

## INOVATIVE METHOD FOR LANDFILLING OF MUNICIPAL SOLID WASTE INCINERATION RESIDUES BY STABILIZATION/SOLIDIFICATION INTO COAL FLY ASH ROCK MATRIX RESULTED FROM DENSE SLURRY TECHNOLOGY

### Goal of the project

The project goal is treatment of MSWI residues by stabilization/solidification by means of using a binder matrix. The aim of this process is to create new compounds in a stabilized form that encompassing the harmful elements, which are non-hazardous or less hazardous than the raw (initial) material.

Project includes a series of experiments for embedding the MSWI residues into the coal fly ash rock matrix with the support of the preview research results. There will be done a small scale landfill disposal, in order to investigate the leaching behavior on environmental conditions for tracking the pollutants concentrations migration into environment.

### Short description of the project

The project concept is based on using fly ash and desulphurization products related to coal incineration as a binder material to stabilize through solidification process the pollutants (heavy metals mostly) contained in MSWI residues.

### Project implemented by

Politehnica University Timișoara

### Implementation period

01.05.2018 – 30.04.2020

### Main activities

The main activity of the project is to assess the discharge behavior of the experimental landfill disposal exposed into environmental conditions.

In this demand the following activity were foreseen:

- Construction of the experimental demonstrator.
- Evaluate the waste characteristics.
- Construction of the experimental landfill disposal according to the proposed technology.
- Leaching and percolation sampling.
- Lab analyses of experimental samples. Data recording.
- Processing and analyses of the experimental data.
- Interpretation of experimental data.
- Model the environmental behavior of the waste.
- Validate the model by calibration with the results from laboratory tests and field experiments and by comparing it to natural analogues.

### Results

**Stage I (2018) – Up-grading the existing lab demonstrator. Technical design. Purchasing of equipment.**

- 1.1 Preparation of design documents.
- 1.2 Designing installations for upgrading the experimental demonstrator in accordance with the proposed technology.
- 1.3 Elaboration of technical datasheets for equipment purchasing.
- 1.4 Launch of the public procurement procedure in accordance with the legislation in force.
- 1.5 Reception of purchased equipment. Equipment payment.

**Stage II (2019) – Construction of experimental demonstrator (upgrade). First run. Testing. Lab analyses**

- 2.1 Integration on technological assembly

## Applicability and transferability of the results

The solidification/stabilization method of different types of toxic residues consists of using a binder matrix, which is non-pollutant for the environment with the aim to encapsulate the harmful chemical compounds.

In this regard most of the applied technologies are using cement based binder matrix material which is an expensive material in comparison with coal fly ash and associated flue gas desulphurization (FGD) by-products related to coal power plants.

In fact the coal fly ash and FGD by-products are residues that end into open landfill disposal, which means that are costs free.

More than that is well known that cement factory worldwide are using coal fly ash as material basis for different types of cements, for their cementitious properties given by the pozzolanic compounds like silica ( $\text{SiO}_2$ ), alumina ( $\text{Al}_2\text{O}_3$ ), and iron oxide ( $\text{Fe}_2\text{O}_3$ ) that exceeds over 80% of the fly ash composition.

The new proposed technology based on using fly ash and desulphurization by-products related to coal incineration as a binder material according to solidification/stabilization method, will eliminate the costs with the cement, which could bring considerable economical savings.

From environmental point of view the incineration residues (fly ash and FGD by-products) related to coal incineration can be used as binder material according to the proposed concept of solidification/stabilization method, with the aim to prevent ground water pollution by leaching phenomenon developed on open landfill disposals by dense slurry technology.

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## Research centre

Research Institute for Renewable Energies – ICER

## Research team

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