Cost efficient alternatives to ELV for carbon reductions

Where it is not realistic to change to ELV, it is still possible to realise major carbon footprint reductions.

ELV traffic signals are increasingly seen as the solution of choice for new traffic signal installations – and rightly so. The benefits of ELV have been well publicised over the last two years and many Local Authorities are now adopting only ELV solutions where new sites are being specified.

However, this does not address the legacy of the many incandescent signals which are still on the streets. Siemens alone estimate that there are some 75,000 Helios signal heads and many thousand ST800 controllers deployed. Although these are all likely to be less than 10 years old and in the majority of cases only in the early stages of their serviceable life, their replacement with low power LED signals would offer a massive saving in carbon emissions, perhaps by as much as 10,000 tonnes annually.

It has, of course, been possible for many years to fit LED signals to LV controllers, although certainly the cost and reliability of early units meant their deployment remained rather limited.

In recent years the development of very high power LEDs has allowed the number of light sources used to be reduced significantly, helping to lower costs and improve reliability. The Helios CLS signals in current production for example, now use between just 8 and 12 high power LEDs to replace up to 250 standard types used previously.

Lamp monitoring of LED signals, however, has always been a challenge, particularly where controllers need to monitor both traditional incandescent signals as well as LEDs. Keith Manson, head of product management, Traffic Solutions, Siemens Mobility, says the root of this problem goes back to the earliest days of traffic signal lamp monitoring, when the ability of affordable microprocessors to undertake extensive calculations was limited. To ease the lamp monitoring task the status of the then incandescent lamps, was deduced by a simple current measurement, made once or twice each mains cycle. The characteristics of the lamps are usually predictable so that this simple measurement philosophy could accurately predict the total lamp current and could also ensure changes in supply voltage could be accounted for without incorrectly flagging lamp faults.

Unfortunately the characteristics of LED signals are much more complex and are not predictable in the same way, says Keith. Attaching them to controllers designed to lamp monitor incandescent signals tends to yield lamp monitoring that is at best unreliable and at worst does not work at all.

The Siemens solution has been to add an intelligent device (called the LMF) to each signal aspect. This conditions the signal current so that, from the controllers standpoint, it believes it is still monitoring an incandescent lamp. There are many benefits to this approach, not least that a Helios CLS signal with LMF can be added to almost any existing Siemens controller on-street, with a certainty that the lamp monitoring will still function correctly.

But, as Keith points out, there were some disadvantages. Although very advanced, the LMF does consume some power, so it is not possible to fully benefit from the low power consumption offered by modern LED signals. Also the LMF does add significant cost and as an additional piece of equipment in the head can impact slightly its overall reliability.

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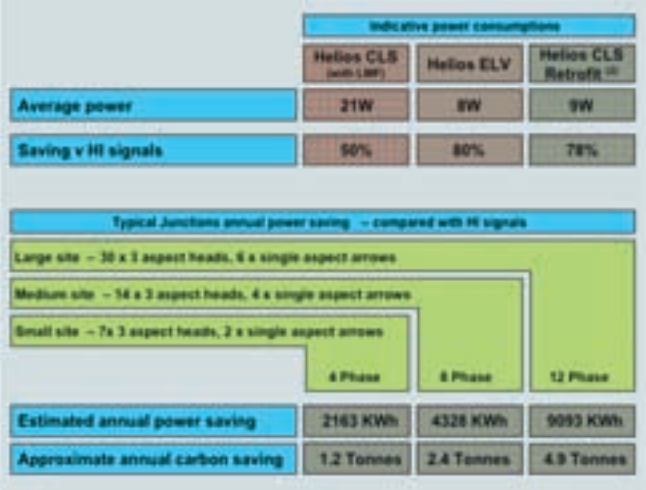
He says that Siemens has recognised for some time that if the full benefit of low power LED's are to be quickly exploited, a means to allow existing controllers to lamp monitor the latest generation of low power LED signals would be needed.

Unfortunately this is not as straightforward as it seems. Not only must the controller be able to measure the very low currents that are present when the signals are dim (as low as 20ma) it must be able to do this with long cable runs. An additional problem is that for most installed controllers, the semiconductor lamp switches are designed to



Potential power savings with LED solutions.

deal with large lamp currents, up to 4A in the case of the ST800 and these switches do not work well at very low switching currents.

After much research and several false starts, however, a viable solution is now completing its development and is on trial in several locations.

This is the Helios CLS retrofit which enables a specially designed CLS LED module to be fitted to existing installed ST800 (and ST900 LV) sites and be driven and monitored by these controllers without the need to fit LMF units in the heads. This, says Keith, makes the solution cost effective as well as very easy to implement on-street.

To achieve this, the existing lamp switch cards in the controller are replaced with a new type, especially designed to be able to drive and current monitor the new CLS heads and new firmware is fitted to the controller. By only replacing a small part of the installed controller equipment most of the investment in the existing infrastructure is retained. Waste disposal issues are also minimised by retaining as much of the installed signal head as possible – just the door and lens arrangement is replaced with the new LED versions.

As well as offering power and carbon reductions of nearly 80% compared with a standard incandescent head there are several other benefits that arise from this approach.

- The signal aspects are fully RLM compatible with both the ST800 and ST900 LED controllers and when fitted these controllers continue to meet the timing requirements of TR2210 and TR2500 respectively.
- In many cases the retrofit can be added to existing controllers without reconfiguring them, minimising the overall cost of the retrofit solution.
- The optics retain all the benefits of the existing Helios traffic signals, particularly the excellent phantom performance achieved by the Helios SIRA lens.

Keith says that there is no doubt that for new installations the use of ELV definitely gives the best overall result, with major reductions in power and carbon footprint as well as the potential for significant reduction in the use of raw materials used in street cabling.

However, where it is not realistic to change to ELV, particularly where the existing infrastructure still has many years of serviceable life, the Helios CLS retrofit offers potential to realise major carbon reductions in a very cost efficient manner.