Für Mensch & Umwelt

Umwelt Bundesamt

LRTAP Convention - TFTEI Meeting 2018

Industrial Sources of Mercury in Germany – a Research Project

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Political Background for the Project

- **Minamata Convention**
  - Suspension of production processes (Annex B of MC)
  - Development of BAT/BEP guidance documents for main sectors, guidance for monitoring and effectiveness evaluation
  - Ban on export and import of products containing mercury
  - Ban of development of new products and processes
  - Orderly storage, disposal and traceability of waste containing Hg

- **LRTAP Convention and its Heavy Metals Protocol covers 9 Industrial Sectors**
  - Application of BAT in the main sectors
  - Compliance with emission limits for dust, Hg, Cd and Pb
  - Cessation of chlor-alkali electrolysis

- **BREF Documents of the Seville Process lead to changes of national legislation**
  - Hg is a priority substance of the EU, requirement for regulation
  - Hg is regulated in BREFs for glass production, NFM, waste incineration, LCP ….
  - Requirements need to be transposed bindingly into national legislation

Aims and Content of the Research Project

- Comprehensive documentation of :
  - Origin and distribution paths of mercury from industrial sources in Germany
  - Quantification of the input of mercury via input materials, e.g. raw materials and resources, their specific release behaviour in the processes and the resulting emission pathways (including industrial products and by-products)
- Description of current mercury abatement measures and review of their transferability to other industries and sectors
- Measurements of the mercury content in products or processes
- Description of real sinks for each industrial sector
- If possible, the investment and operating costs should be evaluated for all proposed measures

Proposals for a national mercury strategy for Germany's industry - including a cost analysis

Research Institutes and Schedule

Öko-Institut : Project management
Ökopol
Cutec
University of Magdeburg : Measurements

Project Schedule

Sectors Covered

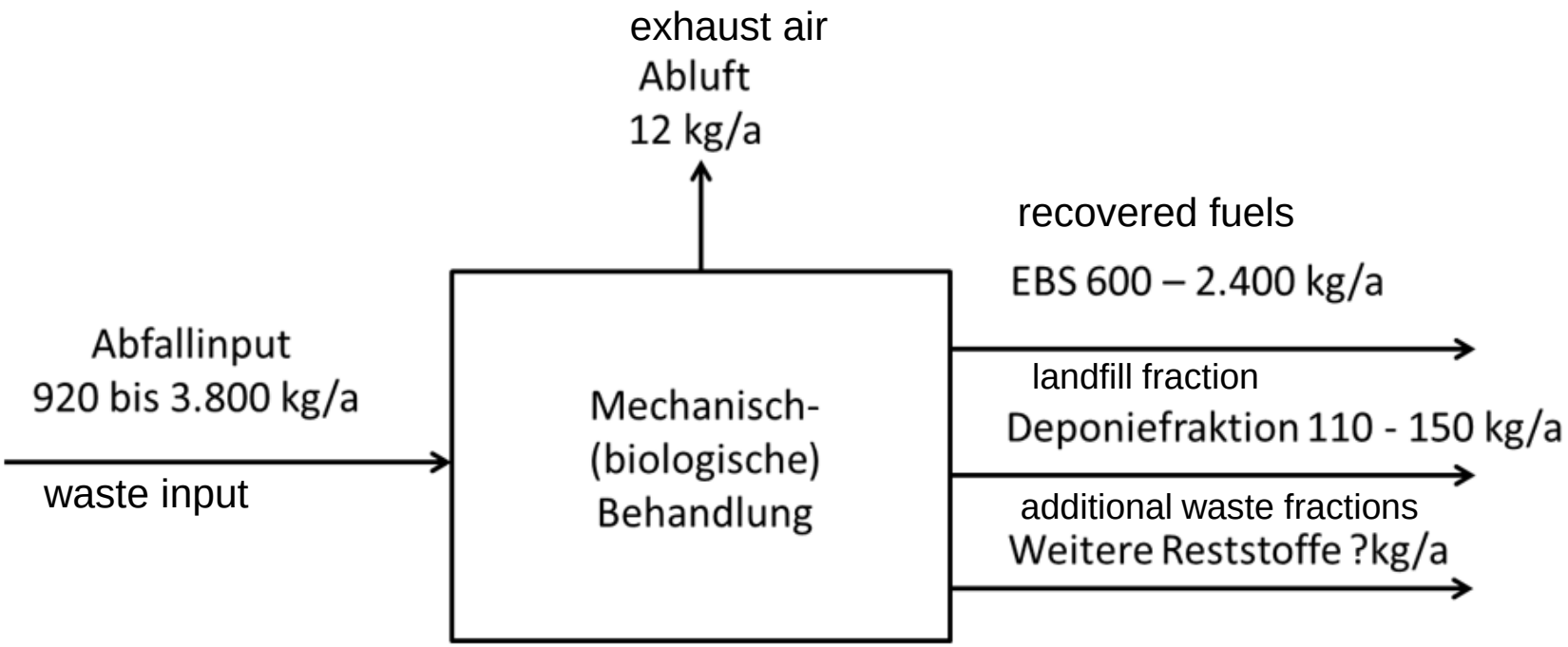
- Processing of metal ores (copper, lead, zinc, aluminum)
- Chemical industry
- Combustion plants (small, medium and large, different fuels)
- Steel production
- Foundries
- Cement production
- Production of lime, dolomite and gypsum
- Glass production
- Ceramics industry
- Refineries
- Natural gas production and distribution
- Paper and pulp production
- Waste incineration, waste treatment
- Crematoriums
- Black carbon and graphite production
- Production of mercury-containing products

Schematic Description of Sectors

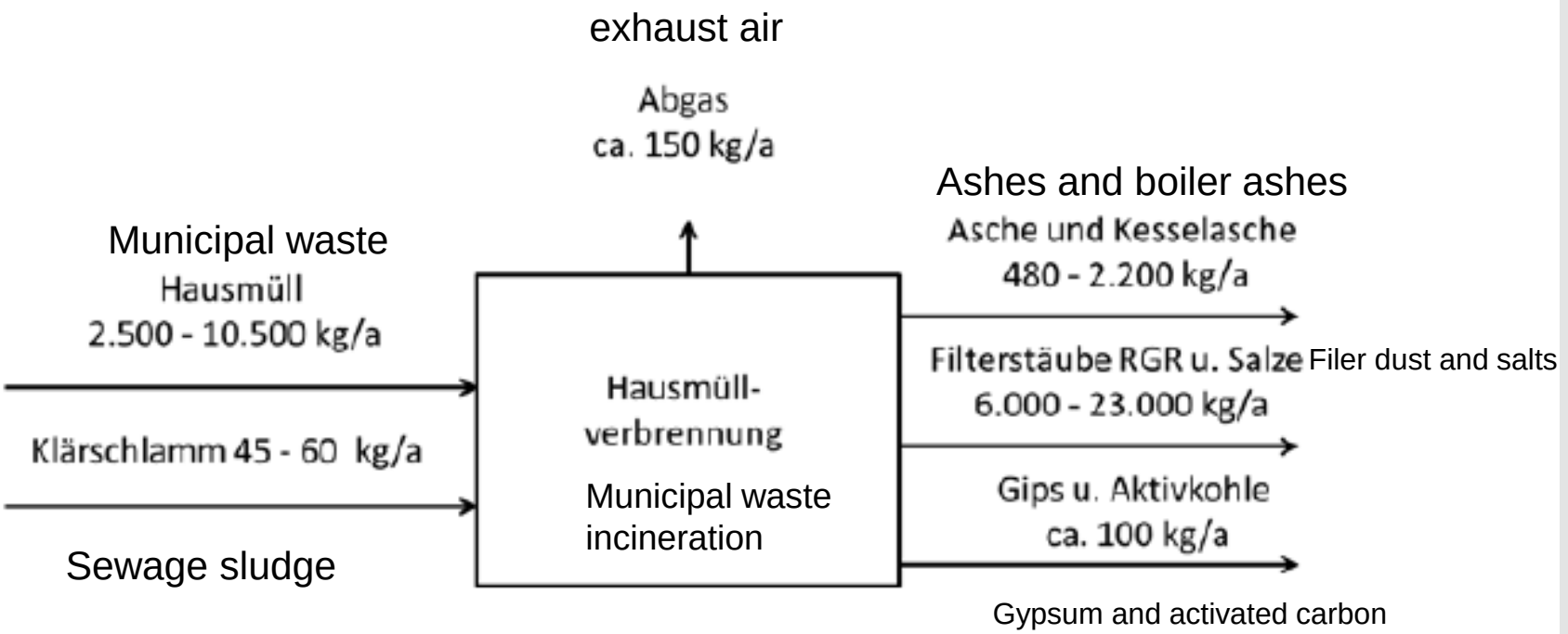
In the description of the sectors the following structure was chosen:

1. General description of installations,
2. General description of the sector,
3. Description and, as far as possible, quantification of the Hg input,
4. Description of the co-benefit techniques and the specific mercury abatement techniques,
5. Description and, as far as possible, quantification of mercury outputs,
6. Comprehensive survey of quantifiable Hg mass flows e.g. using
   - Transfer factors
   - Mass balances
   - Emission declarations of operators (2016)

Example: Mechanical (biological) waste treatment sector



Example: Municipal Waste Incineration



Measurements of Mercury within the Project

Restricted Budget!

Main focus on samples of solid material (fuel or material)

Measuring of emissions in up to 10 installations e.g.

- Smaller combustion installations
- Combustion of wooden material
- If possible, iron and steel industry

Aim:

- Filling of data gaps for input /output-paths in several chapters
- Verification of measured data from literature, e.g. for slag sand

Mercury Abatement Technologies for Air

- Sorbent injection before dust separation (municipal waste incineration, electric-steel plants, power plants, non-ferrous metal industry)
- Addition of sulphuric precipitation in the scrubber to prevent re-emissions (power plants, incinerators)
- Addition of activated carbon in the scrubber (power plants)
- Installation of the sorbent-polymer-catalyst composite technology (US power plants)
- Addition of halogens for better mercury oxidation (municipal waste incineration, power plants in USA)
- Catalysts for specific mercury oxidation (power plants)
- Fixed bed and moving bed process (municipal waste incineration)
- Addition of highly active activated carbon at Hg peaks in the raw gas in combination with continuous measurements (municipal waste incineration)
- Interruption of the mercury cycle in cement plants
- Roasting process for mercury-contaminated dust from the clinker kiln process (cement, US power plants)
- Calomel process (non-ferrous metal industry)

Mercury Abatement Technologies for Water

- Two-stage precipitation
- Ultrafiltration
- Ion exchange

Structure of chapters for abatement technologies (air and water)

- Description
- Achieved environmental benefits
- Cross-media aspects
- Limitations for application
- Economic aspects
- Reasons for the application
- Reference installations

Do real Sinks exist?

Sinks already identified:

- Disposal of filter dusts underground
- Disposal of residues from the non-ferrous industry (e.g., calomel) underground
- Landfill of dust from power plants in open-pit mining
- Generation of Hg-rich sludges in wastewater treatment followed by underground storage

Further measures under development to create real sinks:

- Roasting process in the cement industry with disposal of loaded adsorbents underground
- Avoiding the transition from Hg to REA gypsum by suitable techniques, e.g. special hydrocyclones and Hg-enrichment in sewage sludge.

Further Steps

Discussions with Stakeholders:

- Discussion of technologies (September 2018)
- Transfer of technologies to other sectors
- Estimation and, where possible, assessment of costs

- Reduction strategies (2019)

- Further measurements at installations and materials (end of 2018 and 2019)

- Draft Final Report after Summer 2019

Create a basis for discussion of a national strategy for further reduction of mercury from industry

Thank you for your attention!

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