INCREACE project final event, 20.05.2026

Sustainability Insights from PRIMUS: Advancing High-Value Recycled Plastics

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HORIZON EUROPE GA No. 101057067

PRIMUS Scope and Big goals

ADDRESSING THE BARRIERS FOR HAVING HIGH RECYCLED CONTENT IN TECHNICAL PLASTICS

PRIMUS promotes the usage, **acceptance and safety of plastic recyclates** to be used in added value product made of technical plastics and elastomers, focusing on **traceability of materials to increase transparency** in the plastics value chain.

01 **Create quality** and safe recyclates through technological innovations

02 Support the use of recycled plastics as safe raw materials with **traceability**

03 **Demonstrate** application with 4 novel added-value demo cases in automotive and home appliances

04 Support recyclates market with
1) Advanced mechanical recycling,
2) Debromination of plastics
3) Chemical analytics

Methodologies and achievements

4 PLASTIC FORMULATION FOR TARGETED APPLICATIONS & PROCESS

Industrial Applications:

- **Pilot 1: r-PC/ABS** for automotive interior
- **Pilot 2: r-PP/EPDM** (r-TPV), automotive cooling circuits
- **Pilot 3: r-HIPS** refrigerator inner liners, 70% recycled content
- **Pilot 4: r-EPDM rubber**, washing machine door gasket
- **Are they even more sustainable?**

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All round sustainability methodology

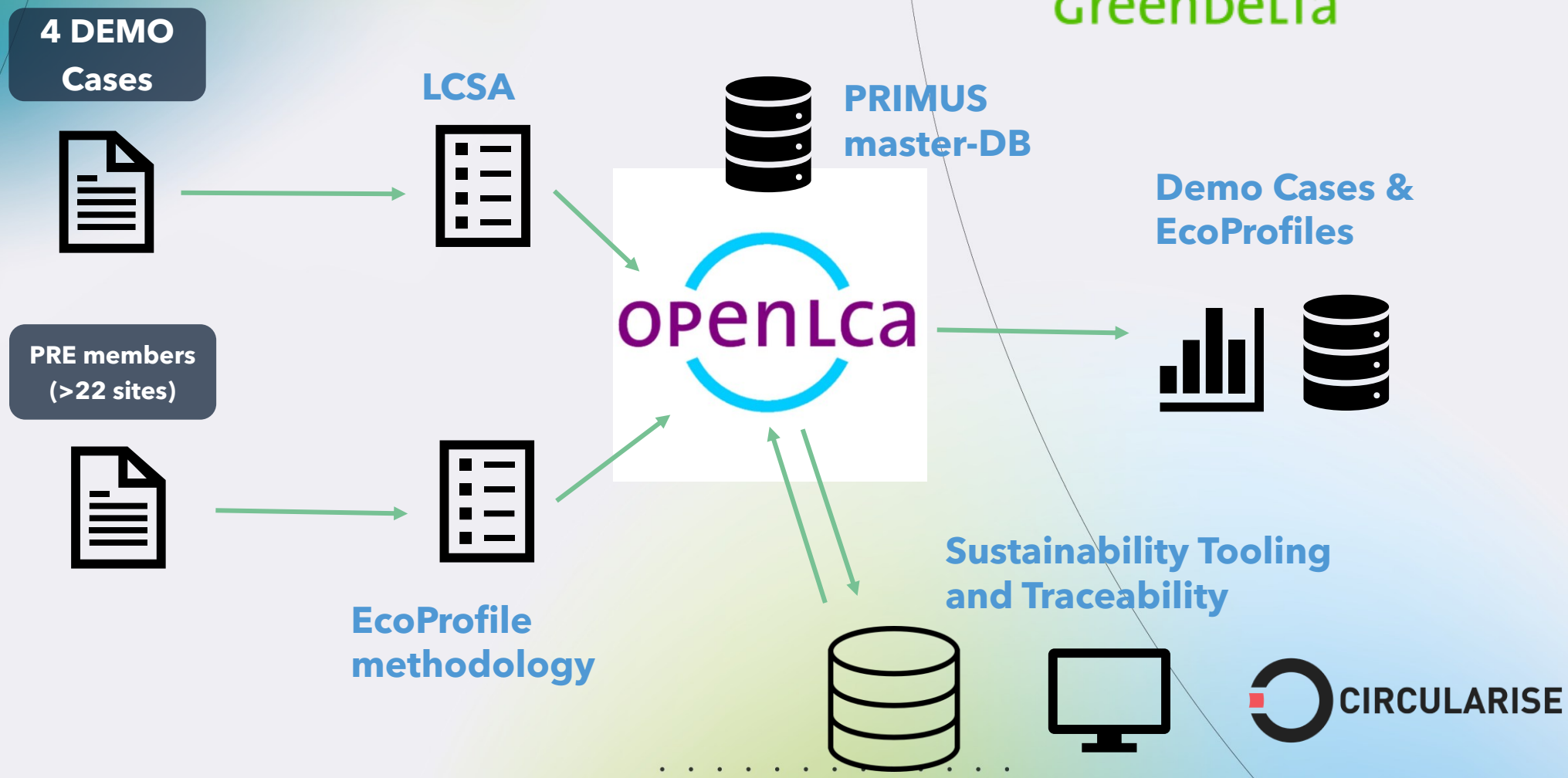
- Environmental Life Cycle Assessment (LCA)
- Social LCA
- Circularity indicators
- Plastic littering risk

… combined!

- System Dynamics

Results can be found https://www.primus-project.eu/general-publications/

All round sustainability methodology



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Demo cases

How sustainable are the recyclates?

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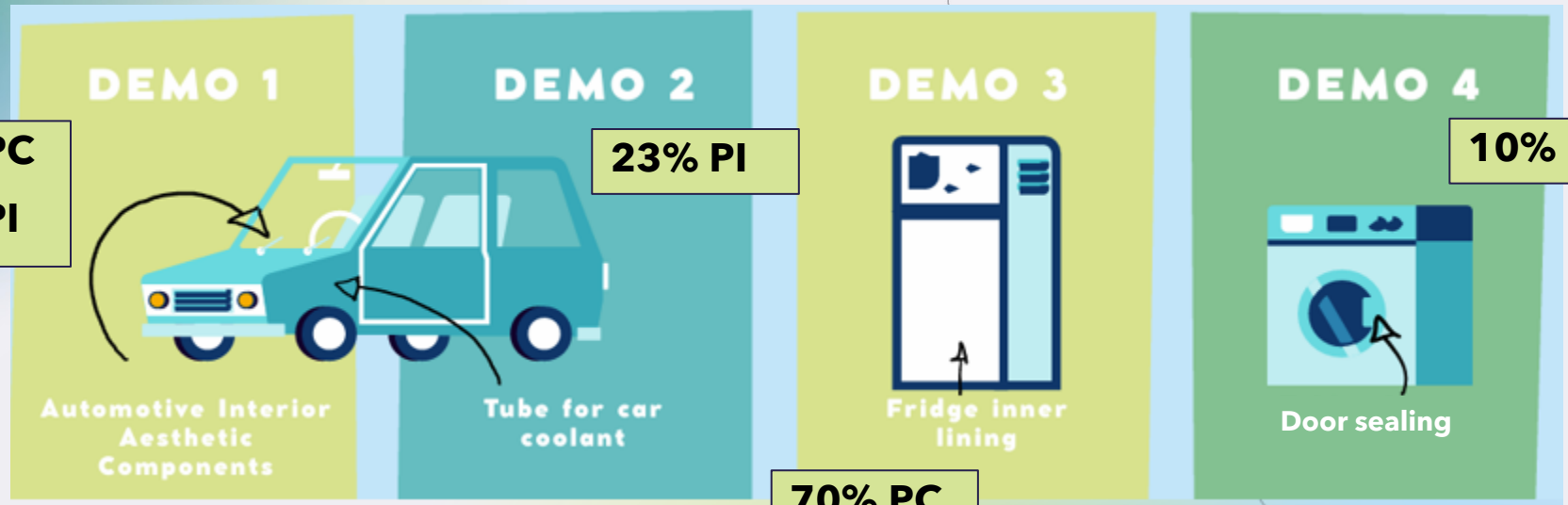
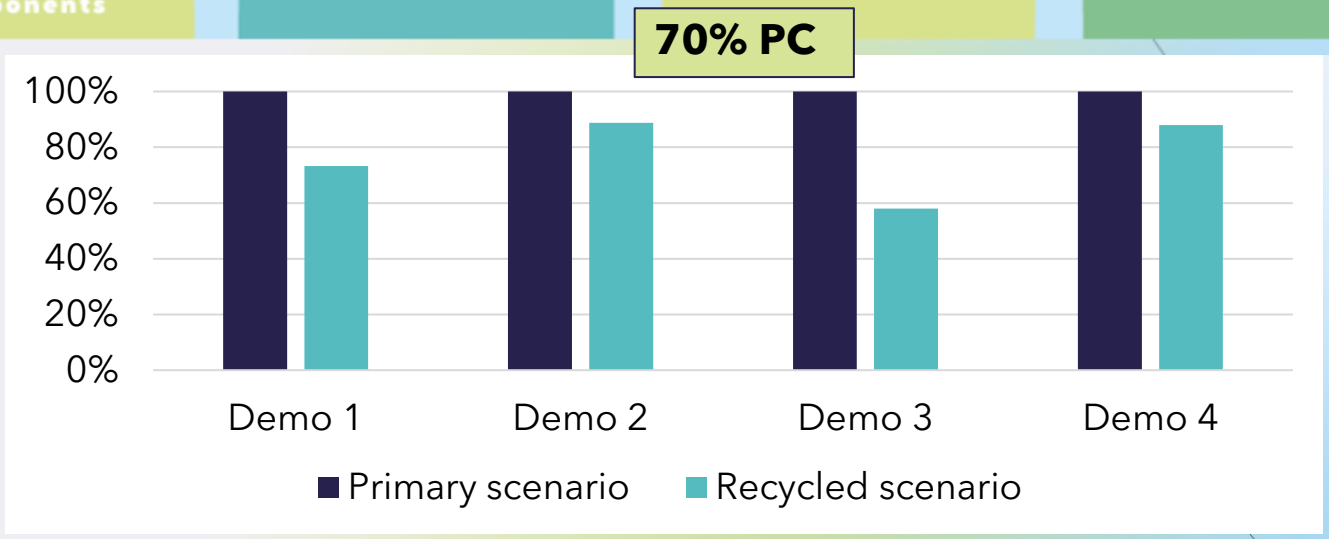
Methodology applied to 4 demonstrator cases

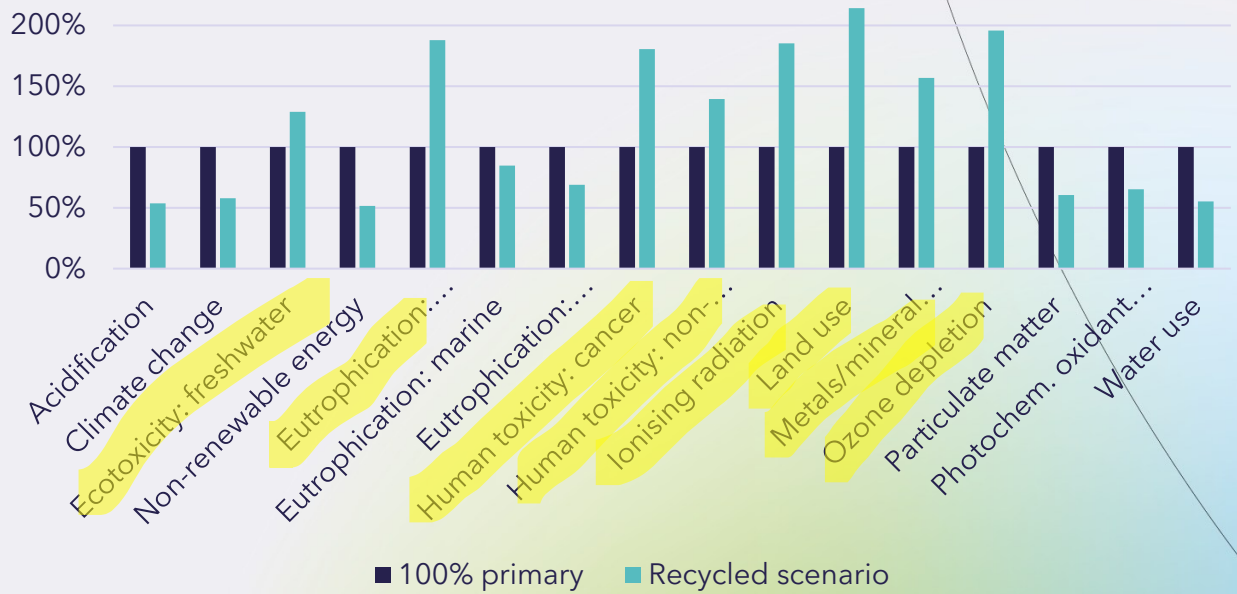
Climate Change results:





Overall environmental LCA results

- General improvements in all impact categories
- Only Demo 3 shows a mix between improvements and worse results, mainly due to the large transportation distance of recycled content and intensive energy and nitrogen use in the specific demo recycling process.



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EcoProfile datasets

often in LCA, data availability is an issue:
We created European LCA datasets for recyclates

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EcoProfiles

Public deliverable of datasets and reports

23 recyclers

- France
- Germany
- Italy
- Austria
- Etc.

8 core datasets

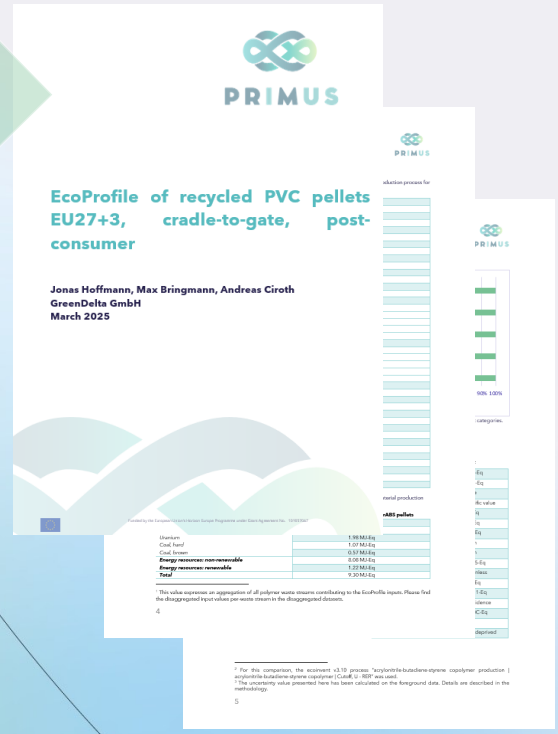
- rMPO
- rLDPE
- rHDPE
- rPET
- rABS
- rPS
- rPP
- rPVC

Regionalisation

- Cradle-to-gate
- Gate-to-gate
- EU average
- Regional

50 EcoProfiles

- PDFs
- ILCD data format



PLASTICS RECYCLERS EUROPE

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ECOPROFILES

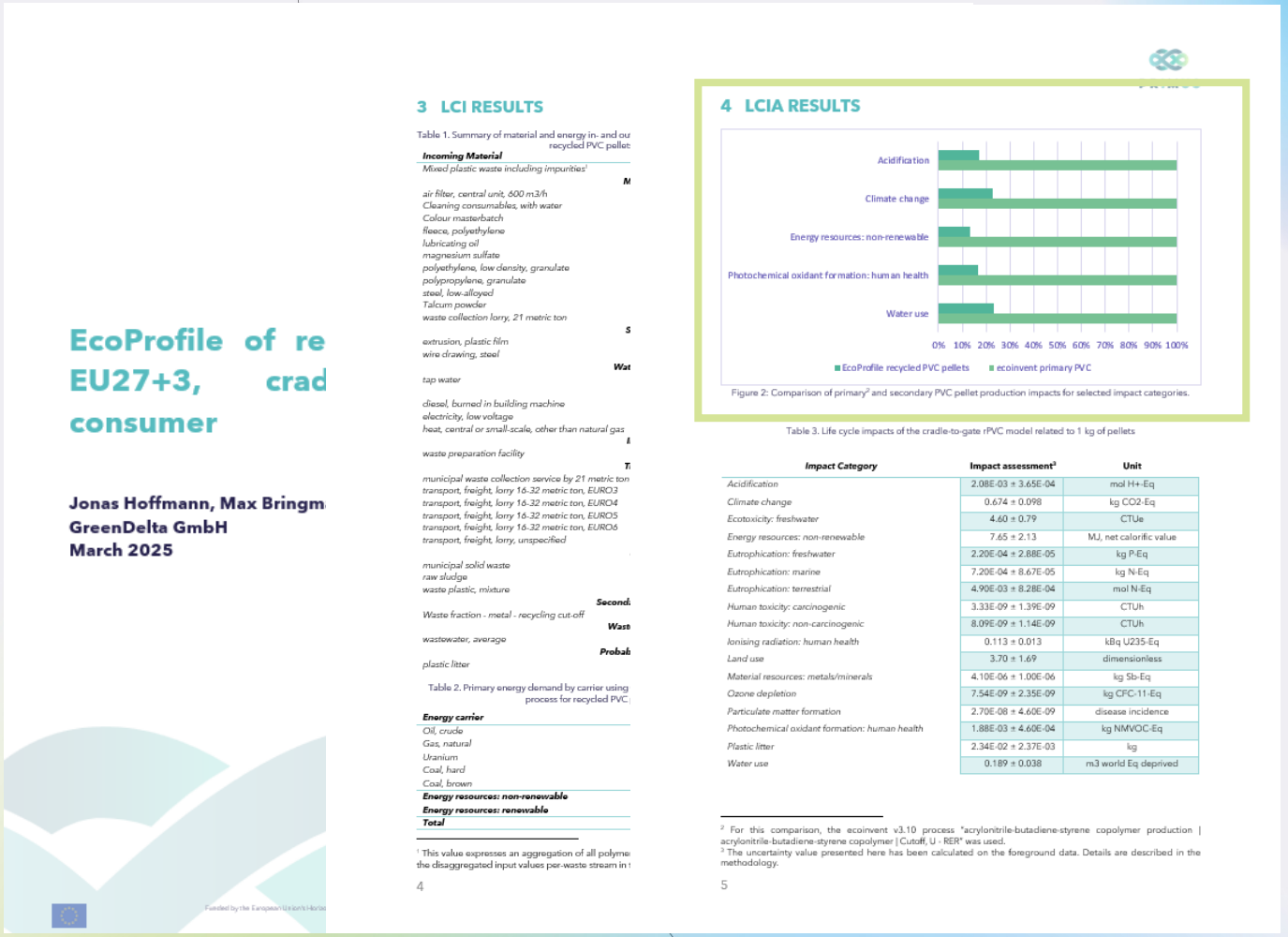
GreenDelta

rMPO, rLDPE, rHDPE, rPET, rABS, rPS, rPP and rPVC

One scientific methodology to assess environmental impacts for recyclates (externally reviewed)

Two classes of use cases:

- Recyclers will be able to compare
- LCA practitioners will be able to use



EcoProfile of re
EU27+3, crad
consumer

Jonas Hoffmann, Max Bringm
GreenDelta GmbH
March 2025

3 LCI RESULTS

Table 1. Summary of material and energy in- and ou
recycled PVC pellet

Incoming Material
Mixed plastic waste including impurities[1]
M
air filter, central unit, 600 m3/h
Cleaning consumables, with water
Colour masterbatch
fleece, polyethylene
lubricating oil
magnesium sulfate
polyethylene, low density, granulate
polypropylene, granulate
steel, low-alloyed
Talcum powder
waste collection lorry, 21 metric ton
S
extrusion, plastic film
wire drawing, steel
Wat
tap water
diesel, burned in building machine
electricity, low voltage
heat, central or small-scale, other than natural gas
I
waste preparation facility
T
municipal waste collection service by 21 metric ton
transport, freight, lorry 16-32 metric ton, EURO3
transport, freight, lorry 16-32 metric ton, EURO4
transport, freight, lorry 16-32 metric ton, EURO5
transport, freight, lorry 16-32 metric ton, EURO6
transport, freight, lorry, unspecified
municipal solid waste
raw sludge
waste plastic, mixture
Second
Waste fraction - metal - recycling cut-off
Wast
wastewater, average
Probab
plastic litter

Table 2. Primary energy demand by carrier using
process for recycled PVC

Energy carrier
Oil, crude
Gas, natural
Uranium
Coal, hard
Coal, brown
Energy resources: non-renewable
Energy resources: renewable
Total

[1] This value expresses an aggregation of all polyme
the disaggregated input values per-waste stream in

4

4 LCIA RESULTS

Figure 2: Comparison of primary[2] and secondary PVC pellet production impacts for selected impact categories.

Table 3. Life cycle impacts of the cradle-to-gate rPVC model related to 1 kg of pellets

Impact Category	Impact assessment[3]	Unit
Acidification	2.08E-03 ± 3.65E-04	mol H+-Eq
Climate change	0.674 ± 0.098	kg CO2-Eq
Ecotoxicity: freshwater	4.60 ± 0.79	CTUe
Energy resources: non-renewable	7.65 ± 2.13	MJ, net calorific value
Eutrophication: freshwater	2.20E-04 ± 2.88E-05	kg P-Eq
Eutrophication: marine	7.20E-04 ± 8.67E-05	kg N-Eq
Eutrophication: terrestrial	4.90E-03 ± 8.28E-04	mol N-Eq
Human toxicity: carcinogenic	3.33E-09 ± 1.39E-09	CTUh
Human toxicity: non-carcinogenic	8.09E-09 ± 1.14E-09	CTUh
Ionising radiation: human health	0.113 ± 0.013	kBq U235-Eq
Land use	3.70 ± 1.69	dimensionless
Material resources: metals/minerals	4.10E-06 ± 1.00E-06	kg Sb-Eq
Ozone depletion	7.54E-09 ± 2.35E-09	kg CFC-11-Eq
Particulate matter formation	2.70E-08 ± 4.60E-09	disease incidence
Photochemical oxidant formation: human health	1.88E-03 ± 4.60E-04	kg NMVOC-Eq
Plastic litter	2.34E-02 ± 2.37E-03	kg
Water use	0.189 ± 0.038	m3 world Eq deprived

[2] For this comparison, the ecoinvent v3.10 process "acrylonitrile-butadiene-styrene copolymer production | acrylonitrile-butadiene-styrene copolymer | Cutoff, U - RER" was used.
[3] The uncertainty value presented here has been calculated on the foreground data. Details are described in the methodology.

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LCA tool and connection to traceability system

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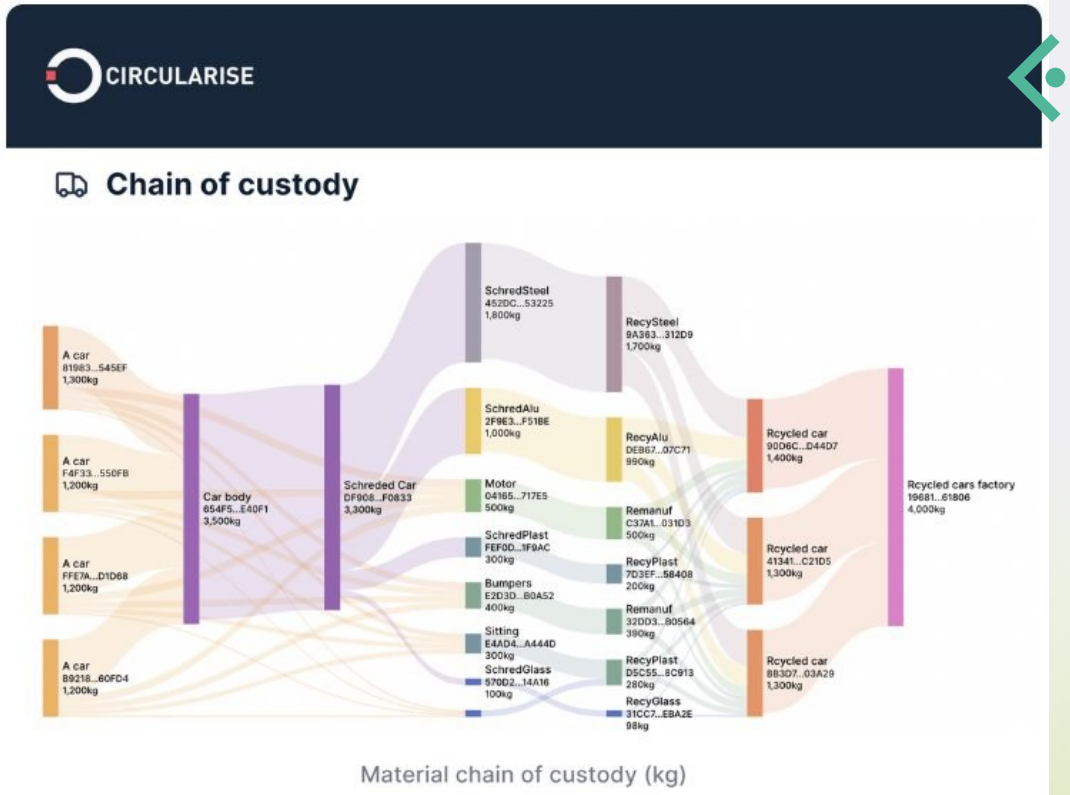
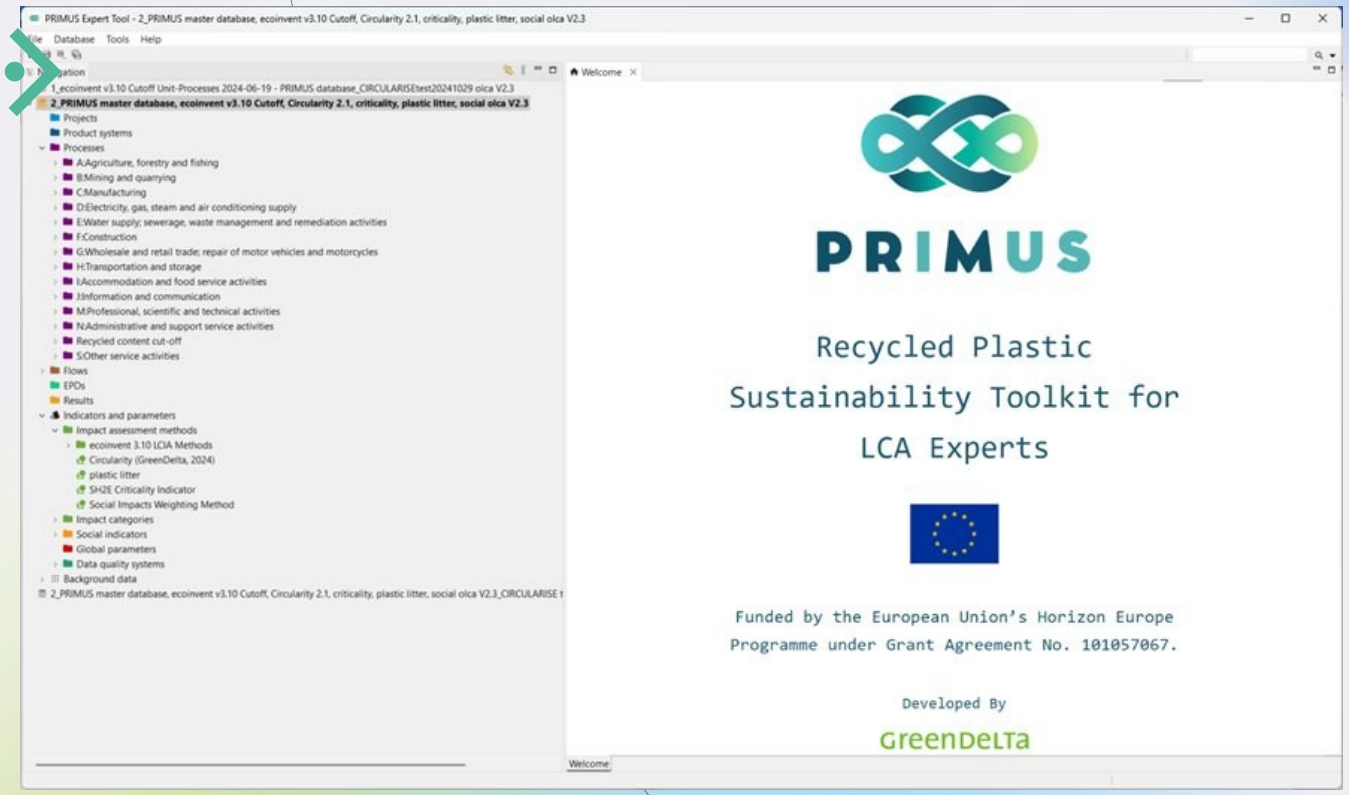
PRIMUS Expert LCA tool

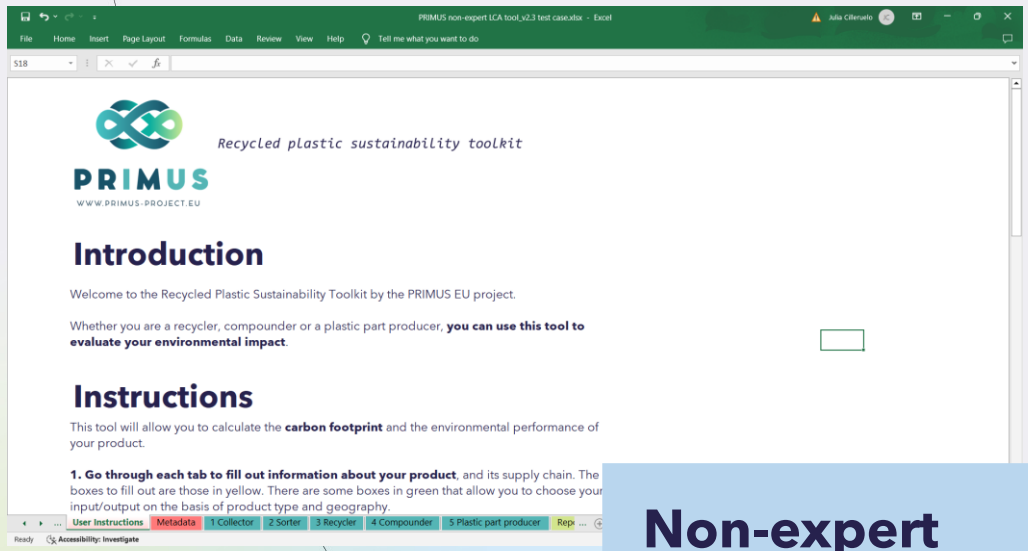
Connects with circularise traceability system





PRIMUS Sustainability Tools

Expert LCA tool



Non-expert LCA tool

Final remarks and findings

- **Demo cases**:
  - In all cases, a reduction of the environmental footprint was achieved
  - Further reduction was often limited by the technical performance of the recyclate
- **EcoProfiles**:
  - A **methodology** for recyclates was created and externally reviewed
  - From **8 core datasets** for recyclates, 50 EcoProfiles were created
  - You can download the reports/datasets at openLCA Nexus (https://nexus.openlca.org/database/EcoProfiles%20Recycled%20Plastics%20)
  - Within the **STOPP project**, a novel versions of EcoProfiles for **polyolefins** will be created
- **Traceability**:
  - Connection with a DPP tool and LCA software was established

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Thank you!

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