

Rethinking circular supply chains *lessons from consequential LCA*

Romain Sacchi, Ernst-Jan Prosmans



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Context



Method



Results



Discussion and conclusion



CONTEXT



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forward supply chain



closed loop supply chain





technosphere



How to select by-products suppliers given the complexity of circular supply chains?

need for new selection criteria

Case: shift from conventional fuels to refuse-derived fuels for cement production



METHOD



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technosphere with waste markets





waste market model





european waste markets



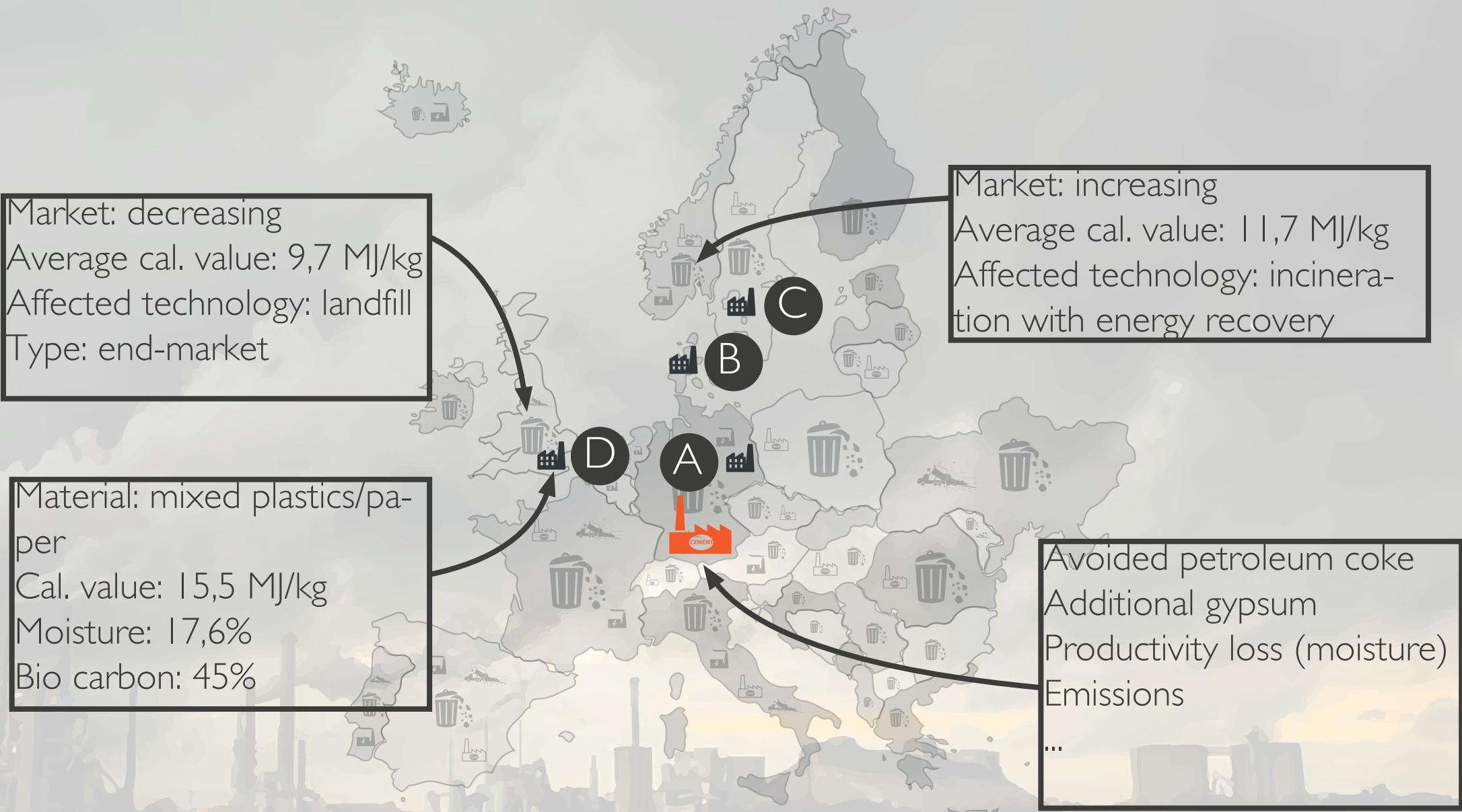
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european marginal waste trade



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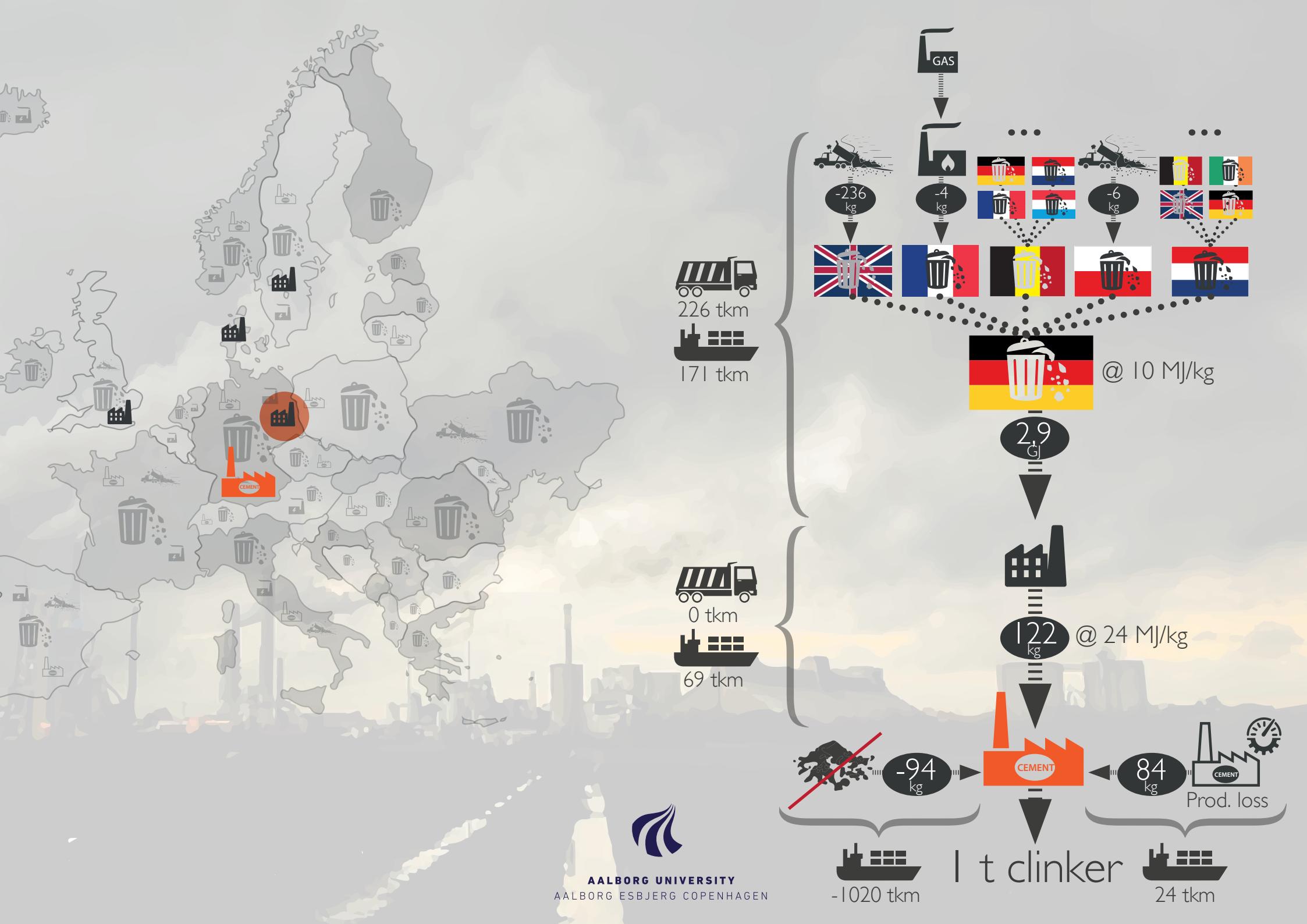


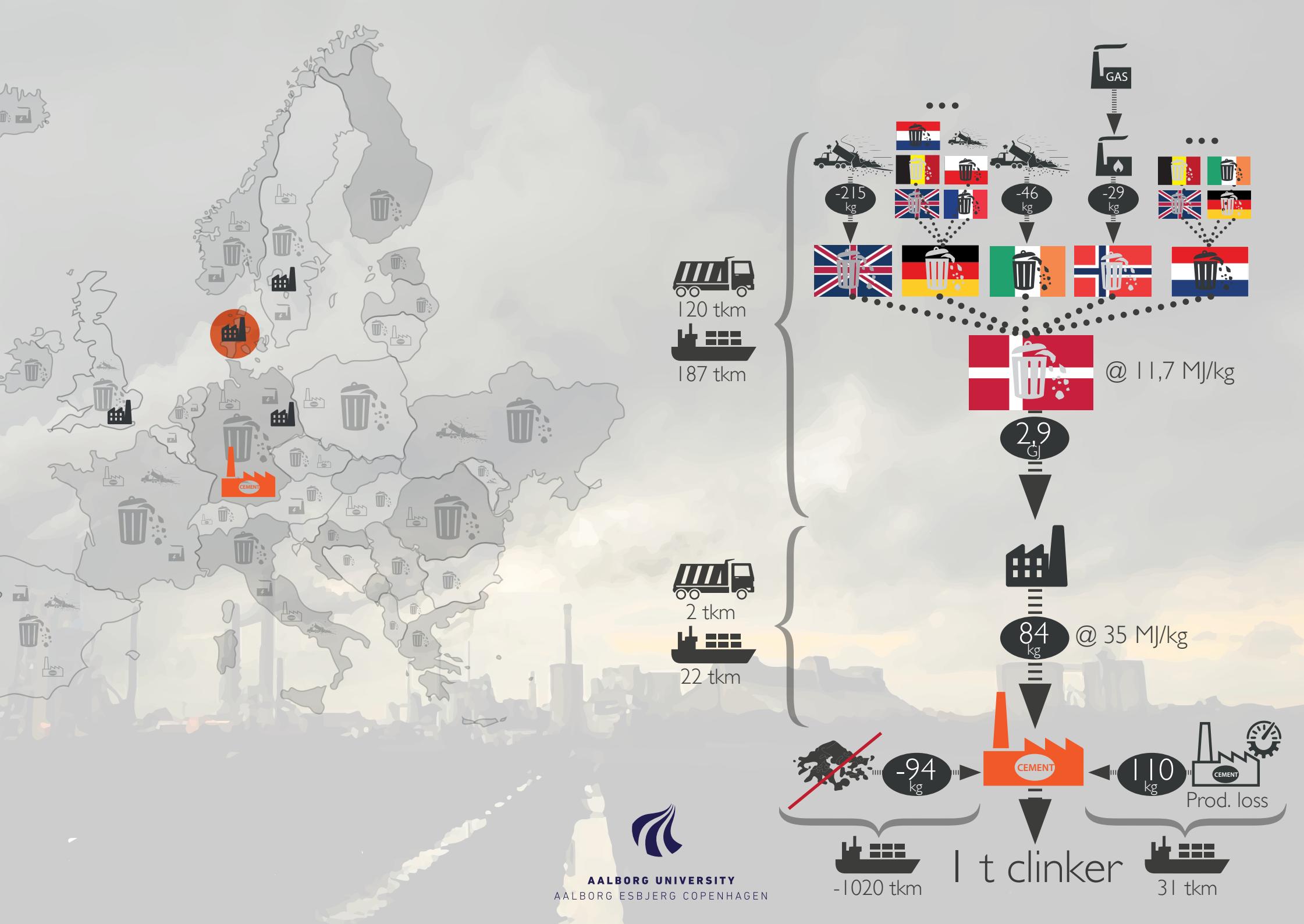
our study case: one cement factory, four potential waste suppliers

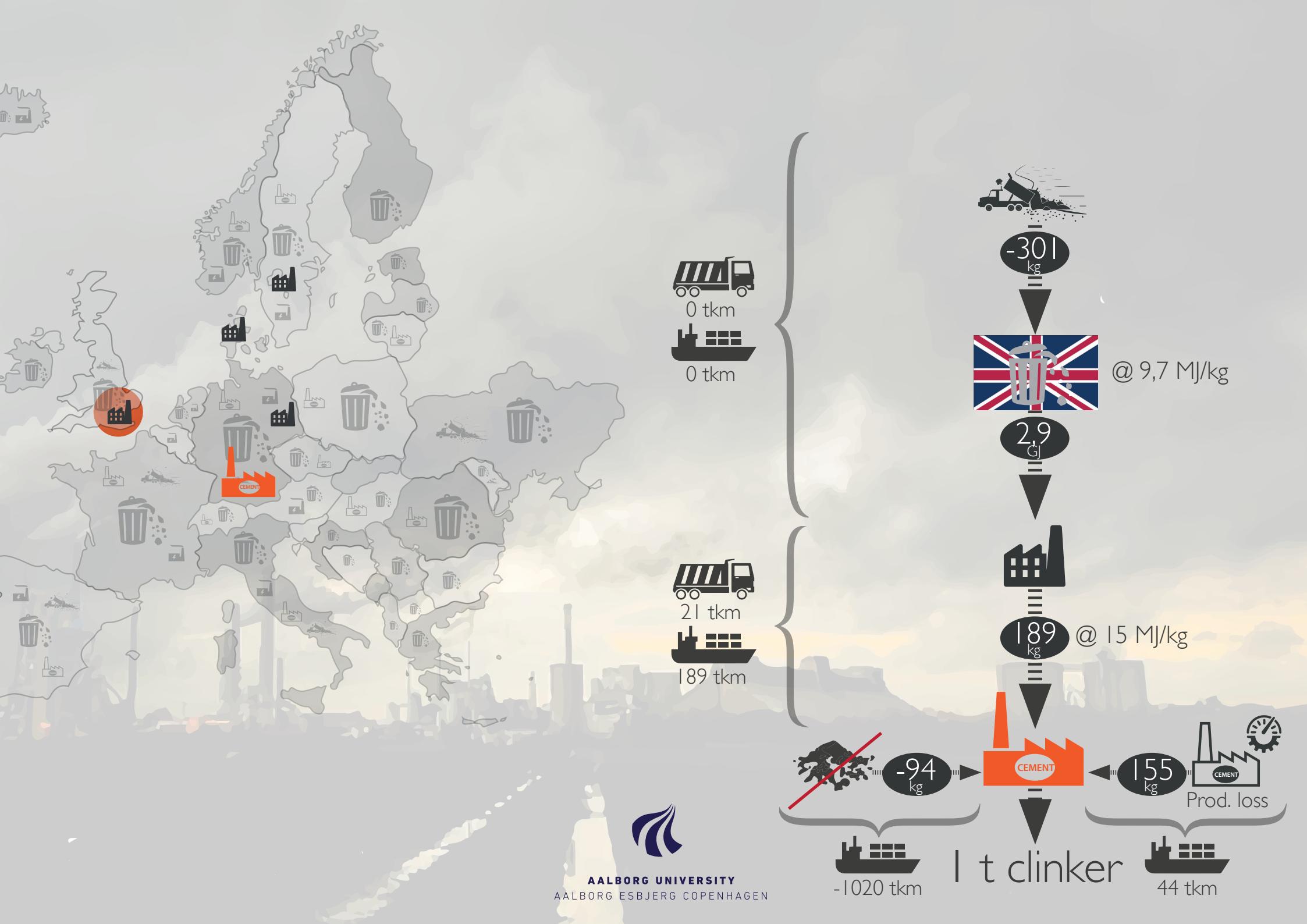
RESULTS

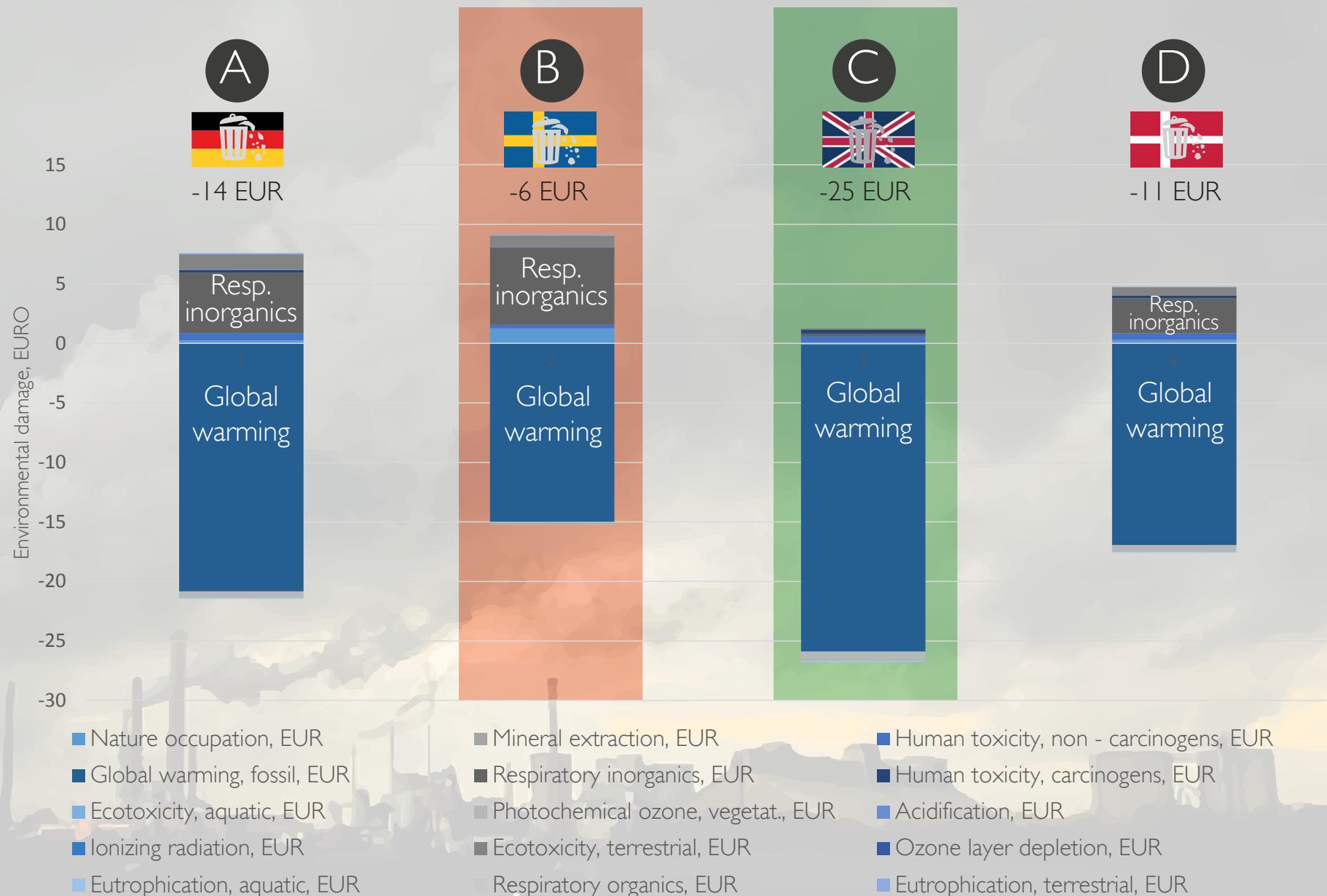


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A



B



C



D



Environmental damage, EURO

40
30
20
10
0
-10
-20
-30
-40
-50



CONCLUSIONS



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Affected waste treatment technology

- Is the by-product fully reused?
- What are the competing reuse applications?
- Are they demand or supply driven?
- What are the alternatives for the affected application?

How does the quality of the by-product affect the productivity of the receiving process?

Reusability



Direct and indirect transport

- Is the by-product traded between other markets?
- What type of markets: end market, trading market, importing market?

suggested criteria for suppliers selection



we thank you for your attention!

references

Model built in OpenLCA v.1.5, developed by GreenDelta GmbH

StepWise2006 v.1.5 impacts monetization method developed by 2.0 LCA consultants, available at lca-net.com

Data on transboundary waste shipments available at ec.europa.eu/eurostat/
Primary data from European cement producer and materials recovery facility

Supplementary inventory data from Ecoinvent v.3.2 (consequential)

Weidema, Frees and Nielsen (1999) Marginal production technologies for Life Cycle Inventories, International Journal of Life Cycle Analysis