Cristina Gloria
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Mechanical Treatment in Enhanced Landfill-Mining

An evaluation of different scenarios with a ballistic separator

Herausgeber:
Univ.-Prof. Dr. Kathrin Greiff
Univ.-Prof. Dr.-Ing. Peter Quicker
Univ.-Prof. Dr.-Ing. Hermann Wotruba

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Mechanical Treatment in Enhanced Landfill Mining

An evaluation of different scenarios with a ballistic separator

from the Faculty of Georesources and Materials Engineering of the
RWTH Aachen University

to obtain the academic degree of

Doctor of Engineering Science

approved thesis

submitted by

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Advisors: Univ.-Prof. Dr.-Ing. Thomas Pretz

Univ.-Prof. Dipl.-Ing. Dr.mont. Roland Pomberger

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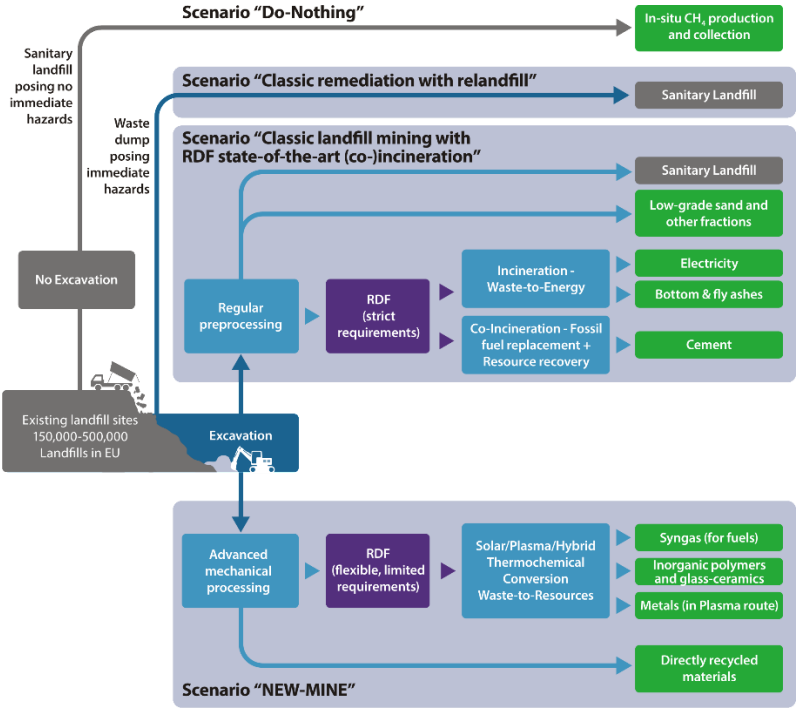
This thesis is dedicated to my father, grandfather, and mother.

New-Mine Project

Within the EU Training Network for Resource Recovery Through Enhanced Landfill Mining (NEW-MINE Project), funded by the EU Programme for Research and Innovation Horizon 2020, the influences on the mechanical treatment were studied to enhance the sorting process of landfilled material. To conduct this study, two landfill mining case studies were performed: 1) at the Halbenrain landfill (Austria); and 2) at the Mont-Saint-Guibert landfill (Belgium). In total, approximately 500 t (in Belgium) and 374 t (in Austria) of landfilled waste were excavated and processed. Consequently, several scenarios with different preliminary conditions (input material (composition) and moisture), in a fixed pre-treatment process, were evaluated. In this way, it can be seen how sensitive the mechanical treatment is, even when innovative technology is used. Additionally, this study shows how difficult it is to obtain a high yield of "valuable" materials from old landfill waste, mainly due to the agglomeration and mingling of different kinds of waste. The valorization technologies in the NEW-MINE project aim for more flexible requirements and a higher RDF recovery rate. However, a robust enough technology is yet not proven, and until now, only lab-scale experiments have taken place.



Comparison of different scenarios for the EU's landfills (EURELCO 2016).

Publications

Journal papers (peer-reviewed):

1. C. García López, A. Ni, J.C. Hernández Parrodi, B. Küppers, K. Raulf and T. Pretz, “Characterization of landfill mining material after ballistic separation to evaluate material and energy recovery potential”. Detritus Journal, Special Issue: Enhanced Landfill mining, September 2019. DOI 10.31025/2611-4135/2019.13780.

2. C. García López, B. Küppers, J.C. Hernández Parrodi, A. Clausen, T. Pretz. “Landfill mining: A case study on sampling, processing and characterization of excavated waste from an Austrian landfill”. Detritus Journal, Volume 02, June 2018. DOI 10.31025/2611-4135/2018.13664.

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8. H. Lucas, J. C. Hernández Parrodi, C. García López, D. Vollprecht, K. Raulf, R. Pomberger, T. Pretz and B. Friedrich, “Assessment of the recovery of metals in landfill mining. A case study of a landfill in Belgium”. Detritus Journal, Special Issue: Enhanced Landfill mining, September 2019. DOI 10.31025/2611-4135/2019.13879.

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2. C. García López, B. Küppers, K. Raulf, T. Pretz, D. Vollprecht, R. Pomberger, “Applicability of Sensor-Based Sorting to Landfill Mining Material” At the World Congress ISWA (Bilbao, Spain), October 2019.

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List of Abbreviations

MSW	Municipal solid waste
CDW	Construction and demolition waste
IW	Industrial waste
LFM	Landfill mining
ELFM	Enhanced landfill mining
EU	European Union
MSG	Mont-Saint-Guibert
Fe-metals	Ferrous metals
NF-metals	Non-ferrous metals
2D	Two-dimensional
3D	Three-dimensional
B1	Batch 1 from MSG landfill
B2	Batch 2 from MSG landfill
B3	Batch 3 from MSG landfill
B4	Batch 4 from MSG landfill
BS	Ballistic separator
S1	Scenario 1
S2	Scenario 2
S3	Scenario 3
S4	Scenario 4
MC	Moisture content
n	Number of samples
wm	Wet mass
dm	Dry mass
Dmax	Maximum diameter
RDF	Refuse derived fuel
AVA	Thermal treatment plants (waste incineration plant/ waste to energy plant/ pyrolysis plant)
DE	Germany
EAV	European municipal waste list
FEU	Combustion plant with energy recovery

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