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Enhanced Landfill Mining case study: Innovative separation techniques

Lars Cuyvers, Tim Moerenhout, Stefan Helsen, Katrien Van de Wiele, Tom Behets, Luk Umans, and Eddy Wille
Ecorem, Belgium (lars.cuyvers@abo-group.eu)

In 2011, a corporate vision on Enhanced Landfill Mining (ELFM)1 was approved by the OVAM Board of directors, which resulted in an operational programme over the period 2011-2015. OVAM (Public Waste Agency of Flanders) is the competent authority in charge of waste, Sustainable Materials Management (SMM) and contaminated soil management in Flanders. The introduction of the ELFM concept needs to be related with the concept of SMM and the broader shift to a circular economy. Within the concept of ELFM, landfills are no longer considered to be a final and static situation, but a dynamic part of the materials cycle.

The main goal of this research programme is to develop a comprehensive policy on resource management to deal with the issue of former landfills. In order to investigate the opportunities of ELFM, the OVAM is applying a three step approach including mapping, surveying and mining of these former landfills. As a result of the mapping part over 2,000 landfill sites, that will need to be dealt with, were revealed. The valorisation potential of ELFM could be assigned to different goals, according to the R^3P-concept : Recycling of Materials, Recovery of Energy, Reclamation of Land and Protection of drinking water supply. .

On behalf of the OVAM, ECOREM was assigned to follow-up a pilot case executed on a former landfill, located in Zuienkerke, Flanders. Within this case study some technical tests were carried out on the excavated waste material to investigate the possibilities for a waste to resource conversion. The performance of both on site and off site techniques were evaluated. These testings also contribute to the mapping part of OVAM's research programme on ELFM and reveal more information on the composition of former landfills dating from different era's.

In order to recover as many materials as possible, five contractors were assigned to perform separation tests on the bulk material from the Zuienkerke landfill. All used techniques were described, resulting in a separate flowsheet for every contractor. The resulting fractions and materials were described in detail to obtain an inventory of the bulk material. Based on the characteristics from the obtained fractions, all possible valorisation pathways are listed, suggesting a Waste to Material (WtM) or a Waste to Energy (WtE) valorisation pathway. Fractions that needed further treatment were also discussed.

The results of the separation tests proved to be very promising and delivered well sorted waste streams. The composition of the waste material, on the other hand, proved to be less beneficial to be economically feasible. Due to the high amount of sand and clay (up to 90wt%) in the Zuienkerke landfill the share of instant recoverable materials proved to be very limited.

Due to the limited number of tests concerning the separation and valorisation of landfilled waste, the feasibility of ELFM in the short term is not fully described yet. Based on the first experiences, the main drivers to introduce the ELFM concept on these type of landfills are the necessity of urgent remediation actions and the reclamation of land. The added value of land reuse for the future might close the financial gap in a significant way, making the implementation of ELFM feasible on former landfills.

1 Jones et al.,2010: "the safe conditioning, excavation and integrated valorisation of landfilled waste streams as both materials and energy, using innovative transformation technologies and respecting the most stringent social and ecological criteria".