Composites Waste - Demonstration of a new composites waste recycling process and of the use of the recycled materials in various industries
LIFE09 ENV/DK/000367

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Project description:

Background

The use of composites in construction material has grown in recent years and the number of products that now benefit from the valuable properties of composites is expanding. The wind turbine industry was a major consumer of composite reinforcements used in rotor blades. However, approximately 20% of the composite fabric used in the manufacture of rotor blades was discarded during the production process.

There were two main problems related to composite waste: firstly, the very large amount of energy embedded in the production of composites (one-third of the cost of producing composites was energy related); and, secondly, environmental problems associated with the disposal of composites in landfill (approximately 40 000 tonnes of composite waste was deposited annually in EU landfills).

Objectives

The key objectives of the Composites Waste project were to:
- Develop a new waste business concept involving the sourcing and processing of composites waste into quality glass fibre material;
- Demonstrate the use of processed composites waste material in two main industries (the production of asphalt for road-paving, and in production of exhaust systems and silencers);
Gather and develop technical and commercial information on the trading of composite waste. This will include information on the processing of waste from different sources and collection systems; and

Disseminate the technical, environmental and economic results of the project, as well as providing perspectives on possible future uses of the recycled material.

Expected results from the project included:

- An operational pilot plant for processing composite waste into different types of products;
- A proven business concept with the potential to reduce energy consumption and related environmental impacts from producing virgin glass fibre;
- The recycling of 1000 tonnes of waste during the project period;
- Agreements with Danish waste producers, which would potentially reduce the annual disposal of composites in landfill by 2000 tonnes;
- Recommendations on the most promising applications (both economically and environmentally) and the most effective means of transferring recycling solutions to countries with a reasonable potential for setting up a recycling system.

Results

The Composites Waste project developed a working technical solution to process a difficult waste fraction (glass fibre) and developed three products, which can effectively use the processed waste. Further, the project made surveys of the waste sources and markets, and developed a business platform for handling the waste and products on a commercial basis without any (significant) regulatory drivers.

The project made extensive surveys of (non-resin) glass fibre waste sources in the EU as well as a survey of the potential users of the products made from this processed waste fraction. Findings confirmed that this waste fraction is largely unregulated within the EU. It is not hazardous and may not necessarily include organic components (which could be banned from landfills) but is difficult to treat and reuse.

The project’s main environmental benefit relates to identifying innovative treatment and reuse solutions to reduce the amounts of glass fibre waste that was previously landfilled. Outcomes confirmed that around 40 000 tonnes of this waste in the EU can be recycled annually (offering potential savings on use of virgin resources and energy consumption/CO2 emissions during glass fibre production). Approximately 1000 tonnes of waste was recycled during the project.

Project findings also noted that the recycling process does not eliminate all the waste. Some 15-20% of the processed waste remains unused, and so still has to be landfilled or deposed of by other means.

Project conclusions indicate the commercial feasibility for the new waste management approach. Results showed the potential to reduce energy consumption and related environmental impacts from the production of virgin
glass fibres. Each kg of recycled fibres substituting virgin fibres represent 48 MJ energy and emissions of 2 kg CO2, 9 g SOx, and 3 g NOx.

The project was implemented in a commercial context and developed a functional machinery system to process glass fibre waste into shape(s) that can be converted further into new products. The project also successfully tested waste product applications.

A pilot plan for processing composites waste into different types of products (insulation bats, non-woven e-glass fibre and material to be used in car exhaust silencers) was developed and constructed. It became fully operational by the end of the project with a processing capacity of around 1000 tonnes of treated waste annually. This was considered to represent a good starting point for commercialisation of the process on a scale that is relevant to the actual waste volumes.

The project's very flexible organisation enabled the team and external contractors to move quickly from one step to another, and also quickly reject ideas and developments that seemed fruitless. This helped the project to develop products with strong market potential, such as piloting the production of gypsum plasterboards and insulation bats using the waste material. Work here involved practical production tests on the products to check their compliance with existing norms and standards.

A pilot production of silencer and exhaust systems for the automotive market was also undertaken using the waste material. This project action tested the practicality of substituting virgin high tech composites products, and also applied high production standards.

These exhaust system components produced from recycled material were brought nearer to commercialisation than other project actions, such as the foreseen use of glass fibre waste as an asphalt production component, which was not deemed technically acceptable. Thus this opportunity, with a large potential, was rejected.

The project developed a novel form of business platform for a new waste company. This employed four people by the end of the project and indicated growth potential at a European level.

The project accumulated an extensive amount of information on the glass fibre waste market as well as of potential waste users. Such information can be considered valuable for any forthcoming activities in this sector. It was noted that this recycling process does not need to be instigated by any specific regulatory obligations.

Successful continuation of the project depends on the competitiveness of the technology and the developed products. There are alternatives for both, but landfill pressures and commercial opportunities are still considered as being key drivers behind the long-term success of the project’s innovative recycling processes.

Further information on the project can be found in the project's layman report and After-LIFE Communication Plan (see "Read more" section).
Environmental issues addressed:

Themes

Waste - Industrial waste
Industry - Production - Non-metallic minerals

Keywords

waste use, waste recycling, glass industry, building material

Natura 2000 sites

Not applicable

Beneficiaries:

Coordinator: Grymer Group ApS
Type of organisation: SME Small and medium sized enterprise
Description: Grymer Group ApS is a Danish management company that focuses on the management and implementation of successful business projects. The company has been involved in the management and administration of complex multi-party projects for many years.

Partners: Fiber Worldwide ApS, Denmark Pankas AS, Denmark Bosal Research N.V. Teknologisk Institut, Denmark

Administrative data:

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Project location: Kommuner(Danmark) Sjælland(Danmark)
Read more:

- Project web site
  Publication: After-LIFE Communication Plan
  Title: After-LIFE Communication Plan
  Year: 2014 No of pages: 3

- Publication: Layman report
  Title: Layman report
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- Publication: Layman report
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