | kg | Polyethylene, high density, granulate {GLO}| market for | APOS, U | B | Adam 2019 |  |
| 0.4720 | kg | Injection moulding {CN}| processing | APOS, U | C | Adam 2019 | Own modelling, see Table S9 |
| **Total weight** |  |  | **16.3060** | **kg** |  |  |  |  |

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| **Table S7:** Life Cycle Inventory (LCI) of the use phase for travelling with the aluminium e-scooter. The corresponding mileage scenarios of this study have been calculated based on these values. | | | | | | | |
| **Process** | **Location** | **Amount** | **Unit / FU** | **Ecoinvent 3.5 unit processes** | **Data quality** | **Data sources** | **Remarks** |
| Transportation of eScooter from Taizhou to Shanghai by lorry | China | 6.103 | tkm / e-scooter | Transport, freight, lorry 16-32 metric ton, EURO4 {RoW}| transport, freight, lorry 16-32 metric ton, EURO4 | APOS, U | D | Adam 2019 |  |
| Transportation from Shanghai to Rotterdam by ship | to Europe | 197.495 | tkm / e-scooter | Transport, freight, sea, transoceanic ship {GLO}| processing | APOS, U | D | Adam 2019 |  |
| Transportation from Rotterdam to Zurich by lorry | Europe | 13.240 | tkm / e-scooter | Transport, freight, lorry 16-32 metric ton, EURO6 {RER}| transport, freight, lorry 16-32 metric ton, EURO6 | APOS, U | D | Adam 2019 |  |
| Electricity consumption for driving | Switzerland | 0.0158 | kWh / km | Electricity, low voltage {CH}| market for | APOS, U | B | Adam 2019 | vmax R25 1.5761194 kWh/100km |
| Collection and redistribution | Switzerland | 0.0011 | tkm / km | Transport, freight, light commercial vehicle {CH}| processing | APOS, U | D | Adam 2019 | Collecting of e-Scooters for loading and redistribution |
| Maintenance aluminium parts | Global | 6.074E-05 | kg / km | Aluminium alloy, AlMg3 {GLO}| market for | APOS, U | D | Adam 2019 | Small parts and brake lever, 1% in 6 months: 0.164 kg per 2700 km (6 months) |
| China | 6.074E-05 | kg / km | Section bar extrusion, aluminium {CN}| processing | APOS, U | D | Adam 2019 | Production of replacing aluminium parts |
| Maintenance plastic parts | Global | 0.000185 | kg / km | Polyethylene, high density, granulate {GLO}| market for | APOS, U | D | Adam 2019 | Plastic parts: 0.5kg per 2700 km (6 months) |
| China | 0.000185 | kg / km | Injection moulding {CN}| processing | APOS, U | D | Adam 2019 | Production of replacing plastic parts |
| Maintenance tyres | Global | 0.000148 | kg / km | Synthetic rubber {GLO}| market for | APOS, U | D | Adam 2019 | 1 tyre set, 0.2 kg per tyre per 2700 km (6 months) |
| China | 0.000148 | kg / km | Blow moulding Rubber {CN}| blow moulding | APOS, U | D | Adam 2019 | Production of replacing tyres |
| Plastic waste from maintenance | Switzerland | 0.000217 | kg / km | Waste plastic, mixture {CH}| market for waste plastic, mixture | APOS, U | D | Adam 2019 | Waste replaced plastic parts: 0.587 kg per 2700 km (6 months) |
| Rubber waste from maintenance | Switzerland | 0.000148 | kg / km | Waste rubber, unspecified {CH}| market for waste rubber, unspecified | APOS, U | D | Adam 2019 | Waste replaced tyres: 0.4 kg per 2700 km (6 months) |
| Usage of road | Switzerland | 1.631E-09 | my / km | Road {CH}| construction | APOS, U | D | Adam 2019 | Taken from e-bike process in ecoinvent 3.5 |
| Global | 1.631E-09 | my / km | Decommissioned road {GLO}| market for | APOS, U | D | Adam 2019 | Taken from e-bike process in ecoinvent 3.5 |

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| **Table S8:** Life Cycle Inventory (LCI) of the end-of-life (EOL) phase of 1 aluminium e-scooter. | | | | |  |  |  |
| **Process** | **Location** | **Amount** | **Unit** | **Ecoinvent 3.5 unit processes** | **Data quality** | **Data sources** | **Remarks** |
| Treatment of Li-ion battery | Global | 1.9400 | kg | Used Li-ion battery {GLO}| market for | APOS, U | D | Adam 2019 |  |
| Treatment of polyethylene | Switzerland | 0.5870 | kg | Waste polyethylene, for recycling, unsorted {CH}| market for waste polyethylene, for recycling, unsorted | APOS, U | D | Adam 2019 |  |
| Treatment of rubber | Switzerland | 0.5660 | kg | Waste rubber, unspecified {CH}| market for waste rubber, unspecified | APOS, U | D | Adam 2019 |  |
| Treatment of cables | Switzerland | 0.3334 | kg | Waste electric wiring {CH}| market for waste electric wiring | APOS, U | D | Adam 2019 | Electric Cables, 0.065kg/m, 5.1284637 m Assumption based on copper amount |
| Treatment of control unit | Europe | 0.1840 | kg | Electronics scrap from control units {RER}| treatment of | APOS, U | D | Adam 2019 |  |
| Recycling of steel | Global | 2.5430 | kg | Steel and iron (waste treatment) {GLO}| recycling of steel and iron | APOS, U | D | Adam 2019 |  |
| Recycling of Aluminium | Global | 6.1101 | kg | Aluminium (waste treatment) {GLO}| recycling of aluminium | APOS, U | D | Adam 2019 | 90% recycling rate |
| Treatment of motor | Global | 3.5500 | kg | Waste electric and electronic equipment {GLO}| market for | APOS, U | D | Adam 2019 |  |
| Treatment of Aluminium | Europe | 6.1101 | kg | Aluminium scrap, post-consumer, prepared for melting {RER}| treatment of aluminium scrap, post-consumer, prepared for recycling, at remelter | APOS, U | D | Adam 2019 | 10% landfill |
| Landfilling of Aluminium | Switzerland | 0.6789 | kg | Waste aluminium {CH}| treatment of, sanitary landfill | APOS, U | D | Adam 2019 |  |

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| **Table S9:** Modelled and modified processes for the Life Cycle Inventory (LCI) of the aluminium e-scooter | | | | | |
| **No.** | **Modelled and modified process** | **Amount** | **Original ecoinvent process** | **Modelling / Changes** | **Remarks** |
| 1 | Blow moulding Rubber {CN}| blow moulding | APOS, U | 1 kg | Blow moulding {RoW}| production | APOS, U | In "Input to technosphere: materials/fuels" all electricity processes from different countries have been changed to *electricity, medium voltage {CN}| market group for | APOS, U.* | Amounts of all original electricity processes were added up to 1.699986271 kWh. |
| In "Inputs to technosphere: materials/fuels" *Polyethylene, low density, granulate {GLO}| market for | APOS, U* was replaced by *Synthetic rubber {RER}| production | APOS, U* | Amounts have not been changed. |
| In "Outputs to technosphere: waste treatment" *Waste plastic, mixture {RoW}| market for waste plastic, mixture | APOS, U* was replaced by *Waste rubber, unspecified {RoW}| market for waste rubber, unspecified | APOS, U* | Amounts have not been changed. |
| 2 | Casting, aluminium, lost-wax {CN}| casting, aluminium, lost-wax | APOS, U | 1 kg | Casting, aluminium, lost-wax {RoW}| casting, aluminium, lost-wax | APOS, U | In "Input to technosphere: materials/fuels" all electricity processes from different countries have been changed to *electricity, medium voltage {CN}| market group for | APOS, U.* | Amounts of all original electricity processes were added up to 40.46325083 kWh. |
| 3 | Wire drawing, steel {CN}| processing | APOS, U | 1 kg | Wire drawing, steel {RoW}| processing | APOS, U | In "Input to technosphere: materials/fuels" all electricity processes from different countries have been changed to *electricity, medium voltage {CN}| market group for | APOS, U.* | Amounts of all original electricity processes were added up to 0.14142 kWh. |
| 4 | Sheet rolling, chromium steel {CN}| processing | APOS, U | 1 kg | Sheet rolling, chromium steel {RoW}| processing | APOS, U | In "Input to technosphere: materials/fuels" all electricity processes from different countries have been changed to *electricity, medium voltage {CN}| market group for | APOS, U.* | Amounts of all original electricity processes were added up to 0.454039168 kWh. |
| 5 | Section bar extrusion, aluminium {CN}| processing | APOS, U | 1 kg | Section bar extrusion, aluminium {RoW}| processing | APOS, U | In "Input to technosphere: materials/fuels" all electricity processes from different countries have been changed to *electricity, medium voltage {CN}| market group for | APOS, U.* | Amounts of all original electricity processes were added up to 1.134586821 kWh. |
| 6 | Hot rolling, steel {CN}| processing | APOS, U | 1 kg | Hot rolling, steel {RoW}| processing | APOS, U | In "Input to technosphere: materials/fuels" all electricity processes from different countries have been changed to *electricity, medium voltage {CN}| market group for | APOS, U.* | Amounts of all original electricity processes were added up to 0.14 kWh. |
| 7 | Injection moulding {CN}| processing | APOS, U | 1 kg | Injection moulding {RoW}| processing | APOS, U | In "Input to technosphere: materials/fuels" all electricity processes from different countries have been changed to *electricity, medium voltage {CN}| market group for | APOS, U.* | Amounts of all original electricity processes were added up to 1.479957894 kWh. |

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| **Table S10:** Scale for data quality criteria for the Life cycle Inventory (LCI) | |
| **Score** | **Data quality description** |
| A | Data from company |
| B | Own measurements or calculations |
| C | Added data based on A or B |
| D | Own estimations |

**Supplement references**

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