**Supplementary information (SI) for:**

# Plastic Packaging Waste Management in Iceland: Challenges and Opportunities from a Life Cycle Assessment Perspective

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## S1. Data underlying LCA model

SI-1: Data provided by the Icelandic Recycling Fund [1,2]

| **Plastic packaging demand (in market)** | **2017** | **2018** | **2019** | **2020** |
|---|---|---|---|---|
| Packaging | 12,202 | 13,128 | 13,906 | 11,497 |
| Silage film | 1,801 | 1,682 | 1,721 | 1,351 |
| Deposit bottles | 2,047 | 1,961 | 1,866 | 1,597 |
| | *16,050* | *16,771* | *17,493* | *14,445* |

| **Sent for recycling** | **2017** | **2018** | **2019** | **2020** |
|---|---|---|---|---|
| **Packaging** | *1,273* | *4,819* | *4,625* | *3,905* |
| Recycling | 961 | 1,921 | 1,501 | 1,630 |
| Incineration with energy recovery | 207 | 2,212 | 2,091 | 987 |
| Incineration without energy recovery | 28 | 7 | 0 | 0 |
| Landfill | 0 | 0 | 0 | 0 |
| Not packaging | 33 | 643 | 944 | 1,287 |
| Water, dirt etc. | 43 | 37 | 89 | 0 |
| **Silage film** | *2,032* | *2,721* | *2,523* | *2,796* |
| Recycling | 1,034 | 1,365 | 975 | 951 |
| Incineration with energy recovery | 0 | 0 | 0 | 0 |
| Incineration without energy recovery | 1 | 3 | 9 | 3 |
| Landfill | 3 | 42 | 157 | 57 |
| Not packaging | 0 | 0 | 0 | 0 |
| Water, dirt etc. | 995 | 1,311 | 1,244 | 1,365 |
| **Deposit bottles** | *1,625* | *1,625* | *1,586* | *1,447* |
| Recycling | 1,625 | 1,625 | 1,586 | 1,447 |

| **Recycling in Iceland** | **2017** | **2018** | **2019** | **2020** |
|---|---|---|---|---|
| Silage film for final recycling (pellets) | 0 | 0 | 138 | 419 |

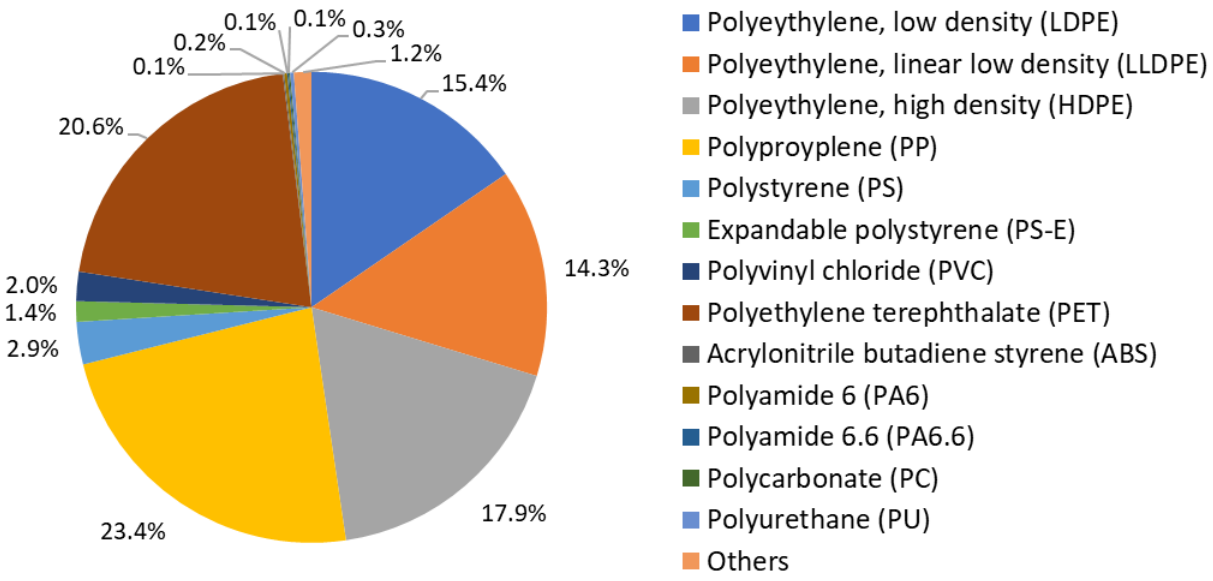
| **Remains in Iceland (no information available) *** | **2020** |
|---|---|
| Packaging | 8,879 |
| Deposit bottles | 150 |
| | 9,029 |

| **Assumption: Disposal in Iceland** | **2020** |
|---|---|
| Landfill | 92.4% |
| Incineration without energy recovery (Source: IRF) | 7.6% |

SI-2: Environmental impact of landfilling in Iceland (Environment Agency of Iceland, 2021, 2020).

In Iceland, 15 active landfill operations have permits that allow them to receive mixed active waste for landfilling [3]. That includes mixed household waste (within municipal solid waste, MSW) that consists of, among other wastes, unsorted plastic packaging. Emissions from landfilling are however not only from active landfills but from landfills not in operation due to the decomposition of waste previously landfilled. The active landfill sites are of varying sizes, from very small to very large in Icelandic terms. The three largest landfill sites make up for most of the landfilling in the country. The largest active landfill, in the capital area, is due to stop all MSW landfilling by January 2023 according to its permit [4]. Even if plastic packaging waste does not include hazardous materials, they still contain additives that can pollute the leachate. Leachate is the liquid that passes through a landfill and has extracted dissolved and suspended matter from it [5]. In Iceland five of the 15 active landfills have leachate collection and in four of them, it is made to pass through a treatment process meant to neutralize it. Following this, the leachate is released to the nearest receiving waterbody. Additionally, none of them are meant to filter out microplastics, only to neutralize certain chemicals and nutrients as in Europe. Iceland's largest landfill releases its leachate into the ocean, following the treatment, and it is treated as municipal wastewater [4]. As stated above 10 of the 15 have no collection or treatment of the leachate but these are very small landfills even on an Icelandic scale.

SI-3: Plastic packaging demand by polymer type in 2020 (European average)[6,7]




For the unspecific consumption share („others“) an average mix of the available plastic types were considered.

SI-4: Calculation procedure

Environmental impact of **plastic demand** in Iceland for household plastic 2020

| Household plastic demand in Iceland (per plastic type) | X | Enviromental impact of household plastic production (per plastic type and cradle-to-gate) | = | Environmental impact of the consumption in iceland for household plastic (per plastic type) |
|---|---|---|---|---|

Environmental impact of **plastic waste** in Iceland for household plastic 2020

| Household plastic waste in Iceland (per end-of-life option) | X | Enviromental impact of end-of-life option (per end-of-life option, impact and credit) | = | Environmental impact of the plastic waste management in iceland for household plastic (per end-of-life option) |
|---|---|---|---|---|

| **14,445 t** | X | **enviromental impact/ton** | = | **enviromental impact/14,445 t** |
|---|---|---|---|---|

SI-5: Life cycle inventory data sets [8,9]

| Data set | Country | GUID | Source |
|---|---|---|---|
| Material | | | |
| Polyethylene, LDPE, granulate | EU-28 | {63E805C4-CE60-4CAA-BD2A-6CC779C01208} | [8] |
| Polyethylene, LLDPE, granulate | EU-28 | {b8c432bd-e016-4226-94db-91074f2cef9f} | [8] |
| Polyethylene, HDPE, granulate | EU-28 | {6ee18ba1-66e9-4573-b03d-3d84e92d7bda} | [8] |
| Polypropylene, PP, granulate | EU-28 | {5F5BDF35-A41C-4C95-8737-943B5EE4F234} | [8] |
| Polystyrene part (PS) | RER | {03a20498-f406-4baf-9b4b-c0a08eb94073} | [8] |
| Expandable polystyrene (EPS) | EU-28 | {b60b30bf-991d-41b8-a295-5d0b2e5f2bb5} | [8] |
| Polyvinyl chloride, from suspension process, S-PVC | EU-28 | {0a149b76-27a3-4209-9b00-0207ca1a44a2} | [8] |
| Polyethylene terephthalate, granulate, bottle grade, at plant | RER | {84854d79-77da-4794-9d2a-f108f7e91741} | [8] |
| Acrylonitrile butadiene styrene (ABS) | EU-28 | {864a6be9-1a0a-44fb-860a-199bdb66dd60} | [8] |
| Polyamide 6 (PA6) | EU-28 | {c3a53e26-b87f-4d41-bffa-785fc0ca4935} | [8] |
| Polyamide 6.6 (PA6.6) | EU-28 | {35D4884B-E15D-453C-8F61-5090E273678A} | [8] |
| Polycarbonate | EU-28 | {acf81ba2-1ebb-4150-9b26-06d8e2c6be10} | [8] |
| Polyurethane rigid foam (PU) | RER | {e24c0df0-1ad8-43c9-8552-7fb9e1a3685f} | [8] |
| Transport | | | |
| Truck, Euro 4, 28 - 32t gross weight / 22t payload capacity | GLO | {BF2EC8D5-CEBB-462B-8E11-09DE1E1C96FF} | [9] |
| Diesel mix at filling station | EU-28 | {99248EE9-3A59-47E4-B1F1-BB79067249BA} | [9] |
| Container ship, 5,000 to 200,000 dwt payload capacity, ocean going | GLO | {14B21448-160F-4F43-962D-20A65461902A} | [9] |
| Heavy fuel oil at refinery (1.0wt.% S) | EU-28 | {50462B0D-7D2B-40D4-843E-9857061E3C08} | [9] |
| Incineration | | | |
| Plastics (unspecified) in waste incineration plant | DE | {a2883726-6b1d-486b-b5f3-3dfeed719d45} | [9] |
| Plastics (unspecified) in waste incineration plant | SE | {91e63099-f053-4d9b-b7b8-10eb2b845fe3} | [9] |
| Plastics (unspecified) in waste incineration plant | NL | {f7f7e18e-647e-4c0b-bcac-1b30e19d9188} | [9] |
| Plastics (unspecified) in waste incineration plant | PL | {088a3a2d-8902-4848-b238-d68582a0fb1e} | [9] |
| Plastics (unspecified) in waste incineration plant | DK | {F509750E-3FA5-4FE3-A3DE-B3640B341EA3} | [9] |
| Landfill | | | |
| Plastic waste on landfill | EU | {64197300-3307-11dd-bd11-0800200c9a66} | [9] |
| Recycling | | | |
| Washing (plastic recycling) | DE | {9334dd0d-f18b-4361-af5e-c974171a1352} | [9] |

| | | | |
|---|---|---|---|
| Granulator | DE | {ecb15cb5-5d34-4aec-becb-3b1812dd5af7} | [9] |
| Pelletizing and compounding | DE | {0f4c3fb4-bc30-43e5-8567-e41ffa5487b0} | [9] |
| Water (desalinated; deionised) | EU-28 | {ded83dc7-a169-4de2-af43-ed30a5e2bb00} | [9] |
| Municipal waste water | EU-28 | {9805E7EE-B500-46B4-A0F0-37B09E00A3FA} | [9] |
| Washing (plastic recycling) | DE | {9334dd0d-f18b-4361-af5e-c974171a1352} | [9] |
| Granulator | DE | {ecb15cb5-5d34-4aec-becb-3b1812dd5af7} | [9] |
| Electricity mix | | | |
| Electricity grid mix | DE | {48ab6f40-203b-4895-8742-9bdbef55e494} | [9] |
| Electricity grid mix | SE | {0982d3bc-3459-44f8-82d4-c0b90b3bcafc} | [9] |
| Electricity grid mix | NL | {BA65B4F5-B979-4609-81FF-D0E16D8D2E59} | [9] |
| Electricity grid mix | PL | {1598ea72-ae02-42fc-ae87-7dbe90df17ce} | [9] |
| Electricity grid mix | DK | {53F9EFFD-6C33-4CAD-AC0B-A4FACB00832E} | [9] |
| Electricity grid mix | IS | {d5d84799-7696-4876-87d3-0a02fcf26e93} | [9] |
| Thermal Energy | | | |
| Thermal energy from natural gas | DE | {cfe8972e-6b51-4a17-b499-d78477fa4294} | [9] |
| Thermal energy from natural gas | SE | {009f27a6-f336-4200-81c0-28e4fa5638a4} | [9] |
| Thermal energy from natural gas | NL | {CAA2A766-26C2-4930-8655-A2AB89597275} | [9] |
| Thermal energy from natural gas | PL | {fc0ef91a-8bc0-4d0d-8b51-9c90e8828d82} | [9] |
| Thermal energy from natural gas | DK | {87FADE97-C24D-4688-8942-D5C43A5B8F15} | [9] |
| Steam | | | |
| Process steam from natural gas 85% | DE | {07f9b4e1-16b8-49df-81b9-dcc064590cdc} | [9] |
| Process steam from natural gas 85% | SE | {b99924c4-b03b-4f03-aa3b-2d5c01e5987b} | [9] |
| Process steam from natural gas 85% | NL | {1b8701ad-d89e-4a24-b041-c4f314dac740} | [9] |
| Process steam from natural gas 85% | PL | {164604cd-eb90-4a4a-857c-518e981b32ad} | [9] |
| Process steam from natural gas 85% | DK | {DCEF0FD6-902B-4827-8160-607879565BBB} | [9] |

SI-6: Electricity mix of different European countries [9]

| | Sweden | Netherlands | Germany | Poland | Denmark | Iceland |
|---|---|---|---|---|---|---|
| Hydro | 38.10% | 0.06% | 3.76% | 1.41% | 0.05% | 69.66% |
| Geothermal | | | 0.03% | | | 30.31% |
| Nuclear | 41.95% | 3.07% | 11.85% | | | |
| Natural gas | 0.23% | 51.03% | 13.00% | 7.44% | 6.82% | |
| Wind | 10.17% | 9.24% | 17.14% | 7.53% | 45.75% | 0.02% |
| Hard coal | 0.21% | 24.02% | 12.87% | 47.81% | 21.63% | |
| Lignite | | | 22.69% | 29.03% | | |
| Photovoltaics | 0.25% | 3.23% | 7.14% | 0.18% | 3.14% | |
| Biomass (solid) | 6.24% | 1.31% | 1.69% | 3.14% | 14.54% | |
| Biogas | 0.04% | 0.78% | 5.28% | 0.66% | 2.05% | |
| Fuel oil | 0.19% | 1.14% | 0.81% | 1.06% | 0.87% | 0.01% |
| Waste | 1.97% | 3.65% | 2.06% | 0.31% | 5.15% | |
| Coal gases | 0.47% | 2.47% | 1.69% | 1.44% | | |
| Peat | 0.19% | | | | | |

## S2. Additional results

SI-7: Impact and credit per ton of plastic packaging waste

| | | **Sent for recycling [1 ton]** (37,71% Sweden, 38,15% Netherlands, 18,52% Germany, 5,29% Poland, 0,33% Denmark) | | | | **End-of-Life treatment in Iceland [1 ton]** | | |
|---|---|---|---|---|---|---|---|---|
| **CML2001 - Aug. 2016** | | **Recycling** | **Incineration with energy recovery** | **Incineration without energy recovery** | **Landfill** | **Recycling** | **Incineration without energy recovery** | **Landfill** |
| Global Warming Potential (GWP 100 years) [kg CO2 eq.] | transport | 3.41E+01 | 3.41E+01 | 3.41E+01 | 3.41E+01 | 7.55E+00 | 7.55E+00 | 7.55E+00 |
| | waste treatment | 1.30E+02 | 2.29E+03 | 2.29E+03 | 6.72E+01 | 4.16E+01 | 2.29E+03 | 6.72E+01 |
| | credits | -1.64E+03 | -1.50E+03 | | | -1.64E+03 | | |
| | net value | -1.48E+03 | 8.28E+02 | 2.33E+03 | 1.01E+02 | -1.59E+03 | 2.30E+03 | 7.48E+01 |
| Abiotic Depletion (ADP fossil) [MJ] | transport | 4.37E+02 | 4.37E+02 | 4.37E+02 | 4.37E+02 | 1.03E+02 | 1.03E+02 | 1.03E+02 |
| | waste treatment | 1.44E+03 | 4.79E+02 | 4.79E+02 | 9.75E+02 | 4.36E+02 | 4.79E+02 | 9.75E+02 |
| | credits | -5.85E+04 | -2.32E+04 | | | -5.85E+04 | | |
| | net value | -5.66E+04 | -2.23E+04 | 9.16E+02 | 1.41E+03 | -5.80E+04 | 5.82E+02 | 1.08E+03 |
| Acidification Potential (AP) [kg SO2 eq.] | transport | 6.21E-01 | 6.21E-01 | 6.21E-01 | 6.21E-01 | 3.04E-02 | 3.04E-02 | 3.04E-02 |
| | waste treatment | 1.59E-01 | 4.50E-01 | 4.50E-01 | 1.73E-01 | 1.63E+00 | 4.50E-01 | 1,73E-01 |
| | credits | -4.71E+00 | -9.52E-01 | | | -4.71E+00 | | |
| | net value | -3.92E+00 | 1.19E-01 | 1.07E+00 | 7.94E-01 | -3.04E+00 | 4.80E-01 | 2.03E-01 |
| Eutrophication Potential (EP) [kg Phosphate eq.] | transport | 7.81E-02 | 7.81E-02 | 7.81E-02 | 7.81E-02 | 7.72E-03 | 7.72E-03 | 7.72E-03 |
| | waste treatment | 4.42E-02 | 9.04E-02 | 9.04E-02 | 1.90E-01 | 3.06E-02 | 9.04E-02 | 1.90E-01 |
| | credits | -1.87E+00 | -1.66E-01 | | | -1.87E+00 | | |
| | net value | -1.75E+00 | 2.12E-03 | 1.69E-01 | 2.69E-01 | -1.83E+00 | 9.82E-02 | 1.98E-01 |
| Abiotic Depletion (ADP elements) [kg Sb eq.] | transport | 2.50E-06 | 2.50E-06 | 2.50E-06 | 2.50E-06 | 8.86E-07 | 8.86E-07 | 8.86E-07 |
| | waste treatment | 8.26E-05 | 5.86E-05 | 5.86E-05 | 1.30E-05 | 4.55E-05 | 5.86E-05 | 1.30E-05 |
| | credits | -4.04E-02 | -1.42E-04 | | | | | |
| | net value | -4.03E-02 | -8.11E-05 | 6.11E-05 | 1.55E-05 | 4.64E-05 | 5.95E-05 | 1.39E-05 |
| Freshwater Aquatic Ecotoxicity Pot. (FAETP inf.) [kg DCB eq.] | transport | 1.60E-01 | 1.60E-01 | 1.60E-01 | 1.60E-01 | 4.06E-02 | 4.06E-02 | 4.06E-02 |
| | waste treatment | 5.40E-01 | 9.56E-02 | 9.56E-02 | 3.11E-01 | 2.28E-01 | 9.56E-02 | 3.11E-01 |
| | credits | -3.46E+02 | -9.07E-01 | | | | | |
| | net value | -3.45E+02 | -6.52E-01 | 2.55E-01 | 4.71E-01 | 2.69E-01 | 1.36E-01 | 3.51E-01 |
| | transport | 1.26E+00 | 1.26E+00 | 1.26E+00 | 1.26E+00 | 1.74E-01 | 1.74E-01 | 1.74E-01 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Human Toxicity Potential (HTP inf.) [kg DCB eq.] | waste treatment | 6.11E+00 | 9.71E+00 | 9.71E+00 | 1.99E+00 | 3.14E+00 | 9.71E+00 | 1.99E+00 |
| | credits | -7.83E+02 | -3.07E+01 | | | | | |
| | net value | -7.75E+02 | -1.97E+01 | 1.10E+01 | 3.25E+00 | 3.31E+00 | 9.88E+00 | 2.17E+00 |
| Marine Aquatic Ecotoxicity Pot. (MAETP inf.) [kg DCB eq.] | transport | 5.40E+02 | 5.40E+02 | 5.40E+02 | 5.40E+02 | 1.36E+02 | 1.36E+02 | 1.36E+02 |
| | waste treatment | 2.04E+04 | 7.02E+04 | 7.02E+04 | 6.45E+03 | 8.82E+02 | 7.02E+04 | 6.45E+03 |
| | credits | -2.35E+05 | -6.56E+04 | | | | | |
| | net value | -2.14E+05 | 5.16E+03 | 7.08E+04 | 6.99E+03 | 1.02E+03 | 7.04E+04 | 6.59E+03 |
| Ozone Layer Depletion Potential (ODP, steady state) [kg R11 eq.] | transport | 3.11E-12 | 3.11E-12 | 3.11E-12 | 3.11E-12 | 9.04E-13 | 9.04E-13 | 9.04E-13 |
| | waste treatment | 1.99E-09 | 2.39E-10 | 2.39E-10 | 1.12E-10 | 5.81E-11 | 2.39E-10 | 1.12E-10 |
| | credits | -2.00E-03 | -3.48E-11 | | | | | |
| | net value | -2.00E-03 | 2.07E-10 | 2.42E-10 | 1.15E-10 | 5.90E-11 | 2.40E-10 | 1.13E-10 |
| Photochem. Ozone Creation Potential (POCP) [kg Ethene eq.] | transport | 7.79E-03 | 7.79E-03 | 7.79E-03 | 7.79E-03 | -1.13E-02 | -1.13E-02 | -1.13E-02 |
| | waste treatment | 1.48E-02 | 2.82E-02 | 2.82E-02 | 1.58E-02 | 2.45E-03 | 2.82E-02 | 1.58E-02 |
| | credits | -9.38E-01 | -1.12E-01 | | | | | |
| | net value | -9.15E-01 | -7.61E-02 | 3.60E-02 | 2.35E-02 | -8.84E-03 | 1.69E-02 | 4.46E-03 |
| Terrestric Ecotoxicity Potential (TETP inf.) [kg DCB eq.] | transport | 5.24E-02 | 5.24E-02 | 5.24E-02 | 5.24E-02 | 1.87E-02 | 1.87E-02 | 1.87E-02 |
| | waste treatment | 3.23E-01 | 2.82E-02 | 2.82E-02 | 1.43E+00 | 2.07E-01 | 2.82E-02 | 1.43E+00 |
| | credits | -3.71E+00 | 2.01E-01 | | | | | |
| | net value | -3.33E+00 | 2.82E-01 | 8.06E-02 | 1.48E+00 | 2.26E-01 | 4.69E-02 | 1.45E+00 |

The net value for recycling, incineration or landfilling a ton of plastic waste can be calculated as the sum of the impacts associated with the transportation of wastes to different countries, from the waste treatment and the associated credits.

SI-8: Scenario analysis (Recycling in Europe 2020, 2021)

| | Recycling | | | Incineration with energy recovery | | | Incineration without energy recovery | | | Landfill | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2020 | Average | 2021 | 2020 | Average | 2021 | 2020 | Average | 2021 | 2020 | Average | 2021 |
| Abiotic Depletion (ADP elements) [kg Sb eq.] | -3.43E+02 | -3.43E+02 | -3.43E+02 | -5.31E-02 | -8.01E-02 | -1.12E-01 | 1.82E-04 | 1.83E-04 | 1.85E-04 | 8.83E-04 | 8.84E-04 | 8.85E-04 |
| Abiotic Depletion (ADP fossil) [MJ] | -2.38E+08 | -2.37E+08 | -2.35E+08 | -2.24E+07 | -2.20E+07 | -2.16E+07 | 2.69E+03 | 2.75E+03 | 2.82E+03 | 8.02E+04 | 8.05E+04 | 8.08E+04 |
| Acidification Potential (AP) [kg SO2 eq.] | -1.93E+04 | -1.91E+04 | -1.88E+04 | 3.65E+02 | 1.18E+02 | -1.72E+02 | 3.16E+00 | 3.21E+00 | 3.28E+00 | 4.46E+01 | 4.53E+01 | 4.61E+01 |
| Eutrophication Potential (EP) [kg Phosphate eq.] | -6.28E+03 | -6.25E+03 | -6.21E+03 | 3.07E+01 | 2.09E+00 | -3.16E+01 | 4.98E-01 | 5.06E-01 | 5.14E-01 | 1.52E+01 | 1.53E+01 | 1.54E+01 |
| Freshwater Aquatic Ecotoxicity Pot. (FAETP inf.) [kg DCB eq.] | -8.03E+05 | -8.03E+05 | -8.03E+05 | -5.55E+02 | -6.43E+02 | -7.47E+02 | 7.54E-01 | 7.66E-01 | 7.80E-01 | 2.67E+01 | 2.68E+01 | 2.69E+01 |
| Global Warming Potential (GWP 100 years) [kg CO2 eq.] | -6.68E+06 | -6.56E+06 | -6.41E+06 | 8.59E+05 | 8.17E+05 | 7.70E+05 | 6.98E+03 | 6.99E+03 | 6.99E+03 | 5.75E+03 | 5.77E+03 | 5.80E+03 |
| Global Warming Potential (GWP 100 years), excl biogenic carbon [kg CO2 eq.] | -6.69E+06 | -6.56E+06 | -6.42E+06 | 8.59E+05 | 8.18E+05 | 7.70E+05 | 6.98E+03 | 6.99E+03 | 6.99E+03 | 5.81E+03 | 5.84E+03 | 5.86E+03 |
| Human Toxicity Potential (HTP inf.) [kg DCB eq.] | -4.58E+06 | -4.58E+06 | -4.58E+06 | -1.54E+04 | -1.94E+04 | -2.42E+04 | 3.27E+01 | 3.29E+01 | 3.31E+01 | 1.84E+02 | 1.86E+02 | 1.87E+02 |
| Marine Aquatic Ecotoxicity Pot. (MAETP inf.) [kg DCB eq.] | -1.11E+09 | -1.11E+09 | -1.10E+09 | 1.39E+07 | 5.09E+06 | -5.30E+06 | 2.12E+05 | 2.12E+05 | 2.13E+05 | 3.98E+05 | 3.99E+05 | 3.99E+05 |
| Ozone Layer Depletion Potential (ODP, steady state) [kg R11 eq.] | -1.71E+01 | -1.71E+01 | -1.71E+01 | 2.13E-07 | 2.05E-07 | 1.87E-07 | 6.71E-10 | 7.26E-10 | 7.93E-10 | 6.56E-09 | 6.57E-09 | 6.57E-09 |
| Photochem. Ozone Creation Potential (POCP) [kg Ethene eq.] | -3.86E+03 | -3.84E+03 | -3.83E+03 | -5.86E+01 | -7.51E+01 | -9.45E+01 | 1.05E-01 | 1.08E-01 | 1.11E-01 | 1.30E+00 | 1.34E+00 | 1.39E+00 |
| Terrestric Ecotoxicity Potential (TETP inf.) [kg DCB eq.] | -1.87E+04 | -1.86E+04 | -1.85E+04 | -3.07E+02 | -5.97E+02 | -9.41E+02 | 7.51E-01 | 7.60E-01 | 7.71E-01 | 8.44E+01 | 8.44E+01 | 8.44E+01 |

SI-9: Scenario analysis (Recycling in Iceland)

| | Basis Scenario | | | | Szenario: Recycling in Iceland | |
|---|---|---|---|---|---|---|
| | **90,6% in Europe** | | **9,4% in Iceland** | | **100% in Iceland** | |
| | transport | waste treatment | transport | waste treatment | transport | waste treatment |
| Abiotic Depletion (ADP elements) [kg Sb eq.] | 1.01E-02 | 3.33E-01 | 3.71E-04 | 1.91E-02 | 3.94E-03 | 2.02E-01 |
| Abiotic Depletion (ADP fossil) [MJ] | 1.76E+06 | 5.78E+06 | 9.69E+05 | 1.83E+05 | 4.56E+05 | 1.94E+06 |
| Acidification Potential (AP) [kg SO2 eq.] | 2.50E+03 | 6.42E+02 | 2.87E+02 | 6.83E+02 | 1.35E+02 | 7.25E+03 |
| Eutrophication Potential (EP) [kg Phosphate eq.] | 3.15E+02 | 1.78E+02 | 7.30E+01 | 1.28E+01 | 3.43E+01 | 1.36E+02 |
| Freshwater Aquatic Ecotoxicity Pot. (FAETP inf.) [kg DCB eq.] | 6.43E+02 | 2.17E+03 | 3.84E+02 | 9.56E+01 | 1.81E+02 | 1.01E+03 |
| Global Warming Potential (GWP 100 years) [kg CO2 eq.] | 1.37E+05 | 5.23E+05 | 7.13E+04 | 1.74E+04 | 3.36E+04 | 1.85E+05 |
| Global Warming Potential (GWP 100 years), excl biogenic carbon [kg CO2 eq.] | 1.38E+05 | 5.18E+05 | 7.23E+04 | 1.69E+04 | 3.40E+04 | 1.80E+05 |
| Human Toxicity Potential (HTP inf.) [kg DCB eq.] | 5.08E+03 | 2.46E+04 | 1.64E+03 | 1.31E+03 | 7.72E+02 | 1.40E+04 |
| Marine Aquatic Ecotoxicity Pot. (MAETP inf.) [kg DCB eq.] | 2.17E+06 | 8.22E+07 | 1.28E+06 | 3.69E+05 | 6.05E+05 | 3.92E+06 |
| Ozone Layer Depletion Potential (ODP, steady state) [kg R11 eq.] | 1.25E-08 | 8.02E-06 | 8.54E-09 | 2.43E-08 | 4.02E-09 | 2.58E-07 |
| Photochem. Ozone Creation Potential (POCP) [kg Ethene eq.] | 3.14E+01 | 5.97E+01 | -1.07E+02 | 1.03E+00 | -5.02E+01 | 1.09E+01 |
| Terrestric Ecotoxicity Potential (TETP inf.) [kg DCB eq.] | 2.11E+02 | 1.30E+03 | 1.77E+02 | 8.69E+01 | 8.32E+01 | 9.23E+02 |

## S3. References


1. Icelandic Recycling Fund Skýrsla Um Starfsemi Úrvinnslusjóds. Available Online: Https://Www.Urvinnslusjodur.Is/Media/Arsskyrslur/Starfsskyrsla-2020.Pdf, Page 38-39 (Accessed on 05.05.2022); 2020;
2. Icelandic Recycling Fund Plastic Packaging in Iceland 2020. E-Mail Correspondence 2022a.
3. Environment Agency of Iceland Plastic Packaging in Iceland 2020. E-Mail Correspondence 2021.
4. Environment Agency of Iceland Operation Permit for Handling the Wastes to SORPA. Https://Ust.Is/Library/Sida/Atvinnulif/Starfsleyfi-Og-Eftirlitsskyrslur/SORPA%20-%20undirrita%c3%b0.Pdf (Accessed on 20.07.2021); 2020;
5. Raghab, S.M.; Abd El Meguid, A.M.; Hegazi, H.A. Treatment of Leachate from Municipal Solid Waste Landfill. null 2013, 9, 187–192, doi:10.1016/j.hbrcj.2013.05.007.
6. Plastics Europe Plastic - the Facts 2021. E-Mail Correspondence 2022.
7. Plastics Europe Plastics – the Facts 2021. Available Online: Https://Plasticseurope.Org/Knowledge-Hub/Plastics-the-Facts-2021/, p. 23 (Accessed on 05.05.2022); 2021;
8. Plastics Europe Eco-Profiles and Environmental Declarations of the European Plastics Manufacturers, Version 3.0. Available Online: Https://Www.Plasticseurope.Org/En/Resources/Eco-Profiles; 2019;
9. Sphera GaBi Database Search. Available Online: Https://Gabi.Sphera.Com/Databases/Gabi-Data-Search/; 2022;