

Research & Development Request

H2020-SPIRE-6-2015: Organic waste integration into industrial feedstock to achieve improved efficiency in the building industry

Summary

A research team from a Greek Technological Institute is preparing a project proposal on the utilization of solid wastes and sludge from the industries for the manufacturing of raw clay building materials. The team is looking for industrial partners, able to characterize and supply waste materials, distribute and implement them into existing production lines for testing and demonstrating the technology.

Creation Date	13 November 2014
Last Update	28 November 2014
Reference	RDGR20141113001

Details

Description

The main goal of the Project is to utilize solid waste and sludge, of organic nature, or mixed with soil, such as solid wastes and sludge from the petroleum producing and processing industries and use it with clay raw materials for the manufacturing of a variety of building materials, such as lightweight clay bricks with improved thermal insulation and tiles, in order to achieve flexible energy, material flow integration in the process industries and improve efficiency in the process industries through reductions in energy consumption and waste material management. Several other advantages will be realized.

The process has been well developed and tested in a small pilot plant production line. Material characterization has been carried out and energy consumption savings have been measured in a small laboratory sintering process. Physico-mechanical properties of the newly prepared red ceramics have been evaluated thoroughly, while standard leaching tests have shown that no leaching of heavy metals occurred from prototype specimens. Optimized process conditions lead to air emissions within acceptable limits.

The approach is a holistic one since it manages waste materials, turning them into industrial feedstock and exploiting their valuable energy content with zero secondary production waste. This approach will be optimized through proper demonstration – implementation in existing industrial production lines of the end-user partners of the consortium. It can be used by end-user industries of large, medium or small capacity.

Implementation in full scale processes can result in significant (up to 50%) energy consumption

savings and it will be very useful for such end-user (red ceramics manufacturers) industries which consume large amounts of energy and rely totally on fossil fuels. It is realized that energy costs in the brick manufacturing industries constitute about 60-70% of the final product cost. Producer industries will minimize the management cost for safely disposing their wastes. Wastes from one industrial sector will be turned into important industrial feedstock for another industrial sector ensuring industrial symbiosis.

The proposed project will engage then industrial partners, both producers and end-users able to characterize and supply waste materials, distribute and implement them into existing production lines for testing and demonstrating the technology. Furthermore, software needs to be developed by a software SME for measuring critical footprint issues and relevant process parameters, feedstock consistency and product quality in order to facilitate proper dissemination and use. This software can be used by end-users.

Proposal Deadline: 04/02/2015

Deadline for Partner Requests: 31/12/2014

Advantages and Innovations

(a) The safe management of oily by-products produced and recovered in the European oil refinery industry is proposed by a holistic approach through their valorization as efficient secondary resources in building ceramic materials manufacturing, where the complete life-cycle of the product, including its durability and impact over the use-phase is considered. This holistic approach is required to ensure the responsible promotion of ceramic products made in the EU instead of less durable products or other ceramic products imported from less environmentally-regulated countries.

(b) Emphasis will be placed on the evaluation of the energy consumption during the manufacturing processes, as significant energy savings can be attained due to the exploitation of the calorific value of the organic wastes (>3000 kcal per kg). Thus, this will contribute to both conservation of energy resources, from the environmental point of view, and to strengthening the competitiveness and growth of a highly energy-consuming industrial activity, such as the European ceramic industry. Furthermore, lightweight bricks are generally preferred because they are easier to handle, and thus their transportation costs are lower.

(c) Eco-friendly lightweight bricks will be developed, with optimized thermal insulation properties towards low exergy buildings. The development of lightweight bricks will allow brick manufacturers to reduce the total clay content by incorporating combustible organic waste particles that reduce the mass of the brick, while maintaining the required properties.

(d) Steps will be taken to introduce energy-saving best practices for the building ceramics industry, improve resource efficiency and move away from traditional energy sources. In addition, taking a life-cycle view of the novel ceramic products, it will be shown that they help achieve resource, water, and energy savings for consumers and downstream user sectors.

Stage of Development

Field tested/evaluated

IPR Status

Secret Know-how

Keywords

Technology

002006016	Materials, components and systems for construction
002007002	Building materials
002007030	Lightweight materials
010003004	Recycling, Recovery
010003009	Waste to Energy /Resource

Market

006012002	Energy for Industry
008001009	Speciality/performance materials: producers and fabricators
008001013	Ceramics
008001023	Other chemicals and materials (not elsewhere classified)
008004002	Chemical and solid material recycling

NACE

E.38.3.1	Dismantling of wrecks
E.38.3.2	Recovery of sorted materials
E.39.0.0	Remediation activities and other waste management services
F.41.1.0	Development of building projects
F.42.9.9	Construction of other civil engineering projects n.e.c.

Network Contact

Issuing Partner

Foundation For Research And Technology Hellas

Contact Person

Angeliki-Eleni Vrochidou

Phone Number

0030 2810391963

Dissemination

Send to Sector Group

Environment

Client

Type and Size of Organisation Behind the Profile

Other

Year Established

0

Turnover

<1M

Already Engaged in Trans-National Cooperation

No.

Languages Spoken

English

Greek

Client Country

Greece

Partner Sought

Type and Role of Partner Sought

The Greek research team is seeking for the following partners:

-Producer industries of waste materials: for waste material characterization, waste management and supply, waste flow logistics, preprocessing waste (if needed), distribution of them to be reused as feedstock, implementation of wastes into existing production lines for testing and demonstrating the technology, flexibility evaluation in energy and in material flow integration into a full scale process, dissemination of the results.

-End-user industries of waste materials (Clay brick manufacturing industries): testing the technology in existing production lines and evaluating energy flexibility, energy consumption reduction, process improvement in the efficiency and process material flow integration.

-Software companies: for measuring critical footprint issues and relevant process parameters, feedstock consistency and product quality in order to facilitate proper dissemination and use.

Type and Size of Partner Sought

SME 11-50, SME <10, 251-500, SME 51-250, >500

Type of Partnership Considered

Research cooperation agreement