The environmental impact of MSW collection and its role for a circular economy

COLLECTORS: WASTE COLLECTION SYSTEMS ASSESSED AND GOOD PRACTICES IDENTIFIED

COLLECTORS Final conference
17 November 2020
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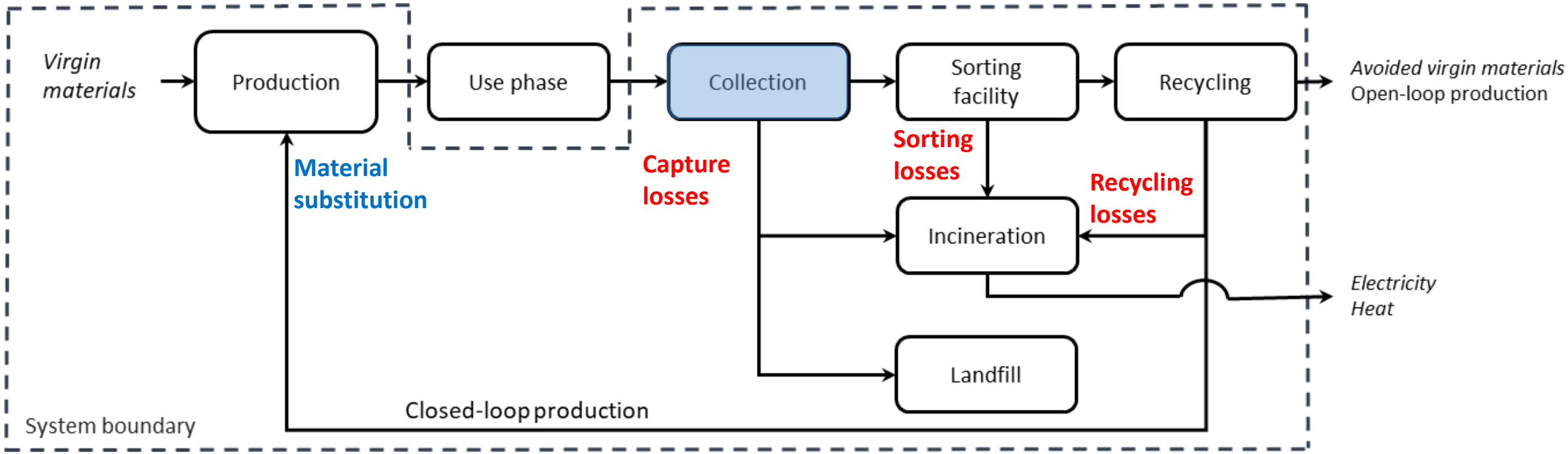
Material Flow Analysis + Life Cycle Assessment

Systems approach with focus on collection



PPW cases

Cases:

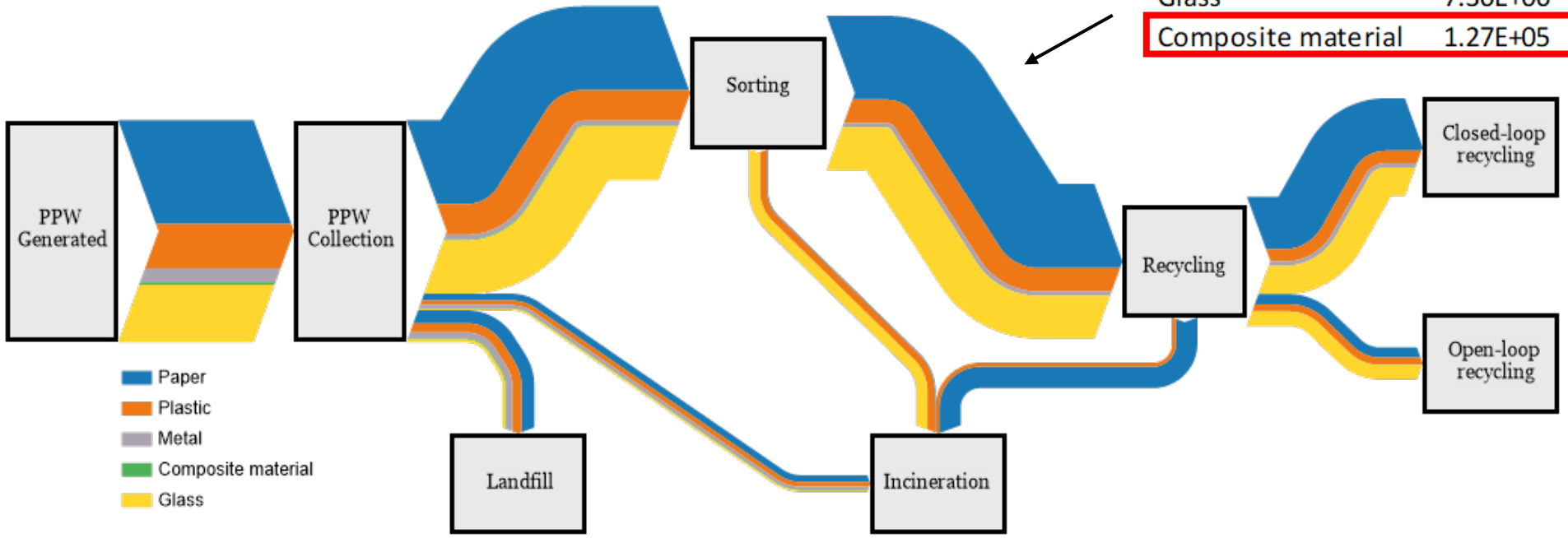
1. Tubbergen (NL)
2. Gent (BE)
3. Rennes (FR)
4. Berlin (DE)
5. Parma (IT)

Packaging waste

- Paper and cardboard
- Glass
- Plastics
- Metals
- Drinking cartons

Quantities matter

Material	Mass (kg)	Recycling rate
Paper	1.42E+07	80%
Plastic	4.01E+06	53%
Metal	7.90E+05	33%
Glass	7.30E+06	74%
Composite material	1.27E+05	28%



PPW material flows in the municipality of Parma

EU PPW flows

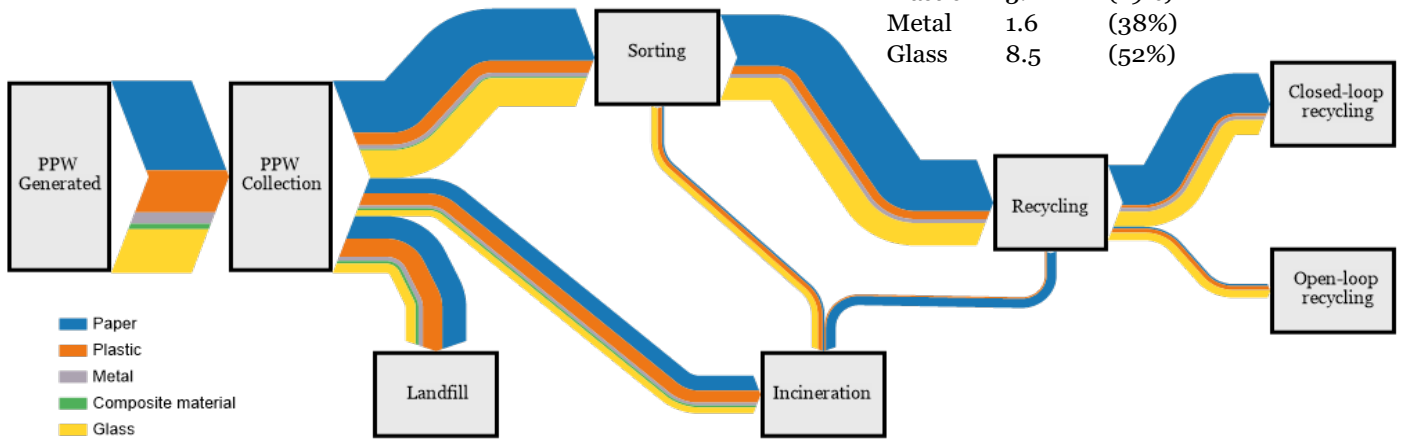
EU-wide PPW flows could be reduced by 18 million tons through improved collection

Tallentire, C. W. and B. Steubing (2020). "***The environmental benefits of improving packaging waste collection in Europe***." Waste Management **103**: 426-436.

Current collection

Material entering recycling (Mt)

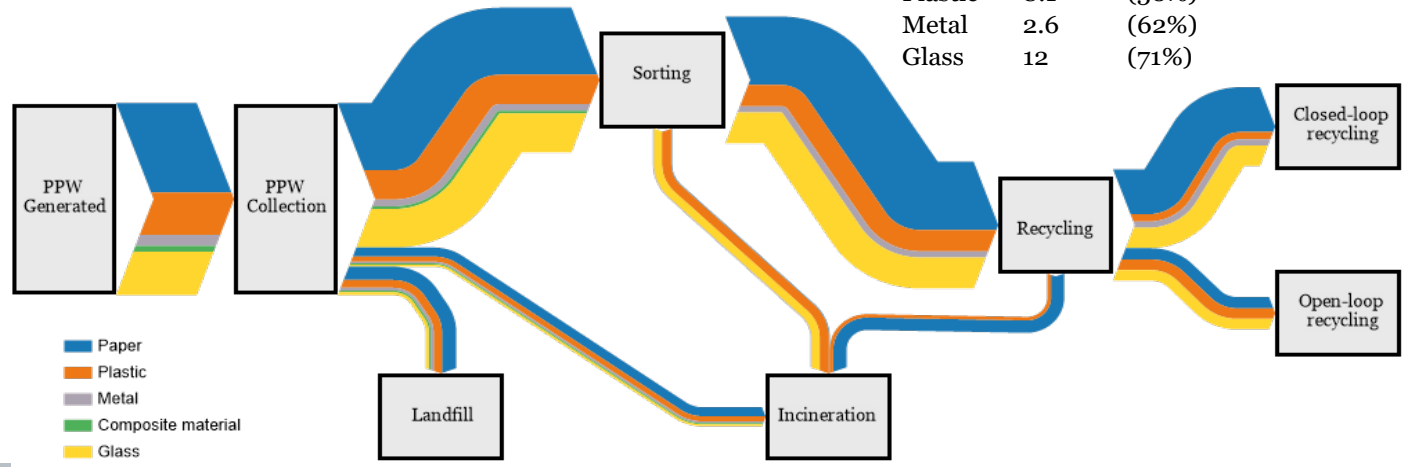
Paper	19	(57%)
Plastic	3.1	(19%)
Metal	1.6	(38%)
Glass	8.5	(52%)



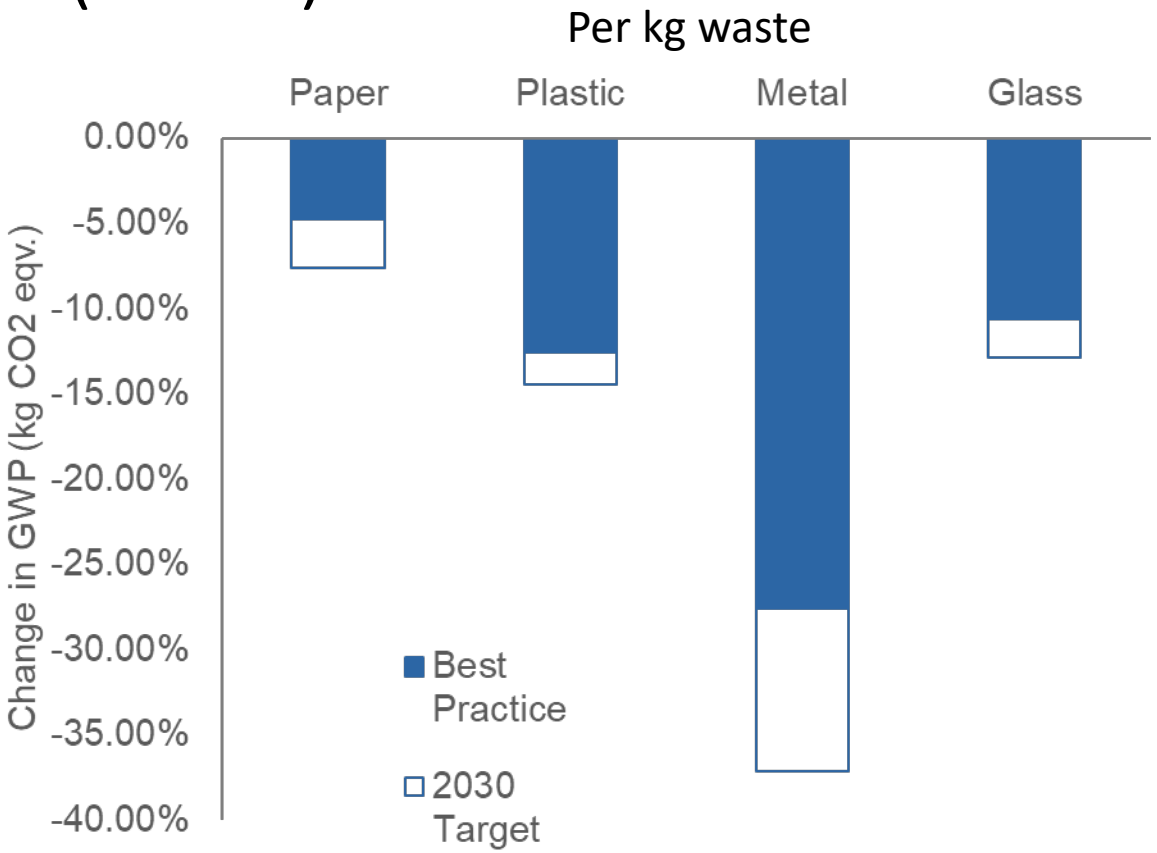
Best practice

Material entering recycling (Mt)

Paper	26	(77%)
Plastic	8.1	(50%)
Metal	2.6	(62%)
Glass	12	(71%)



GHG reductions in the best practice scenario (PPW)



- Important greenhouse gas (GHG) savings possible through better collection

EU-wide effects

- Paper and packaging products account for 2.8% of the GHG emissions in Europe
  - 0.37% reducing in the best practice scenario
  - 0.47% reduction if EU 2030 targets are met

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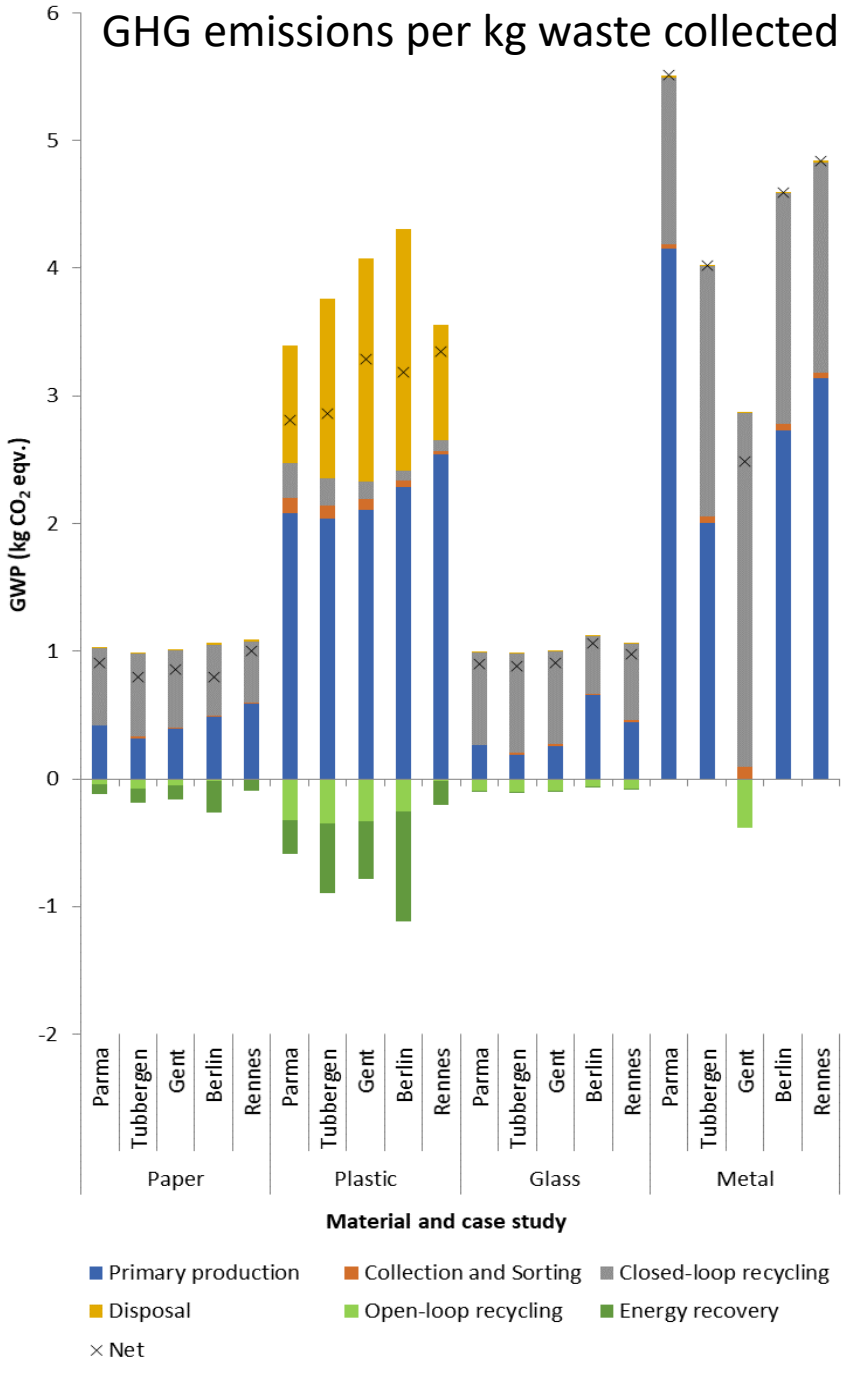
Environmental analysis

- Collection stage has
  - relatively low direct environmental impacts
  - High indirect influence on results (affecting recycled quantities and thus avoided virgin materials)
- Closed/open-loop recycling yield important environmental benefits
- Trends throughout case studies rather similar



Environmental analysis for WEEE

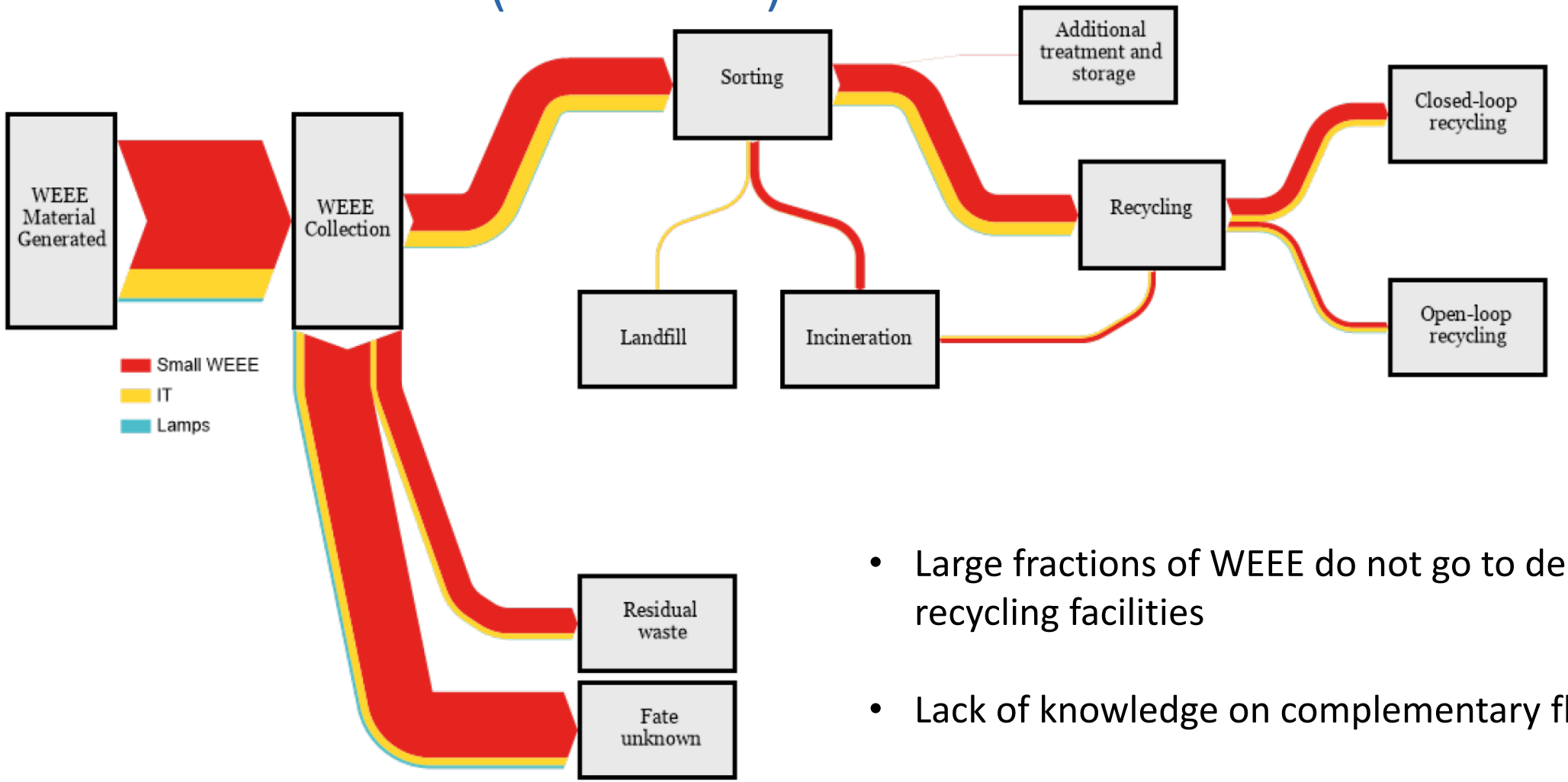
Cases

1. Pembrokeshire (UK)
2. Helsinki (FI)
3. Genoa (IT)
4. Cyclad (FR)
5. Vienna (AT)

WEEE

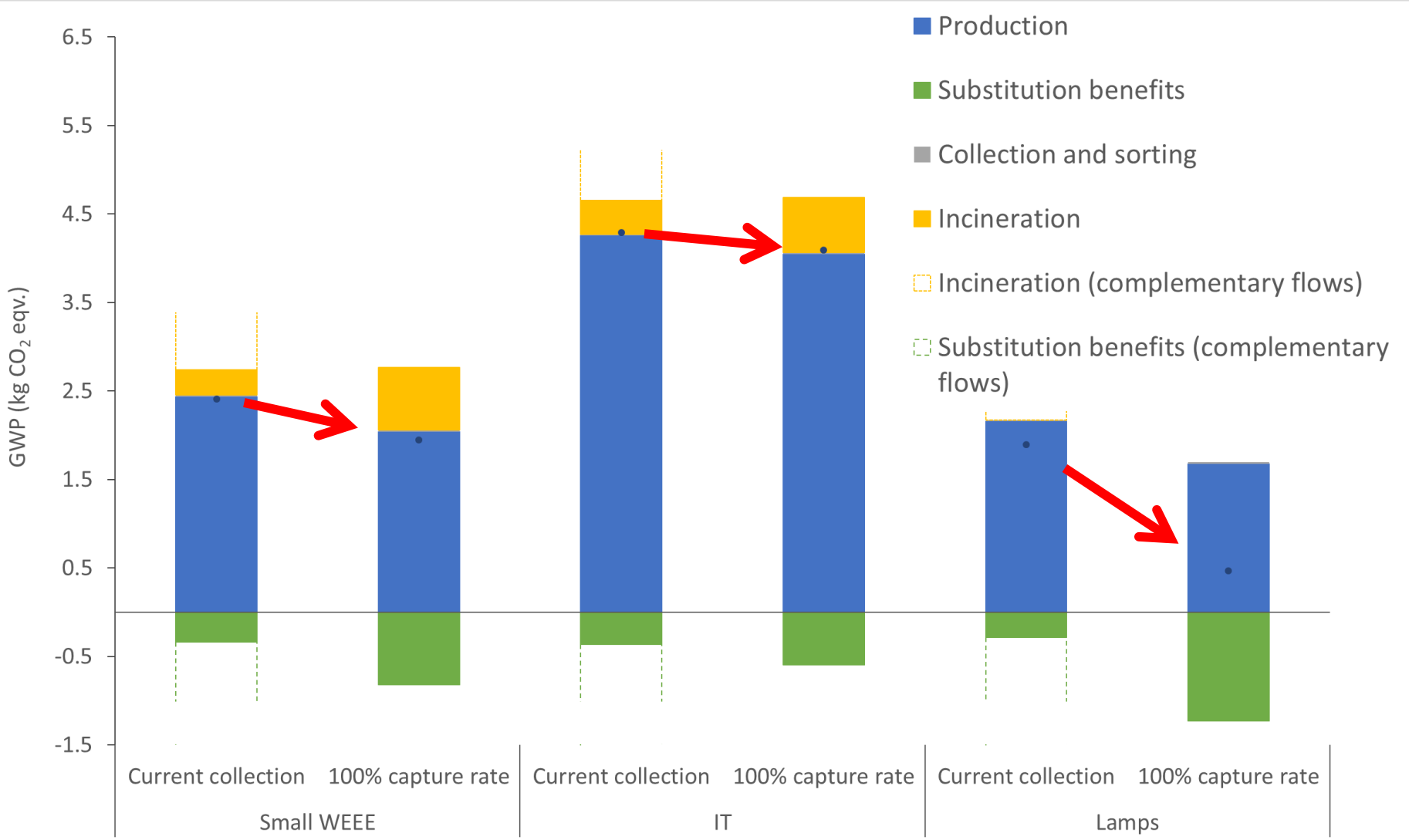
- Lamps
- Small household appliances
- Small IT

Material flows (Helsinki)



- Large fractions of WEEE do not go to dedicated recycling facilities
- Lack of knowledge on complementary flows

Impacts and sensitivity of capture rate (Helsinki)



- WCS has low direct environmental importance
- Improving capture rate can lead to substantial impact reductions
- Benefits could be further increased if recycling efficiencies were also improved
- Role of complementary flows unclear

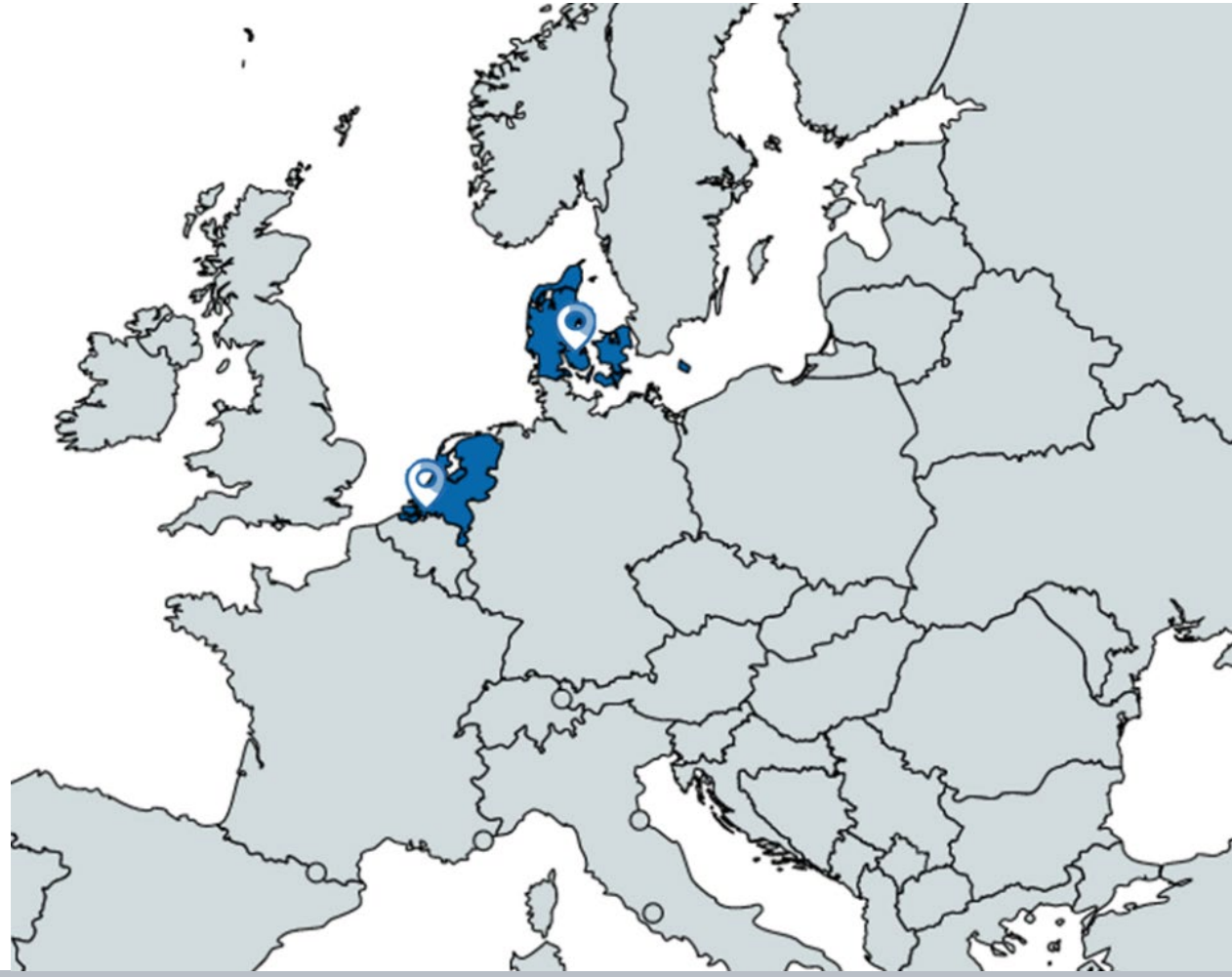
Construction and demolition waste

Cases

1. Odense (Denmark)
2. Reimerswaal (The Netherlands)

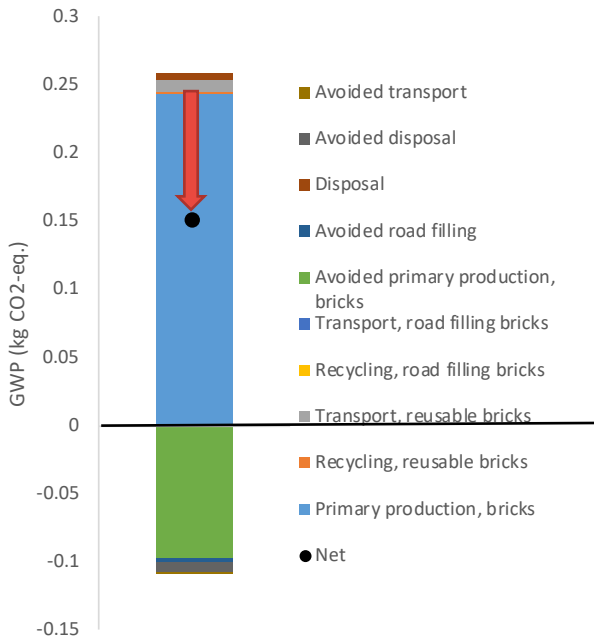
CDW

- Bricks
- Insulation
- Sanitary ceramics
- Gypsum

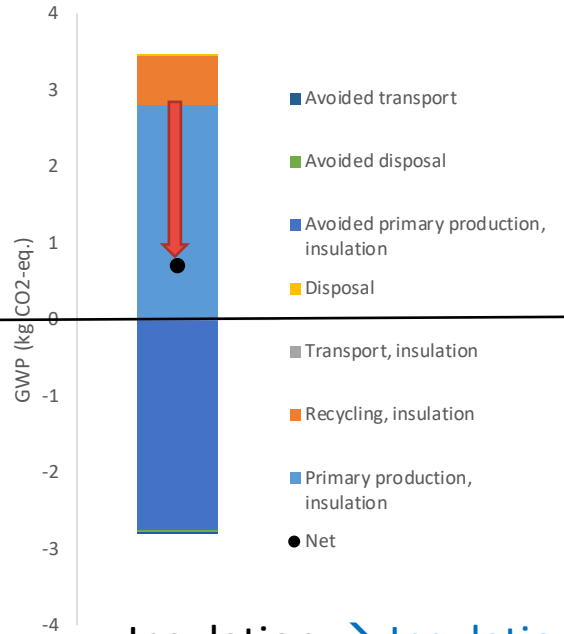


Construction and demolition waste

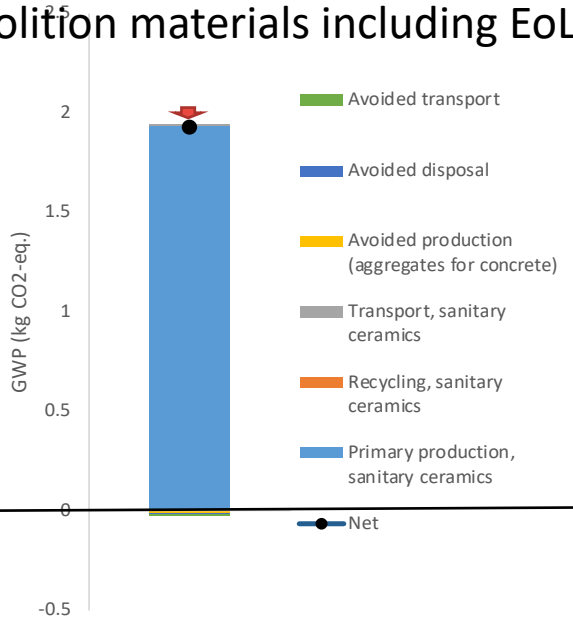
Climate change impacts of different construction and demolition materials including EoL treatment



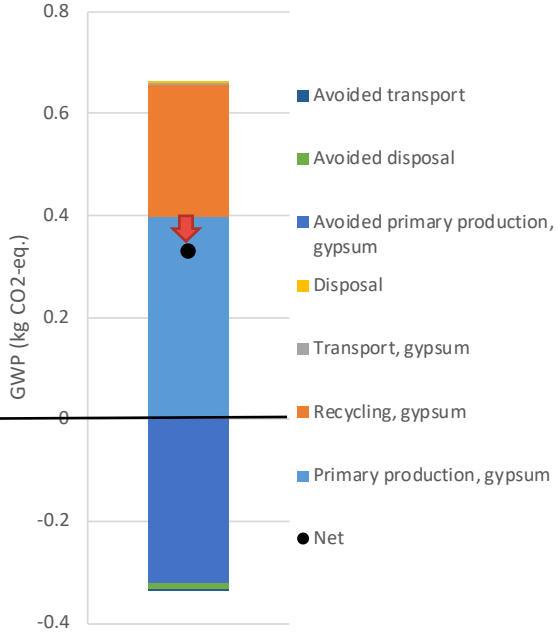
Bricks → Bricks
(Odense, DK)



Insulation → Insulation
(Odense, DK)



Sanitary ceramics
→ Road fillings
(Odense, DK)



Gypsum → Gypsum
(Reimerswaal, NL)

Lessons from LCA

- Individual improvements (e.g. transport during collection) are important, but collection phase itself has minor environmental impacts compared to the benefits it can yield
- Improving the EoL management of products can decrease their environmental impact substantially
  - WCS are central for overal efficiency of material recovery
  - Sorting and recycling losses need to be further minimized
  - Quantities and qualities matter
- Complementary flows (WEEE):
  - need to be further studied and reduced where they are detrimental
  - Missing information makes it challenging to quantify the real environmental benefits of better WEEE management
- More life cycle thinking! (starting with the design of products and their packaging)
- Check out our reports for more results: https://www.collectors2020.eu/results/environmental-impact/