

Street life

Solar-powered street lamps, lit paving slabs that harness energy as people walk on them... **Andrew Brister** looks at ingenious ways to make lighting zero energy



Next time you're stuck in a jam on the M25 near South Mimms take a close look at the street lights. The Highways Agency is busy conducting field trials of a new solar-powered unit that could revolutionise the humble street light up and down the country.

The product is the SunMast, the UK's first grid-connected, solar-powered street light. By day, it collects energy and feeds it back into the grid, enabling clients to earn money and reduce carbon emissions. At night it lights streets and highways safely from the grid. SunMast's arrival in the UK is timely, because cash-strapped councils have seen their lighting bills skyrocket in recent years and many local authorities are opting to switch off street lights altogether, which has prompted concerns from MPs, police and safety groups.

SunMast has been developed by Scotia, a Danish company. In the UK it has set up Scotia Light, entering into a 50/50 joint venture with KN Network Services, an engineering

Trial trails The Highways Agency is conducting trials near South Mimms

services firm that specialises in renewable energy. "With government cost-cutting, and increasing concerns over rising energy bills, the time was right to join forces with KNNS to form Scotia Light," said Peter Vissing, chief executive of Scotia in Denmark. "The Government has recently overturned a ban on councils producing their own green energy. Because the SunMast system generates renewable energy as part of the urban environment, it can put councils on the road to energy self-sufficiency."

Light without emissions

The SunMast was first installed on the site of the 2009 Copenhagen Climate Conference to demonstrate the feasibility of zero-emission street lighting. It is being trialled in the UK by the Connect Plus consortium tasked with upgrading and maintaining the M25 on behalf of the Highways Agency. Catriona Cliffe is sustainability manager at Connect Plus. "There are two elements to the





First light SunMast was first installed at the Copenhagen Congress Center for the Copenhagen Climate Conference. Fortunately, it is enjoying more success than the conference

» M25 contract: widening works to be completed by 2012 and operation and maintenance over 30 years. Our annual maintenance spend is worth £50 million for the 440km network and meeting sustainability challenges is critical to our success.”

Time to do it right

Thanks to the 30-year timeframe, Connect Plus has the opportunity to embrace new technology, and two columns are now in place at its South Mimms depot. “We are monitoring electricity generation versus consumption in different locations,” says Cliffe. “There is the potential for energy savings and the related carbon savings are potentially significant. There is flexibility as well because the SunMast can work in conjunction with energy-efficiency measures such as trimming, variable dimming, mesopic vision, and LED lighting.”

The SunMast’s photovoltaic panels, which are integrated into the body of the mast, are designed to work with any standard outdoor lamp as well as LEDs. Because the SunMast does not depend on batteries, which deplete quickly and need maintenance, it provides completely reliable road lighting.

Also, the mast’s simple linear form means that a green

energy solution need not be aesthetically intrusive.

The mast produces electricity by day and only imports it when needed by night. Because the SunMast is connected to the grid, it can be considered a fail-safe system even for critical applications such as road lighting. It doesn’t depend on batteries, and therefore isn’t limited by power capacity or the need for regular maintenance.

The SunMast uses a new type of PV solar cell especially developed for lower-light applications and integration into vertical structures. The cells are described by makers Q-Cells as having “outstanding low light behaviour” – a term that refers to their ability to work with indirect light under cloudy conditions or with sunlight arriving at an oblique angle to the surface of the cells.

Integrated into the body of an 8 metre-high mast are 480Wp of efficient solar cells. Depending on the amount of energy that is used for lighting, each SunMast has the potential to enable a zero-energy unit or even a lighting system with a net energy gain.

A number of heights are available to suit various lighting tasks for roads, paths, parks and public areas. The higher the mast the more power it can produce; a 10 metre-high mast will generate well over 350kWh a year and therefore can be matched with higher wattage lamps. Shorter masts produce »

PAVING THE WAY FORWARD



We know that power walking can be good for you, but a new technology is showing that it's good for the planet too.

Pavegen harnesses the kinetic energy used by all of us as we walk. The Pavegen slab moves, by less than 5mm, under each footstep. It converts that energy and stores it in the slab. By harvesting energy in high footfall environments in urban areas, it can power pedestrian lighting, information panels and other low-powered applications.

Pavegen has partnered with advanced leds and Ryburn Rubber on the slabs. One of the areas that looks promising is pedestrian crossings. Self-sufficient lighting could be used in these areas to make pedestrians more visible. Pavegen slabs could be easily retrofitted and need no grid connection. The rubber is produced from recycled car tyres.

Pavegen is generating, pardon the pun, serious interest from investors as well as winning environmental and innovation awards while the field trials are completed.

Orders are already coming through. The new Westfield shopping centre in Stratford will see 20 Pavegen slabs installed at the end of 2011 and the slabs will also be in place at an educational centre in Langton School, Kent in January 2011.

» less electricity but also need less energy for lower-level lighting.

"We believe the marketplace is very exciting," says Scotia Light's managing director Mark Cassidy. "Councils have huge volumes of street lights that cost a lot of money to run. We can save them money and help them meet their targets under initiatives such as the Carbon Reduction Commitment."

Cassidy recognises that councils may well be cash strapped in the new austerity Britain. "We are working on a funding model that we hope to have in place by the first quarter of 2011. By working with financial backers, we will be able to offer customers a lease-type arrangement so they don't have to pay upfront capital costs."

If just one per cent of UK lighting columns were converted to solar masts, says Scotia Light, it would:

- Generate 24,840,000kWh of renewable energy each year;
- Supply more than 6,000 homes a year in the UK with electricity;
- Save over 12,000 tonnes of CO₂ each year.

The Highways Agency alone is responsible for some 7.5 million street lights, about 50 per cent of the publicly owned sector. No wonder Cassidy calls the marketplace 'exciting'. ■

Proving a point

The Copenhagen installation demonstrated that zero-carbon street lighting was possible

