Innovative circular economy concepts by reusing industrial subproducts and waste

PROJECT DETAILS

Funding Programme:
LIFE Programme
Sub-Programme:
LIFE Environment and Resource Efficiency
Funding Scheme:
Demonstration Actions
Project Reference:
LIFE16 ENV/ES/000481; UE-17-SUBRPRODUCTS-LIFE 16-481
Project Duration:
48 months (from 2017-09-01 to 2021-08-30)
Total Project Value:
€ 1.470.296
EU Contribution:
€ 882.176
UniOvi Budget:
€ 399.663

EC Website:
http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=6195
Project Website:
https://www.unioviedo.es/subproducts4life

PROJECT DESCRIPTION

Coal combustion products (CCPs) include residues such as fly ash and flue gas desulphurisation (FGD) gypsum. More than 105 million tonnes of CCPs are produced in the EU each year. Much of this goes to landfill where it causes environmental problems for soil and water.

The SUBproducts4LIFE project aims to demonstrate a highly-replicable industrial symbiosis model for the reuse of waste products from power stations and steel works in the remediation of contaminated soils and brownfield sites. This will involve the reuse of coal ash and gypsum from power stations and two types of steel slag.

Specific project objectives are to:

- Increase the value chain of the four industrial residues and analyse their life-cycles;
- Create an industrial symbiosis model between active industries (power stations and steel works) and contaminated sites (abandoned mines and metallurgical plants);
- Achieve better soil management and land reuse, in active industries and in built-up areas on former mines;
- Reduce the overall environmental impact of active industries and contaminated sites;
- Improve soil and water conditions, by reducing arsenic (As) and mercury (Hg) content in soil and leachate water through ‘semi-natural’ processes; and
- Prove the efficiency of alternative on-site techniques and methodologies to prevent contamination of water.

By promoting the recycling of CCPs, the project contributes to the implementation of the EU Waste Framework Directive. It will improve the quality of runoff water in the pilot areas, complying with the objectives of the Water Framework Directive and the EU Groundwater Directive. SUBproducts4LIFE is also in line with the Environmental Quality Standards Directive as it tackles mercury pollution in water and soil (mercury is classed as a priority substance in Annex II of the Directive). The soil remediation actions directly contribute to the implementation of the Soil Thematic Strategy.

Expected results:

- Recycling/reuse of 14 530 tonnes of waste - 12 310 tonnes of coal ash, 2 070 tonnes of gypsum from FGD and 150 tonnes of steelmaking slag, to be used in three pilot studies in two mining areas;
- Re-use of 4 000 tonnes of blast furnace slag;
- Verification at real-scale conditions of the “fixing capacity” of the four industrial sub-products;
- A life-cycle assessment, circular economy plan and replicability and transfer plan for each of the four materials;
- Phytoremediation of two 200-300 m2 parcels of land, the planting of at least 200 trees of native species, and the erection of animal safety fences;
- Reclamation of mining waste deposits (total reclaimed surface of 5.000 m2) by the reuse of coal ash, gypsum and blast furnace slag, also leading to decreased contamination and improved stability;
- Increased soil surface, with recovery of at least 25% of mining pilot areas currently sealed (5 000 m2 in upper waste deposit and 2.000 m2 in production area);
- Improved water management, through rainwater collection with a perimeter ditch and effluent treatment with nine filter and water treatment trenches, reducing leachate water by 40-50%; and
- At least a 20% reduction in arsenic and mercury contamination in soil and leachate water in pilot areas.

PROJECT PARTNERS

Project Coordinator
Universidad de Oviedo, Spain

Spain
Cuestiones Económicas, S.L.
Hidroeléctrica del Cantábrico, S.A.
Biosfera Consultoría Medioambiental, S.L.
Escorias y Derivados S.A.
Tecnología de Medioambiente y Minería S.L.
Instituto Asturiano de Prevención de Riesgos Laborales

UNIOVI TEAM

Rafael Rodríguez Díez [1]
rrodrifer@uniovi.es
María Aida González Díaz [2]
aidag@uniovi.es
José Luis Rodríguez Gallego [1]
jgallego@uniovi.es
Julia María Ayala Espina [3]
jayala@uniovi.es
Begoña Fernández Pérez [3]
fernandezbegona@uniovi.es
Antonio Torralba Burrial [4]
torralbaantonio@uniovi.es
Javier Viñuela Álvarez
vinuelajavier@uniovi.es

[1] Department of Mining Exploitation and Prospecting
[2] Department of Organisms and Systems Biology
[3] Department of Materials Science and Metallurgical Engineering
[4] Department of Education Sciences