**Supplementary Information**

**Comparative life cycle assessment of sodium-ion and lithium iron phosphate batteries in the context of carbon neutrality**

For the recapitulation purpose, this paper provides a comprehensive LCI data package, in which the battery data are obtained from previously published literature, statistical yearbooks, government reports, and some enterprise real-world data.

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# 1. Inventory analysis

The NIB and LFP battery pack inventory data are shown in Tables S1-S2.

S1. Inventory data for NIB battery pack

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Electricity | 3.53E+01 | kWh |
| NIB battery cell | 8.03E-01 | kg |
| BMS | 5.60E-02 | kg |
| Shell | 1.90E-1 | kg |
| LFP repurposing | 1.00E+00 | kg |
| Natural gas | 3.65E-01 | kg |
| Output | NIB Battery pack | 1.00E+00 | kg |
|  | Waste heat | 1.27E+1 | MJ |

S2. Inventory data for LFP battery pack

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Electricity | 2.67E+01 | kWh |
| Water | 7.95E-03 | kg |
| LFP battery cell | 8.03E-01 | kg |
| BMS | 1.66E-02 | kg |
| Shell | 1.33E-01 | p |
| LFP repurposing | 1.00E+00 | kg |
| Output | LFP Battery pack | 1.00E+00 | kg |

## 2.1 Inventory data for NIB batteries

The NIB battery cell inventory data is shown in Table S3-S14

S3. Inventory data for NIB battery cell

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Cathode | 2.16E-01 | kg |
| Anode | 2.92E-01 | kg |
| Separator | 1.69E-02 | kg |
| Electrolyte | 1.17E-01 | kg |
| Cell container | 1.97E-01 | kg |
| Nitrogen | 8.39E-03 | kg |
| Infrastructure | 3.20E-10 | p |
| Electricity | 2.91E+00 | kWh |
| Heat | 2.10E+01 | MJ |
| Output | NIB Battery cell | 7.99E-01 | kg |
|  | Waste heat | 4.69E-01 | MJ |

S4. Inventory data for NIB Cell container

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Casing | 4.84E-01 | kg |
| Nylon 6 for sealings | 5.21E-03 | kg |
| Output | Cell container | 2.47E-01 | kg |

S5. Inventory data for NIB Electrolyte

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Ethylene carbonate | 1.04E-01 | kg |
| DMC | 2.60E-02 | kg |
| NaPF6 (salt) | 1.72E-02 | kg |
| Output | Electrolyte | 1.47E-01 | kg |

S6. Inventory data for NIB NaPF6 (salt)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Sodium fluoride production | 3.73E-02 | kg |
| Phosphorus pentachloride | 2.32E-01 | kg |
| Hydrogen fluoride | 4.73E-01 | kg |
| Nitrogen | 1.46E-04 | kg |
| Lime | 8.70E-01 | kg |
| Electricity | 6.33E-02 | kWh |
| Output | limestone residue | 1.02E+00 | kg |
|  | Wastewater | 4.22E-04 | kg |
|  | Phosphorus trichloride | 3.08E-02 | kg |
|  | NaPF6 | 1.17E-01 | kg |
|  | NaF recycled | 4.96E-03 | kg |
|  | Waste heat | 2.28E-01 | MJ |

S7. Inventory data for NIB DMC

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Electricity | 4.66E-04 | kWh |
| Ethylene carbonate | 1.73E-01 | kg |
| Methanol | 1.26E-01 | kg |
| Heat | 1.79E-02 | MJ |
|  | DMC | 1.77E-01 | kg |
| Output | Ethylene glycol | 1.22E-01 | kg |

S8. Inventory data for NIB Cathode

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Active material | 2.31E-01 | kg |
| Carbon black | 4.91E-03 | kg |
| Tetrafluoroethylene | 4.78E-03 | kg |
| Polyethylene | 4.85E-03 | kg |
| N-methyl-2-pyrrolidone | 8.59E-04 | kg |
| Heat | 7.21E-02 | MJ |
| Aluminium foil | 4.92E-02 | kg |
| Electricity | 5.40E-04 | kWh |
| Output | 1-Methyl-2-pyrrolidinone | 8.59E-04 | kg |
|  | Cathode | 2.70E-01 | kg |
|  | Waste heat | 7.21E-02 | MJ |

S9. Inventory data for NIB Active material

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Na2CO3 | 4.70E-01 | kg |
| MnO2 | 3.50E-01 | kg |
| NiCO3 | 2.87E-01 | kg |
| Mg(OH)2 | 2.35E-02 | kg |
| N-methyl-2-pyrrolidone | 8.59E-04 | kg |
| Heat | 9.05E+00 | MJ |
| TiO2 | 3.22E-02 | kg |
| Electricity | 2.63E-02 | kWh |
| Output | Active material | 8.54E-01 | kg |
|  | Carbon dioxide | 3.01E-01 | kg |
|  | Waste heat | 9.15E+00 | MJ |

S10. Inventory data for NIB Mg(OH)2

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Electricity | 4.90E-02 | kWh |
| Sodium chloride | 2.91E+00 | kg |
| Hydrated lime | 3.30E-02 | kg |
| Magnesium mineral extraction | 1.79E-02 | kg |
|  | Mg(OH)2 | 2.75E-02 | kg |
| Output | Waste heat | 1.77E-01 | MJ |

S11. Inventory data for NIB NiCO3

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | NaHCO3 | 4.77E-01 | kg |
| NiSO4 | 4.37E-01 | kg |
| Water | 2.68E+00 | kg |
| Heat | 8.80E-01 | MJ |
| Electricity | 3.76E-03 | kWh |
| Output | NiCO3 | 3.36E-01 | kg |
|  | NiCO3 in effluent | 4.27E-03 | kg |
|  | Na2SO4 in effluent | 6.52E-02 | kg |
|  | Carbon dioxide | 3.01E-01 | kg |
|  | Waste heat | 7.69E-01 | MJ |

S12. Inventory data for NIB Anode

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Hard carbon | 2.92E-01 | kg |
| Carbon black | 9.45E-03 | kg |
| Carboxymethyl cellulose (CMC) | 8.83E-03 | kg |
| Styrene-butadiene rubber (SBR) | 3.80E-03 | kg |
| Water | 1.26E-01 | kg |
| Heat | 4.05E-01 | MJ |
| Aluminium foil | 1.02E-01 | kg |
| Electricity | 7.52E-07 | kWh |
| Output | Anode | 3.65E-01 | kg |
|  | Waste Water | 1.26E-01 | kg |
|  | Waste heat | 4.09E-01 | MJ |

S13. Inventory data for NIB Styrene-butadiene rubber (SBR)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Butadiene | 7.82E-03 | kg |
| Styrene | 2.61E-03 | kg |
| Emulsifier | 2.84E-04 | kg |
| Cyclohexane | 1.04E-04 | kg |
| Water | 1.87E-02 | kg |
| Cooling water | 2.60E-03 | m3 |
| Heat | 1.43E-01 | MJ |
| Sodium persulfate | 5.24E-05 | kg |
| Electricity | 5.72E-03 | kWh |
| Output | SBR | 1.04E-02 | kg |
|  | Waste Water | 1.87E-02 | kg |
|  | NMVOC | 1.50E-04 | kg |
|  | Waste heat | 1.64E-01 | MJ |

S14. Inventory data for NIB Hard carbon

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Coke | 9.13E-01 | kg |
| Nitrogen | 7.21E-01 | kg |
| Water | 1.43E-01 | kg |
| Heat | 1.51E+00 | MJ |
| Electricity | 1.47E-02 | kWh |
|  | Hard carbon | 8.01E-01 | kg |
| Output | CO2 | 6.72E-02 | kg |
|  | NO | 3.73E-02 | kg |
|  | NO2 | 3.01E-03 | kg |
|  | SO2 | 4.03E-02 | kg |
|  | Waste heat | 1.56E+00 | MJ |

## 2.2 Inventory data for LFP batteries

The NIB battery cell inventory data is shown in Table S15-S23

S15. Inventory data for LFP battery cathode material

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Iron Phosphate | 2.41E+00 | kg |
| Water | 5.78E-01 | kg |
| Lithium carbonate | 6.02E-01 | kg |
| Glucose | 2.41E-01 | kg |
| Nitrogen | 2.42E-02 | kg |
| Output | CO2 | 4.12E+00 | g |
| Dust | 2.31E-01 | g |
| Suspended solids | 1.64E-02 | g |
| Phosphorus | 1.20E-04 | g |
| Cathode material | 2.41E+00 | kg |

S16. Inventory data for LFP battery Iron Phosphate

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Electricity | 8.43E+00 | kwh |
| Steam | 1.93E+01 | kg |
| Iron powder | 8.99E-01 | kg |
| Sulfur acid | 1.62E+00 | kg |
| Phosphoric acid | 1.84E+00 | kg |
| Ammonia | 4.26E+00 | kg |
| Hydrogen peroxide | 9.04E-01 | kg |
| Desalted water | 2.05E+01 | kg |
| Output | Ammonia | 2.22E+00 | g |
| Dust | 7.93E-01 | g |
| Sulfuric acid mist | 4.89E-01 | g |
| Chemical Oxygen Demand (COD) | 2.22E-00 | g |
| Biological Oxygen Demand (BOD) | 2.23E-01 | g |
| Ammonia nitrogen | 3.13E-03 | g |
| Suspended solids | 8.87E-02 | g |
| Iron Phosphate | 2.41E+00 | kg |

S17. Inventory data for LFP battery Lithium carbonate

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Steam | 3.71E+00 | kg |
| Hard coal | 1.28E+00 | kg |
| Sulfuric acid | 1.19E+00 | kg |
| Sulfur acid | 4.76E-01 | kg |
| Lime Stone | 4.46E-01 | kg |
| Sodium hydroxide | 1.21E-01 | kg |
| Sodium Carbonate | 1.12E+00 | kg |
| Ultrapure water | 1.07E+00 | kg |
| Output | SO2 | 4.80E+00 | g |
| CO2 | 1.89E+02 | g |
| Dust | 7.49E-01 | g |
| Sulfuric acid mist | 7.68E-03 | g |
| Chemical Oxygen Demand (COD) | 9.63E-03 | g |
| Suspended solids | 9.36E-01 | g |
| Lithium carbonate | 6.02E-01 | kg |

S18. Inventory data for LFP batteryanode material

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Electricity | 9.36E-01 | kWh |
| Natural gas | 1..99E-02 | kg |
| Natural Graphite | 9.94E-01 | kg |
| Water | 7.68E-01 | kg |
| Asphalt | 1.11E-01 | kg |
| Output | Non-methane hydrocarbons | 7.46E-01 | g |
| Dust | 4.39E-01 | g |
| Benzoapyrene | 1.48E-06 | g |
| Soot | 1.76E-01 | g |
| Anode material | 1.05E+00 | kg |

S19. Inventory data for LFP battery Electrolyte

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Electricity | 2.76E+00 | kWh |
| Natural gas | 1.57E-01 | kg |
| Steam | 1.15E+01 | kg |
| Pure water | 6.70E-01 | kg |
| Nitrogen | 4.89E-01 | kg |
| Sodium hydroxide | 7.08E-02 | kg |
| Water | 1.24E+00 | kg |
| Output | CO2 | 8.45E+02 | g |
| Dust | 4.96E-02 | g |
| Fluoride | 8.82E-03 | g |
| Hydrogen fluoride | 7.42E-02 | g |
| Hydrogen chloride | 1.94E-01 | g |
| Volatile Organic Compounds (VOC) | 3.40E-01 | g |
| Chemical Oxygen Demand (COD) | 1.30E-01 | g |
| Fluoride | 4.32E-03 | g |
| Suspended solids | 1.25E-01 | g |
| Ammonia nitrogen | 1.27E-02 | g |
| Electrolyte | 1.88E+00 | kg |

S20. Inventory data for LFP batteryseparator

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Electricity | 4.22E+00 | kWh |
| Polypropylene | 1.88E-01 | kg |
| Polyethylene | 9.44E-05 | kg |
| Aluminum oxide | 3.75E-01 | kg |
| Carboxymethylcellulose sodium | 3.75E-06 | kg |
| Aqueous acrylic acid | 4.69E-02 | kg |
| Water | 4.83E-01 | kg |
| Output | Volatile Organic Compounds (VOC) | 9.36E-01 | g |
| Dust | 1.78E-02 | g |
| Chemical Oxygen Demand (COD) | 5.76E-03 | g |
| Lithium carbonate | 2.82E+01 | m2 |

S21. Inventory data for LFP batterycopper foil

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Electricity | 1.12E+01 | kWh |
| Natural gas | 2.49E-04 | kg |
| Copper | 9.04E-01 | kg |
| Concentrated sulfuric acid | 1.46E-02 | kg |
| Hydrochloric acid | 1.21E-04 | kg |
| Tartaric Acid | 1.02E-04 | kg |
| Active carbon | 3.02E-04 | kg |
| Cobalt Sulphate Hexahydrate | 6.04E-04 | kg |
| Zinc Sulphate Heptahydrate | 6.04E-04 | kg |
| Carboxyethyl cellulose | 1.21E-04 | kg |
| 3-Carboxy-1-propanesulfonate | 6.04E-05 | kg |
| Water | 1.01E+01 | kg |
| Output | Sulfuric acid mist | 6.38E-01 | g |
| Copper | 3.38E-04 | g |
| Cobalt | 4.47E-05 | g |
| Copper foil | 9.04E-01 | kg |

S22. Inventory data for LFP battery aluminum foil

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Electrolytic aluminum | 7.97E-01 | kg |
| Water | 1.72E+00 | kg |
| Diatomite | 2.48E+00 | kg |
| Rolling Oil | 7.84E+00 | kg |
| Output | Non-methane hydrocarbons | 1.79E+00 | g |
| Chemical oxygen demand (COD) | 2.98E-02 | g |
| Suspended solids | 5.93E-04 | g |
| Ammonia nitrogen | 5.86E-04 | g |
| Aluminum foil | 6.02E-01 | kg |

S23. Inventory data for LFP battery Shell foil

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Electricity | 6.58E-01 | kWh |
| Stretching oil | 5.26E-02 | kg |
| Water | 2.88E-03 | kg |
| Aluminum | 1.32E-01 | kg |
| Output | Shell | 1.75E+00 | P |

## **2.3 Inventory data for use phase**

S24. Background Parameters of NIB and LFP battery life cycle models

|  |  |  |  |
| --- | --- | --- | --- |
| Parameter name | NIB | LFP | Unit |
| Vehicle mass | 1625 | 1625 | kg |
| Total mileage | 200000 | 200000 | km |
| Battery mass | 558 | 600 | kg |
| Battery capacity | 57.0 | 57.0 | kwh |
| Power battery system energy density | 102 | 95 | Wh/kg |
| Battery cell energy density | 160 | 137 | Wh/kg |
| Electricity consumption | 12.2 | 12.2 | kWh/100km |
| Battery charge and discharge efficiency | 90 | 90 | % |

S25. Inventory data for NIB and LFP batteries in EV phase

|  |  |  |  |
| --- | --- | --- | --- |
| Parameters | LFP battery | NIB battery | Unit |
|  | 2440 | 2440 | kWh |
|  | 4414.52 | 4111.54 | kWh |
| Total electricity loss | 6854.52 | 6551.54 | kWh |
| Electricity loss per kg | 11.42 | 11.72 | kWh/kg battery |

S26. Inventory data for NIB and LFP batteries in CBS phase

|  |  |  |  |
| --- | --- | --- | --- |
| Parameters | LFP battery | NIB battery | Unit |
|  | 8773.22 | 7416.12 | kWh |
| Electricity loss per kg | 14.62 | 13.97 | kWh/kg battery |

## 2.4 Inventory data for the recycling phase

### 2.4.1Inventory data for the NIB battery recycling process

Based on the actual situation of the battery recycling industry in China, the recycling process of NIB is divided into two options. One is hydrometallurgical recycling and the other is pyrometallurgical recycling. The inventory data for the hydrometallurgical recycling process is shown in Table S27 and the inventory data for the pyrometallurgical recycling process is shown in Table S28.

S27. Inventory data for hydrometallurgical recycling process of NIB

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Electricity | 1.41E-01 | kWh |
| Reagent | 2.50E-02 | kg |
| used battery of NIB | 1.00E+01 | kg |
| Water | 7.20E-01 | kg |
| H2SO4 | 2.13E-01 | kg |
| Lime | 1.16E-01 | kg |
| Output | Non-Fe-Co-metals | 1.05E-01 | kg |
| Aluminum | 9.59E-02 | kg |
| Copper | 9.38E-03 | kg |
| NiCO3 | 8.71E-02 | kg |
| MnO2 | 1.07E-01 | kg |
| Mg(OH)2 | 6.74E-03 | kg |
| TiO2 | 1.09E-02 | kg |
| SO2 | 4.50E-06 | kg |
| VOC | 2.50E-06 | kg |
| Solid suspension | 1.20E-05 | kg |
| Chemical Oxygen Demand (COD) | 3.00E-05 | kg |
| Total hydrocarbon | 1.00E-08 | kg |
| Plastic to refining | 5.82E-02 | kg |
| Residue to landfill | 2.02E-01 | kg |

S28. Inventory data for pyrometallurgical recycling process of NIB

|  |  |  |  |
| --- | --- | --- | --- |
|  | Parameter name | Amount | Unit |
| Input | Electricity | 8.00E-01 | kWh |
| Used battery of NIB | 1.00E+00 | kg |
| NaOH | 2.10E-01 | kg |
| Water | 1.10E+00 | kg |
| Output | Non-Fe-Co-metals | 1.05E-01 | kg |
| Aluminum | 9.57E-02 | kg |
| Copper | 9.36E-03 | kg |
| NiCO3 | 8.71E-02 | kg |
| MnO2 | 1.07E-01 | kg |
| TiO2 | 1.09E-02 | kg |
| SO2 | 4.80E-05 | kg |
| Dust | 1.04E-05 | kg |
| CO2 | 2.03E+00 | kg |
| Plastic to refining | 5.82E-02 | kg |

### 2.4.2 Inventory data for the LFP battery recycling process

S29. Inventory data for hydrometallurgical recycling process of LFP batteries

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Parameter name | Amount | Unit |
| Input | Energy and Power | Natural gas | 3.40E-02 | kg |
| Materials | used battery of LFP | 1.75E-02 | P |
| Hydrochloric acid | 4.04E+00 | kg |
| Thick water | 5.61E+00 | kg |
| Magnesium hydroxide | 5.85E-01 | kg |
| Sodium hydroxide | 4.26E-01 | kg |
| Output | Atmospheric Pollutant | Dust | 3.03E-01 | g |
| Sulfuric acid mist | 8.11E-02 | g |
| Hydrogen chloride | 5.43E-02 | g |
| Production | Lithium chloride solution | 8.90E+00 | kg |

S30. Inventory data for Physical recycling process of LFP batteries

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Parameter name | Amount | Unit |
| Input | Energy and Power | Electricity | 3.65E+01 | kWh |
| Materials | used battery of LFP | 1.75E-02 | P |
| Liquid Nitrogen | 3.80E+01 | kg |
| DMC Solvents | 1.93E+00 | kg |
| Lithium carbonate | 1.53E-01 | kg |
| Nitrogen | 4.92E-01 | kg |
| Glucose | 1.45E-03 | kg |
| Output | Atmospheric Pollutant | Hydrogen fluoride | 2.10E-01 | g |
| Dust | 6.51E+00 | g |
| Volatile Organic Compounds(VOC) | 2.44E+00 | g |
| Production | graphite | 1.05E+00 | kg |
| Aluminum | 5.26E-01 | kg |
| copper | 8.42E-01 | kg |
| Battery Separator | 4.52E-01 | kg |
| Plastic Parts | 1.11E-01 | kg |
| Shell | 1.75E-02 | P |
| Electrolyte | 1.04E+00 | kg |
| Cathode material | 2.32E+00 | kg |

# 2. Results of sensitivity analysis

S31. Results of sensitivity analysis

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | **NIB** | | | | **LFP** | | | |
|  |  | **electricity** | | **NiSO4** | | **electricity** | | **Copper** | |
| **Impact category** | **Unit** | **-10%** | **+10%** | **-10%** | **+10%** | **-10%** | **+10%** | **-10%** | **+10%** |
| Global warming | kg CO2 eq | -1.93% | 1.93% | -7.51% | 3.49% | -2.11% | 3.06% | -1.00% | 0.48% |
| Stratospheric ozone depletion | kg CFC11 eq | -0.15% | 0.15% | -4.44% | 2.06% | -0.45% | 1.40% | -1.84% | 4.51% |
| Ionizing radiation | kBq Co-60 eq | -1.79% | 1.79% | -3.74% | 1.74% | -1.86% | 2.81% | -2.34% | 3.68% |
| Ozone formation, Human health | kg NOx eq | -0.88% | 0.88% | -10.86% | 5.04% | -2.19% | 3.14% | -1.67% | 1.79% |
| Fine particulate matter formation | kg PM2.5 eq | -1.13% | 1.13% | -8.11% | 3.76% | -0.92% | 1.87% | -2.09% | 4.41% |
| Ozone formation, Terrestrial ecosystems | kg NOx eq | -0.86% | 0.86% | -10.73% | 4.98% | -2.13% | 3.07% | -1.64% | 1.80% |
| Terrestrial acidification | kg SO2 eq | -1.00% | 0.99% | -5.99% | 2.78% | -0.73% | 1.68% | -2.20% | 4.90% |
| Freshwater eutrophication | kg P eq | -0.26% | 0.26% | -12.56% | 5.83% | 0.08% | 0.87% | -3.41% | 8.67% |
| Marine eutrophication | kg N eq | -0.37% | 0.37% | -7.38% | 3.43% | 0.12% | 0.83% | -2.73% | 7.20% |
| Terrestrial ecotoxicity | kg 1,4-DCB | -0.15% | 0.15% | -3.15% | 1.46% | 0.40% | 0.55% | -4.38% | 11.29% |
| Freshwater ecotoxicity | kg 1,4-DCB | -0.08% | 0.08% | -13.57% | 6.30% | 0.35% | 0.60% | -3.88% | 10.08% |
| Marine ecotoxicity | kg 1,4-DCB | -0.08% | 0.08% | -13.49% | 6.27% | 0.36% | 0.59% | -3.88% | 10.08% |
| Human carcinogenic toxicity | kg 1,4-DCB | -0.49% | 0.49% | -6.38% | 2.96% | -0.10% | 1.05% | -1.37% | 3.85% |
| Human non-carcinogenic toxicity | kg 1,4-DCB | -0.06% | 0.06% | -13.80% | 6.41% | 0.39% | 0.56% | -4.02% | 10.44% |
| Land use | m2a crop eq | -0.50% | 0.50% | -10.83% | 5.03% | -0.40% | 1.35% | -1.21% | 3.08% |
| Mineral resource scarcity | kg Cu eq | -0.01% | 0.01% | -20.06% | 9.31% | 0.42% | 0.53% | -2.84% | 7.83% |
| Fossil resource scarcity | kg oil eq | -1.54% | 1.54% | -9.40% | 4.36% | -1.08% | 2.03% | -0.55% | 0.83% |
| Water consumption | m3 | -0.56% | 0.56% | -8.76% | 4.07% | 0.14% | 0.80% | -0.04% | 1.19% |