Is Solar Power a Viable Alternative for Street Lighting?

As a new solar-powered street lighting product arrives in the UK, Terry Felstead asks whether the technology has a future

Financial pressures and government targets for saving energy and carbon have recentl;y made lighting engineers review ways to manage their lighting asset more efficiently. The drive to move to a 'zero emission' lighting status is another incentive to look at alternative energy sources. For a number of years street lighting engineers have explored the opportunities for using Solar Power to drive street lighting – but with limited success. Compared to other parts of the world the UK has not been ideally suited for solar power generation for street lighting due to its northerly location – and at the same time, the design of solar-powered luminaires has left a lot to be desired. The overall result has been that they have not generally been accepted as part of a local authority's street scene. Early systems also relied on batteries to store electricity generated during the daytime hours, but they have struggled to generate and store enough power to run a street light through the hours of darkness.

The first grid-connected photovoltaic solar street light with a difference by Scotia SunMast UK is now available in the UK (see *LJ*, January 2010, p 38 for review) – and the concept for this new product has turned conventional thinking on its head. The vertical surfaces of lighting columns are now being used as the attachment surface for the solar cells instead of fitting solar panels on to the luminaire – an approach that has already been successful in Scandinavia. The new system is based on daylight striking the photovoltaic cells and being converted to electricity using an inverter in the base of the mast. The electricity is converted from DC to AC for export into the DNO grid system during the daytime – and when night falls the equipment then draws the required power from the Grid. There are no batteries involved.

Trials are currently being carried out on the M25 DBFO contract by Connect Plus Services (CPS) using these Scotia Sunmast units, with CPS looking to use PV systems as part of a suite of energy-saving solutions for their network. Street lighting – 21,000 units – currently constitutes some 60% of CPS's maintainable assets and its energy load in Contract Year 1 was 41,838,584.94 kWh.

Practical Benefits

For the practicing lighting engineer the main benefits of the new solar technology are:

1. The ability to use any luminaire with the SunMast system, so competition isn't stifled and individual authority policies and choices can be maintained.
2. The ability to use any light source, including LEDs.
3. The absence of batteries.
4. No extra column installation equipment is required.
5. All PV panels, cables and inverters are already pre-installed within the mast.
6. The vertical positioning of the PV system reduces cleaning – as well as increasing energy yields in northern latitudes, where the sun is mostly low in the sky.
7. It has a simple, clean design, so it will blend into the street environment.
8. All the system components are made from recyclable materials.
9. The system offers outstanding low-light behaviour as the PVs are designed to work under cloud cover.
10. The system is intrinsically 'future proofed' by offering the ability to easily replace the PV solar cells as technology develops.
11. All the components are technically compliant, in accordance with EN40 – solar panels are MCS accredited solar panels and the inverters are G83-certified.
12. It has a performance warranty of 20 years on the solar components and the columns should have a life of 40 years.

Conclusions

This new approach to solar powered street lighting appears to have strong merits. If the trials on the M25 DBFO confirm the track record of the product currently being used in Scandinavia, then the use of solar-powered equipment of this type, offering zero-emission lighting, may well become a common choice for lighting practitioners in the future. In the long run it should reduce the operational costs of street lighting, allow clients to earn money on street lighting via solar feed-in tariffs – and obviously it will help to alleviate, or negate, future energy cost increases. Its environmental advantages are a potential reduction in the carbon footprint of street lighting by 80-120%, which will help both authorities and businesses to meet their carbon reduction targets. Finally, it could enable cities and roads to be lit without compromise to safety or quality – and empower communities to generate their own energy. Go to ***www.scotialight.com for more details.***

Part of the M25 trial of SunMast