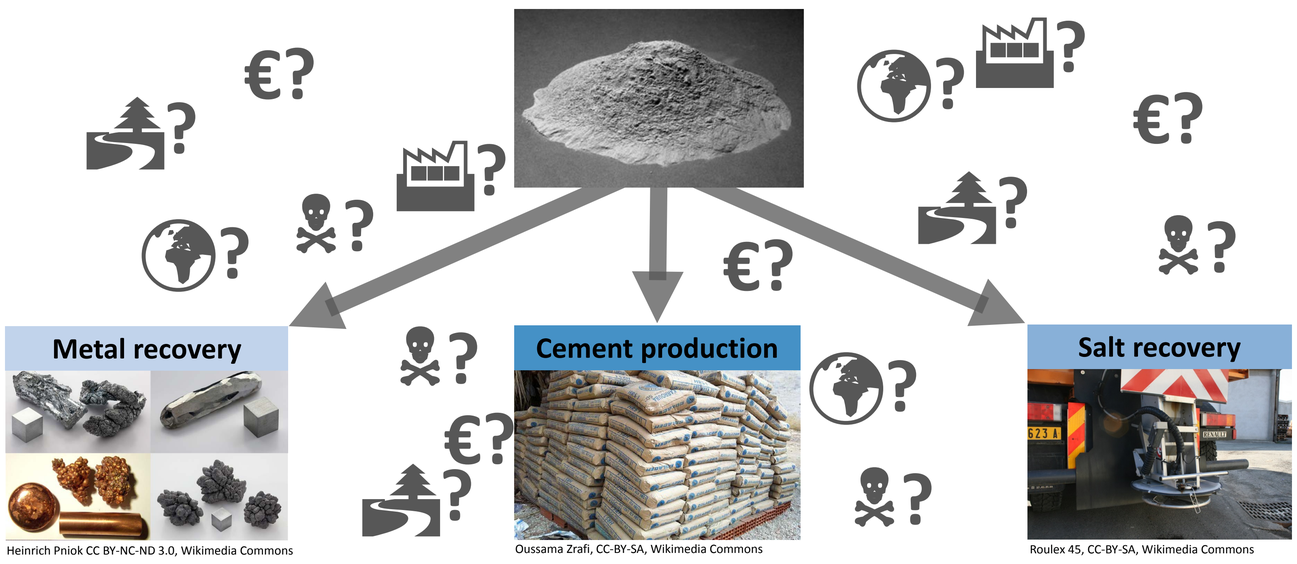
Investigating, evaluating and classifying material quantities in fly ash from waste incineration: A case study from Vienna

TECHNISCHE UNIVERSITÄT WIEN

Introduction

- There are increasing efforts to utilise MSWI fly ash and its constituents for metal recovery, cement production and chloride salt recovery
- Currently, it is not clear, which MSWI fly ash utilisation option is preferable from an economic and environmental perspective
- Resource classification frameworks only reflect a private investor's micro view
- Environmental impacts are not sufficiently taken into account in resource classification frameworks (public entity's macro view)



Research questions

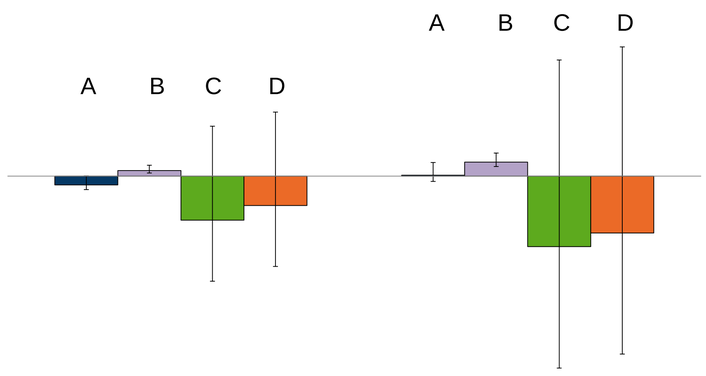
- Which MSWI fly ash utilisation options are preferable from an economic and environmental point of view?
- How can environmental impact assessment be integrated into resource classification frameworks?

Methodology

- System boundaries were defined and inventories were established for four different utilisation scenarios based on 18 Gg/a MSWI fly ash
- Life cycle assessment (LCA) was conducted using the ReCiPe model for climate change, human health, ecosystem quality and resources
- Discounted cash flow (DCF) analysis was performed for economic assessment of fly ash utilisation scenarios
- Monetary valuation of LCA results based on social cost of carbon for climate change and LIME2, a weighing model based on conjoint analysis, for human health and ecosystem quality
- Addition of monetised LCA result to net present value in order to evaluate scenarios from a public entity's macro view (including external costs)
- Application of resource classification according to UNFC

Results

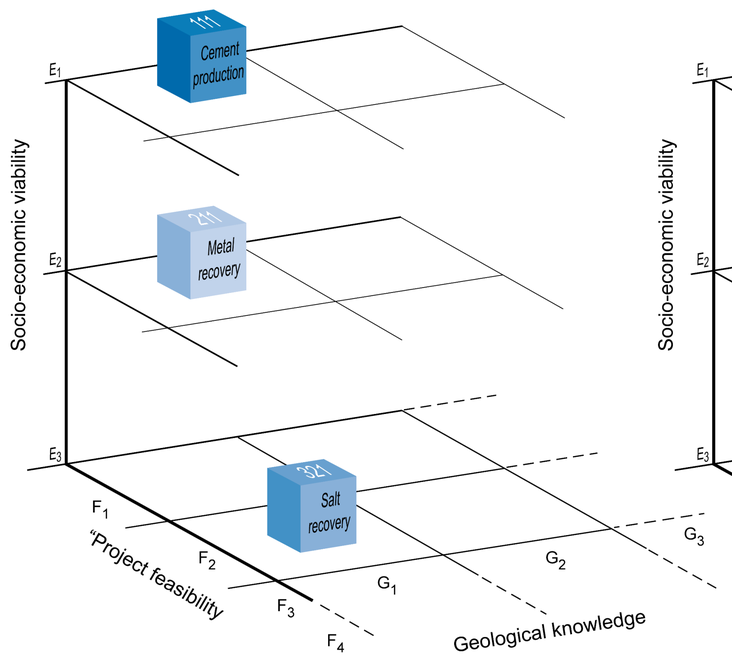
Net present value of all scenarios considered



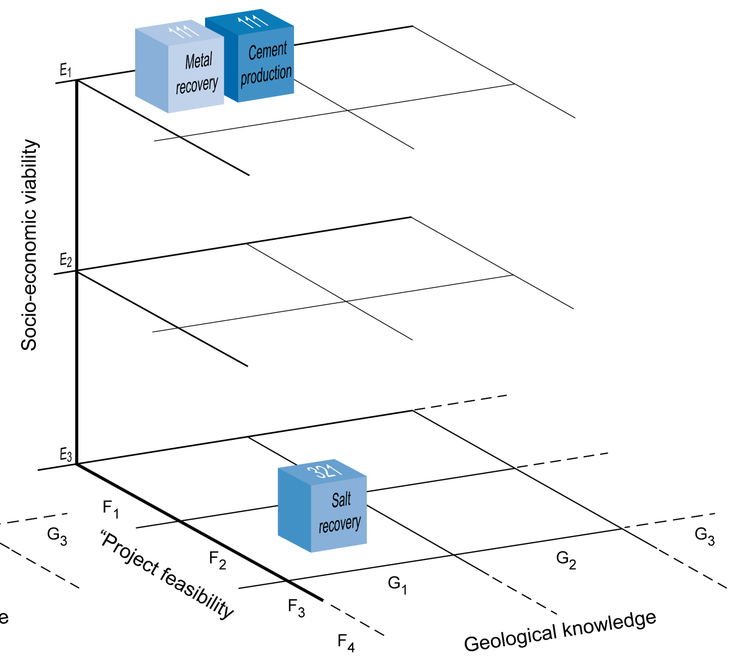
[EUR]	NPV micro	NPV macro
Metal recovery (A)	-27.957.570	2.733.200
Cement production (B)	17.620.770	43.917.484
Metal and salt recovery (C)	-138.845.506	-222.201.389
Cement production and salt recovery (D)	-92.860.050	-179.333.308

Classification of MSWI fly ash according to UNFC

Private investor's micro view



Public entity's macro view



- The **application of UNFC** to the anthropogenic resource **MSWI fly ash** was successfully **demonstrated**.
- **Integration of LCA results** is possible **after monetary valuation**.
- From a private investor's micro view, cement production from MSWI fly ash is classified as commercial project (111), while from a public entity's macro view, **cement production** and metal recovery are both classified as **commercial projects. Salt recovery** is classified as **non-commercial project** (321) from both perspectives.
- **Further efforts** are necessary to **establish valid weighing factors** for monetary valuation.

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