



Group Lotus plc

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**Lotus Eco Elise
Trackday Warrior Turns Eco Warrior**

Lotus unveils the Eco Elise technology demonstrator at the British Motor Show, capitalising on great strides forward in green technology.

The Eco Elise project promotes a different perspective on “green”, one which does not revolve solely around tailpipe CO₂. This holistic approach is in keeping with the progressive Lotus culture, driving Lotus to become the world’s green automotive consultancy.

Sustainable materials, hemp, eco wool and sisal have been developed for body panels and trim and, combined with hi-tech water based paint solutions, showcase new affordable green technologies. The green credentials of the technology on show in the Eco Elise have been analysed throughout the lifecycle of the car.

A green gear change display has been integrated into the dashboard to promote greener driving as well as a weight reduction programme, illustrating the holistic approach taken. The energy expended to manufacture the car has been evaluated, working to the 3R’s - Reduce, Re-use and Recycle.

Mike Kimberley, CEO of Group Lotus plc commented "This Eco Elise is a great example of the advanced and affordable green technologies Lotus is developing. We are at the cutting edge of environmental technology and are determined to push forward with our green agenda. The Lotus brand values of lightweight, fuel efficient, and high performance are more relevant today than they ever have been. We are keen to ensure that Lotus as a company and its products offer an ethical, green option that appeals to our customers".

In keeping with the “performance through light weight” philosophy, the Eco Elise weighs 32





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kg (70.5 lbs) less than the standard Elise S, which means that the efficient Elise S engine in the Eco Elise will give higher fuel economy figures and even better performance.

Dramatic improvements to the culture and operations at Lotus has rewarded the company with staggering reductions in energy (Electricity 14%, Gas 30%) and water (11%) consumed across the Hethel headquarters in 2007, compared to 2006. These advances have coincided with improvements in recycling, with 57% of waste product now being recycled.

The new green materials sourced for this car have been carefully studied to ensure that each technology used reduces the environmental impact of the vehicle. The life of the components has been analysed; during the production stage, in-use and at the end of the vehicle's life. The technology used aims to offer lower emissions of both solvents and CO₂ in the lifecycle of the vehicle, with reductions in energy consumed during manufacture.

The Eco Elise will be displayed in the Greener Driving Pavilion at the British International Motor Show from 23rd July until 3rd August. The project displays affordable green technology that is intended to be feasible and production viable in the near term future.

The Lotus Eco Elise in more detail

The project focuses on developments in:

- Sustainable materials
- Cleaner manufacturing processes
- Renewable energy generation
- Reducing carbon miles
- Efficient driving techniques
- Weight reduction

The renewable materials have been incorporated into the project, with hemp, eco wool and sisal providing natural, biodegradable engineering materials. Cleaner manufacturing processes have been sought, utilising the latest water based paint technology. Using this





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paint system saves energy and reduces emissions of solvents from the paint shop. Solar panels have been set into the hemp hard top to help power the electrical systems and give a means of renewable energy generation.

With the use of locally farmed hemp, the carbon miles to produce the Eco Elise are reduced, in keeping with the holistic approach to this vehicle. The Eco Elise puts an emphasis on efficient driving techniques by using an “economy” gear change display to improve fuel efficiency and promote greener driving. The car has undergone a weight reduction programme to add a little extra lightness, assisting in more economical, greener driving.

Sustainable materials

Sustainable hemp technical fabrics have been used as the primary constituent in the high quality “A” class composite body panels and spoiler. The renewable hemp has exceptional material properties that make for a very strong fibre. Historically hemp has been used in the manufacture of rope, illustrating the great strength of the material.

The hemp fibres have also been used in the manufacture of the lightweight Lotus designed seats. An additional benefit of using hemp is that it is a natural resource that requires relatively low energy to manufacture and absorbs CO₂ whilst growing as a plant through natural photosynthesis. This hemp material is used with a polyester resin to form a hybrid composite, however it is hoped that a fully recyclable composite resin will be viable in the short-term future.

The Eco Elise seats are upholstered in a durable yet, biodegradable woollen fabric that has been given the EU Flower certificate to exemplify its environmental credentials. This new material is ethically produced and does not use any dyes or harmful processing. In fact the colour is created from the selection of sheep breeds used to produce the wool for the yarn, which increases the natural feel of the wool and reduces the processing of the cloth.

Sisal is a renewable crop that, like hemp, is used for its strong material properties. Sisal has





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been used for the carpets in the Eco Elise, as it is a tough, abrasion resistant material. The use of these materials illustrates the capability at Lotus of utilising new, advanced materials and the flexibility of the manufacturing facilities.

Cleaner manufacturing processes

Whilst improving the green credentials of the Lotus production facilities, the Lotus Paint Facility, in partnership with Du Pont has developed a totally water-based paint system. This paint solution includes primer, colour coat and lacquer, and it is the first time that it has been possible to hand spray a water based “A” class production paint finish.

In using this progressive water based technology, Lotus is able to achieve impressive savings in energy consumption due to the low cure temperature this paint requires. An additional benefit of this paint system is the reduction in emissions of solvents, all of which contribute to substantial cost savings for Lotus. This is a result of the unique collaboration with Du Pont in pushing forward low-volume paint spraying technology. This technology is anticipated to be available in production cars in the near future.

Renewable energy generation

The hemp hard top on the Eco Elise has two flexible solar panels neatly embedded in the roof, contributing power to the electrical systems and saving energy that would be drained from the engine.

The solar panels have been integrated into the hard top to illustrate the feasibility of applying this technology. This application shows the installation of solar panels into a composite “A” class panel with a double curvature. Using this technology on a greater number of panels would make it possible to provide more power, especially on a larger vehicle.

Reduction in carbon miles

The hemp fibres have been farmed in East Anglia, thus reducing the carbon miles incurred in





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the production of this Elise. Lotus Manufacturing has component manufacturing facilities and a paint facility at its headquarters in Hethel, Norfolk, with another manufacturing site a short distance away in Norwich. The company operates a carefully managed logistics system operating between sites to improve efficiency, reduce costs and carbon miles. This is a Kanban driven barcode system that has been adopted by key suppliers. The process also uses packaging that is recycled many times over to eliminate waste.

Efficient driving techniques

Lotus cars have red shift lights to help drivers extract the maximum performance from the engine. However for the Eco Elise, Lotus designed software has been developed to assist drivers in maximising the fuel efficiency of the engine. A green gear shift display has been integrated into the instrument panel to ensure that gears are changed at the optimum point to reduce emissions and save fuel.

Weight reduction

"Performance through light weight" is so synonymous with Lotus. The reduction in mass improves the handling and braking performance and also reduces the effort required to accelerate the car. The weight reduction philosophy has even extended to the audio system with an exceptionally lightweight stereo and speaker system from Alpine saving 1.5 kg (3.3 lbs). The system uses MP3/ iPod technology in a sleek modern design.

The Eco Elise uses special lightweight wheels that reduce the unsprung mass and contribute a weight saving of approximately 15.8 kg (34.8 lbs) over the already super light Elise wheels. The weight saving programme for the Eco Elise has resulted in a total saving of around 32 kg (70.5 lbs) over the feather light Elise S, which reduces the fuel required to drive the car.

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About Group Lotus plc:

The main operating subsidiary of Group Lotus plc is Lotus Cars Ltd, which has two operating divisions - Lotus Engineering and Lotus Cars. Lotus Engineering is an internationally recognised automotive engineering consultancy based in Norfolk, UK. Global facilities include those in Michigan (USA), Kuala Lumpur (Malaysia), China and offices in Germany and Japan, with rapid expansion in new territories such as South East Asia and the Gulf States.

Lotus Engineering provides comprehensive and versatile consultancy services to many of the world's OEMs and Tier 1 suppliers, offering a full engineering service from initial concept and project design through development and integration of the complete vehicle to meet all worldwide markets and customers to full production. This includes third party 'niche vehicle' engineering and manufacture worldwide.

Lotus Cars builds world class, prestige, high performance sports cars for sale in 37 countries. These include the iconic Lotus Elise, and the Exige and Europa. Lotus is a global high-tech company, expanding and committed to driving forward technology for both Lotus Cars and its Engineering clients, spearheading research into such areas as hybrids, electric vehicles and renewable fuels.

What is the EU Flower?

- The EU flower is a symbol of superior environmental quality and is available to a range of products and services.
- The scheme, which has been designed and is overseen by the European Commission, sets out specific ecological criteria that products must comply with to be certified as environmentally friendly.
- The award of the label is independently verified and endorsed by the European Commission. The EU Flower is a recognised environmental quality mark across the countries of the EU and in Norway and Liechtenstein.

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