

SUMMARY OF FINDINGS

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Resource efficient Ireland – Biodegradable plastic from farm waste plastic

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The report describes a cross disciplinary approach to converting post consumer waste (polyethylene (PE)) into value added eco-friendly material. PE which makes up the largest proportion of plastic waste worldwide was pyrolysed to generate two products; an oil (80%) (fuel source) and a wax (~20%) (by product). The ability of bacteria to convert the wax by product to a biodegradable plastic was investigated. The biodegradable polymer was processed to prepare it for application.

Key Words: Polyethylene, waste conversion, biodegradable plastic, biopolymer

Background - New technologies to deal with plastic and other waste will have to emerge from Ireland and other European countries in order to achieve European resource efficiency goals. The development of infrastructure for recycling technologies, market penetration by recycled products as well as building research and development capacity is critical for Ireland to build a green economy. The EPA through its research programme (STRIVE) brought together University researchers and industry from across a broad range of expertise to address a key need and build a technology for waste plastic recycling.

The major outputs:

- Patented technology and high value products from (farm) waste plastics
- Highly skilled university graduates
- Licensing of the innovative technology into an Irish SME
- Unique technology developed in Ireland with global relevance

This demonstrates that Ireland through investment and vision can lead the way globally in environmental technologies. The development of technology and the creation of highly skilled jobs are in keeping with government policy for employment and wealth creation in Ireland through green growth (Our sustainable future 2012). Polyethylene makes up the largest proportion of plastic waste worldwide and is widely used in farms. This report describes an interdisciplinary approach to converting post consumer waste

(polyethylene (PE)) into value added biodegradable material. Microbiology, bioprocesses engineering, chemical engineering, material science and nanotechnology were combined to convert PE to a biodegradable polymer. Farm plastic waste, made of polyethylene, was subjected to a two-step treatment to produce a biodegradable plastic. The researchers improved the process further through minute investigations and developed applications for the biodegradable polymer. The project results will be used to implement the polyethylene to biodegradable plastic technology at a larger scale.

Key points

- Polyethylene was converted to a biodegradable polymer using a 2-step process
- Plastic waste can now be a source of biodegradable polymers
- The polymer product was processed for biodegradable applications
- The project has forged links between industry and academia which would have been impossible without project funding.
- The interdisciplinary nature of the research was key to the success of this project
- The project's scientific outputs meets policy i.e technology development to treat waste for increased resource efficiency
- Irish technology and products can be exported worldwide to address global issues

Findings/Recommendations

- The conversion of waste to value added products can contribute to the efforts at a national and European level to upcycle waste and divert waste from landfill. The technology has the potential to address the global issue of plastic waste management, which is of paramount importance socially and politically.
- The support of scale up activities for technologies such as this is critical if such a technology is to emerge from the lab into the industrial sphere.
- The integration of disciplines and technologies is key to address complex issues such as plastic waste management.
- The development of a flagship waste refinery in Ireland for the production of value added products such as (bio)fuels, (bio)polymers and (bio)chemicals can become a reality with the development of industry/academic partnerships.

For Further Information

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<http://www.epa.ie/pubs/reports/research/waste/strivereport107.html>