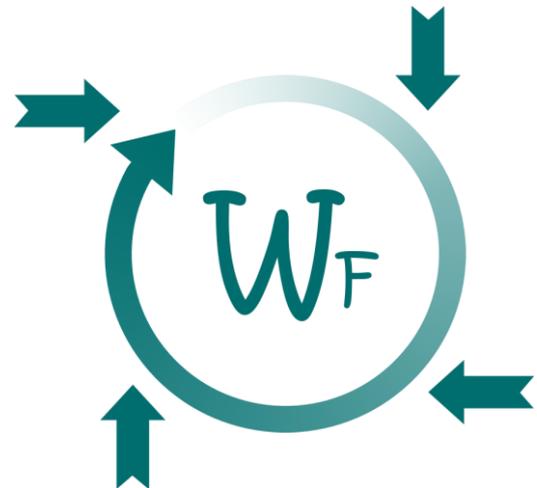


**ReWaste F
Recycling and Recovery of
Waste for Future**

Programme: COMET – Competence
Centers for Excellent Technologies

Programme line: COMET-Project

Type of project: ReWaste F, 04/21 –
03/25, multi-firm



HOW MUCH RECYCLING IS IN ONE TON OF CEMENT?

A STUDY ON THE INFLUENCE OF SECONDARY FUELS AND SECONDARY RAW MATERIALS ON RECYCLING CONTENT AND POLLUTANT CONTRIBUTION IN CEMENT PRODUCTION.

Waste and industrial by-products are increasingly used in the production of cement clinker and cement, serving both as secondary fuels and secondary materials. Secondary raw materials (SRM) are applied as part of the raw meal in the clinker-burning process, while secondary supplementary cementitious materials (SSCM) are added to the clinker for cement production. Another secondary raw material in this sense is the ash from refuse-derived fuels (RDF), which is incorporated into the clinker during combustion. Therefore, from a technical perspective, the incineration of RDFs can be considered not only as energy recovery but also as material recycling.

Since these waste-derived materials become part of the product, they are recycled from a technical point

of view. Therefore, cement consists of a certain, but unknown, share of recycled material.

For this reason, a method has been developed that allows measuring this recycled content in a standardized and comparable way across different cement plants. This method includes two distinct ways to determine the recycled content in cement production, a mass-based method, and a chemical component-based method. In this way, it is possible to exclude substances that are used in the process and increase the recycling rate but are incidental to the functionality of the cement.

The use of secondary raw materials also potentially contributes heavy metals to the cement. Therefore, the method has been expanded to include an analysis

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for a heavy metal contribution. This enables the identification of those material flows that contribute significantly to the share of heavy metals in cement.

To test the functionality of these methods, they were applied to two Austrian cement plants. It is shown that one ton of cement consists of 365 kg respectively 387 kg of secondary materials (see Figure 1). This results in an average recycling rate over the two cement plants of 37.6% during the one-year observation period.

The heavy metal analysis indicates that the use of RDFs represents a significant contribution of lead and antimony to cement. In addition, the results indicate that due to the high proportion of SSCMs utilized in cement production, they make a relatively substantial contribution to the heavy metal content of arsenic, cobalt, chromium, nickel, lead and mercury in the cement.

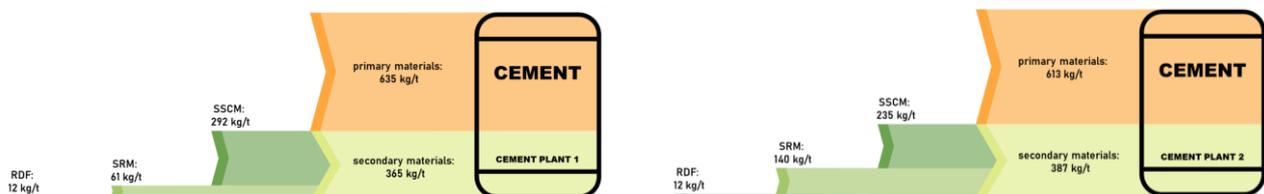


Figure 1: Results from the mass-based recycling rate calculation from the two cement plants; SSCM (secondary supplementary cementitious materials); SRM (secondary raw materials for clinker production); RDF (refuse derived fuels).

Project coordination (Story)

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