

# Innovation results

AN R&D CASE STUDY

#010

## Eco-friendly starch foam packaging

You only have to walk past a burger bar to see the rubbish problem caused by food packaging. New foam made from starch solves the problem. It is biodegradable and can easily be disposed of by composting with kitchen and garden waste.



### The need

**We can't live without it. Packaging protects delicate and temperature-sensitive products; it carries important labels and attracts shoppers' attention in busy stores.**

**Yet despite packaging regulations, the sheer volume remains a headache. To illustrate the scale, in 2008 the UK disposed of an estimated 10.7 million tonnes of packaging waste, 35% of which was not recovered or recycled. The challenge is two-fold: to dispose of packaging safely and to cut reliance on depleted oil resources which are often used in traditional packaging.**

**Packaging made on an industrial scale from renewable materials is an essential part of the solution.**

### The results

In this Technology Strategy Board co-funded R&D project, Green Light Products led a consortium of industrial and academic partners to make packaging foam from renewable natural materials such as starch, biopolymer and natural fibres. The packaging it came up with is tough, keeps contents hot or cold – as required – and is biodegradable.

Packaging made of 'traditional' materials, such as the loose-fill expanded polystyrene 'chips' that tumble out when unpacking new appliances, is now a low-value commodity. Green Light Products already makes higher value-added packaging – biodegradable chips and air cushions. It now sees the future in heavy-duty biodegradable materials to replace polyethylene foam (the moulded plastic shapes used for cold boxes and for holding appliances snug tight in cartons).

Green Light knew that starch could be turned to foam by expanding it with water in an extruder. Then, when heated

under pressure, it puffs like popcorn. This simple process avoids the use of pentane, the highly flammable blowing agent used to make polyethylene foam.

The consortium's breakthrough was to match the production cost of polyethylene foam. What's more, most of the downstream moulding and shaping processes used with traditional materials also work with starch foam. So it is easy to substitute starch for polyethylene. And the product's good thermal resistance makes it ideal for transporting chilled items, such as food and life-saving pharmaceuticals, in non-refrigerated cold boxes for up to 48 hours.

Recycling this kind of packaging remains uneconomical as putting the infrastructure in place is prohibitively expensive. Therefore, starch foam's ultimate biodegradability and suitability for composting, itself a form of recycling, will trump traditional materials that consume oil and clog landfill sites.

## Building the business

The starch foam innovation supports Green Light Products' business plan in three ways:

- Offering starch foam gives an advantage over other loosefill producers.
- It offers a new range of biodegradable packaging products to compete with

polyethylene foam in new market sectors.

- With patents in place, Green Light Products will explore the market for licensing the process abroad.

Green Light forecasts sales for consortium members in the region of £10-20m annually on the back of the starch foam innovation.



## Next steps

The response to limited test marketing has been so positive that Green Light has potential customers keen to place orders as soon as production can be ramped up. The next step is extended test marketing to check that the apparent demand is sufficient to justify the investment to tool up.

Consortium partners are exploring other imaginative ways to exploit starch foam.

For example, the construction industry – where packaging may account for 10-20% or more of site waste according to the Waste & Resources Action Programme – is keen to find an alternative biodegradable product that will survive the rigours of delivery to, and storage on, busy construction sites. Starch foam could also replace polystyrene used to form voids in concrete structures.

'Since we are a small organisation with limited resources, the project enabled us to do R&D that otherwise we could never have done.'

Green Light Products



### Technology Strategy Board Driving Innovation

Collaborative research and development projects are one of the tools that the Technology Strategy Board uses to drive innovation in the UK. The Technology Strategy Board is a business-led executive non-departmental public

body, established by the Government. Its role is to promote and support research into, and development and exploitation of, technology and innovation for the benefit of UK business, in order to increase economic growth and improve the quality of life. It is sponsored by the Department for Business, Innovation and Skills (BIS).

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#### Project #10118

#### Project partners

Green Light Products, Brunel University, Heygates, HGCA, SCA Industrial, Kingspan, Imperial College, Building Research Establishment (BRE), PIRA, Buro Happold, Caledonian Ferguson, Foam Engineers, Biffa

#### Technology Strategy Board investment

£958,000

#### Total project investment

£2m

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