

LED lighting need not be overly complicated

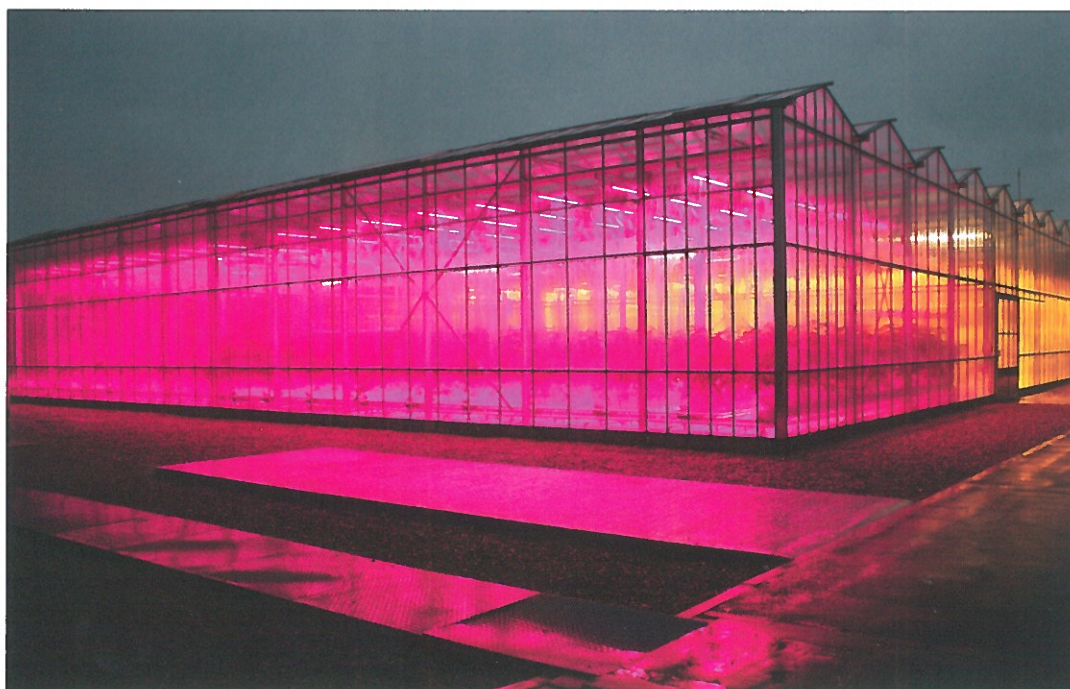
Light emitting diodes (LEDs) are becoming more common as a light source in commercial greenhouse production, with some studies suggesting the global market could be worth around £2,385 million by 2020, but cost issues mean that to date their use has mainly been in new-build projects. Richard Crowhurst reports.

At the moment the industry is still mostly using high pressure sodium lights," explains Dr Phillip Davis of Stockbridge Technology Centre. "Most people already have them, and once you have them it is cheaper to keep them than to change. However, anywhere a new installation is going in, people are considering LEDs."

There are a number of benefits to using LEDs, including running costs. Professor in Horticulture and Product Physiology at Wageningen University, Leo Marcelis, recently warned that energy consumption is the least efficient aspect of the Dutch horticultural sector, accounting for 10 per cent of the country's gas consumption.

"The problem is the energy needed for lighting, and light is the driving force behind plant growth," explained Prof Marcelis. He and his research team estimate that using LEDs could potentially achieve energy savings of up to 50 per cent of traditional lighting technologies.

"LEDs are cheaper to run, so depending on how many hours you use them for, you can save energy and that can give you a payback depending on energy costs. However we don't really know the economics of a lot of these things at the moment," says Dr Davis. "As with all new technologies, LED lighting is still quite expensive, and this is preventing rapid uptake. However, as costs come



Stockbridge Technology Centre's LED glasshouse for tomato production.

down and energy prices go up we will probably see more people switching to LEDs."

Professor Marcelis adds that LEDs ability to change the colour of the light, the position of the light source in relation to the plant, and the intensity of the light, would enable lighting to be used much more efficiently, resulting in better plant growth and a higher quality product.

There are also other management considerations for growers using the new technology. "When you grow plants under LEDs they are quite different to under high pressure sodium lights, so people have got to do a bit of learning about how to grow the plants. For example on ornamentals they may need to review their use of plant growth regulators.

There is a bit of learning to be done," explains Dr Davis. Consequently, there are a number of small trials of LED lighting currently underway in different horticultural sectors.

STC has an indoor LED facility called LED4CROPS which has now been running for two years. In that time the team has experimented on a wide range of horticultural plants. "Indoor multi-tiered growing is a really interesting area," adds Dr Davis. "It is gradually spreading around the world. There are various projects around Chicago and lots in Korea and Japan and we are starting to see a few pop up in the UK. However, we have very different economics to those two countries, so whether it will be economically viable as soon here remains to be seen."

STC is also engaged in a three year HDC funded project looking at the light responses of some thirty different crop species.

There has also been a lot of speculation about tailoring LED light output to different crop traits and requirements, but Dr Davis says such fine levels of management are not necessarily required to benefit from the new technology. "You can do that, and I think ultimately in another 20 years time, people will do that. Growers assume that you have to tailor the light to the each crop, but you don't have to. After all, we haven't been doing that for the last 100 years. You can buy lights now that will work and will pretty much grow most plants, especially in a glasshouse where there is



Philips LEDs have increased the potential of indoor crop production.

background sunlight anyway. "One difficulty in tailoring light to a specific crop is that every variety of crop has a slightly different response. In this regard, it might be easier for growers to use a general LED light and then manipulate the plants using the other methods that we already have," he adds.

"LEDs will generally improve the morphology of a crop compared to sodium lights, but there are some cases where they do things you don't necessarily want, but generally it is better than sodium light. People are very nervous about switching as they think if they get the light wrong it will go horribly wrong, but I don't think that's the case most of the time."

So far, the main area where people are starting to implement LEDs is in high wire tomato projects where LED inter-lighting is being investigated. STC currently has a new project comparing tomato production under four different light treatments: standard sodium lighting, sodium and LED inter-lighting hybrid and two treatments with both LED top and inter-lighting, one of

which also has diffuse glass in the roof.

In the trials the inter-lighting is currently arranged in two rows. The bottom one is at least three or four leaves below the bottom of the canopy and the second is about 60 cm above this, but Dr Davis stresses that these can be changed. "I expect a lot of tomato growers will have LED inter-lighting in the next few years," he adds.

The recently completed Sandylands Nursery in Evesham is equipped with a hybrid grow-light system installed by Certhon using LEDs in combination with SON-T high pressure sodium lights. The combination of SON-T exposure (105 μmol) and LED inter-lighting (110 μmol) assures year-round production, with the crop remaining active during winter as well as dark summer days. Electricity costs are expected to be around 10 per cent lower, while there will also be less excessive heat from the lamps, reducing ventilation requirements and saving further energy.

Dutch tomato grower Kwekerij Wim Peters BV,



The indoor LED facility called LED4CROPS at Stockbridge Technology Centre.

based in Someren, has already installed such a hybrid lighting system combining LED inter-lighting and High-intensity discharge (HID) top lighting. He has used Philips LED GreenPower inter-lighting for his top-quality Tasty Tom tomatoes. According to Philips, two other growers in Belgium and Friesland are also planning to use the company's LED inter-lighting in tomato crops from this season.

It's not just tomato growers who are looking to utilise the new technology. Dutch grower Van der Arend Roses and light manufacturer Valoya have invested in a special LED trial which aims to reduce energy use by 25 per cent. The scheme uses a 'hybrid' combination of SON-T and LED lights, partly to reduce the need for additional heating. SEE TONY - SPRING

According to Wageningen University, which is carrying out the trial, it builds on two small-scale field trials of last winter. These showed that the plants under the hybrid spectrum yielded up to 5.3 per cent more production (in

kg) at a 30 per cent reduction of PAR light, in turn offering opportunities to save energy.

There is also considerable development with pot plant growers. PKM, one of the largest pot plant growers in Denmark is doubling the area under Fiona FL 300 Lighting, the Danish company that has successfully researched and developed the application of LED's since 2005. Closer to home S & A Produce the largest independent specialist strawberry grower in the UK has been successfully working with Fiona's FL300 GROW for winter production.

However, when thinking about using new technology, it is easy to get carried away. Dr Davis also warns growers not to forget about the importance of sunlight and the effect of the glass itself. "Diffuse glass is a lot more expensive than standard glass but it can have some huge benefits depending on what crop you have," he points out. "I think we will see much more of this in the next few years, certainly in northern Europe." ♦