

More Than Just Illumination

Whether it's plants, animals or humans, all living species need light. However, each depends on different spectrums of light for survival, growth, development and well-being. *HKTDC Lighting* speaks to two lighting manufacturers that have their spotlights on biocentric lighting. By Lydia Li



Plant- and animal-centric lighting

With 19 intellectual property rights under its belt, LuxBalance Lighting Ltd specialises in providing lighting systems and lighting algorithms for tissue culture, urban farming and poultry farming. Banly Cheung, co-founder and managing director (*right*), and Jille Kuipers, co-founder, believe plant-centric lighting is a key engine in drastically increasing food production to feed the world's growing population, while animal-centric lighting plays a vital role in improving the well-being of poultry

What is plant-centric lighting?

Plant-centric lighting is about stimulating plants to grow faster and helping them to grow healthier by giving them the right type of light at the right time of the day and at different growth stages. To achieve this, we use a combination of lighting hardware and algorithms, namely the HortiPower system.

Is plant-centric lighting a new concept?

No, but its meaning and functionalities have changed immensely over the years. Back in the 1980s, farmers already had what they called plant-centric lighting in greenhouses, where they installed large lighting fixtures high above the

plants to provide them with artificial lighting. But these fixtures could not give the farmers control over light spectrums and intensity because LEDs and other technologies that allow us to control the lights and customise lighting algorithms today for different plants and their different phases of development weren't available at that time. Even 10 years ago, we could not do what we are doing with plant-centric lighting today.

What is the biggest advantage of plant-centric lighting?

By providing the right light recipe to a plant, we can speed up its growing process. Some of our partner

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banana growers in the Philippines have reported that by using our lights and lighting algorithms, they can speed up bananas’ tissue culture growth in the lab and have them ready for planting in the field from eight weeks to six. We believe in the end we can further cut it down to four weeks.

Plant-centric lighting is a key engine to doubling food production, as many people believe it is needed to meet a growing population. Besides yield, large-scale food brands are concerned with the taste and look of their produce. Thus, they clone what they call “model plants” in tissue labs to ensure that every batch of produce has, say, the same sweet taste or the same good looks. Again, by implementing plant-centric lighting in the labs, food brands can speed up the growth of tissues and seedlings.

What are other key benefits of plant-centric lighting?

Plant-centric lighting can help plants to grow healthier roots, so that they can absorb water and nutrients more efficiently and move to the next growth stage faster. Plant-centric lighting can also stimulate or delay flowering. If you want more fruit, which is a result of the maturation of flowers, you can use a lighting algorithm to stimulate plants to



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begin flowering. However, you may want ornamental plants to reach a certain height before they go into flowering, and so you can use another lighting algorithm to delay the process. All in all, plant-centric lighting can ensure that farmers have higher yields, more consistent and better plant quality, faster growth cycles, higher energy efficiency, as well as reduced labour costs and water consumption rates of up to 90 per cent.



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What is animal-centric lighting?

Animal-centric lighting supports animals’ growth, development and their well-being. Our animal-centric lighting, namely the SunPerform system, is mainly targeted at chickens to give them optimum dynamic lighting conditions that they need. Currently there are three applications: brood lighting, where light is used to stimulate newborn chicks to grow and walk; broiler lighting, where we use light to help chickens grow and develop; and layer lighting, where we use light to keep hens’ egg laying cycles constant and to improve their well-being. Essentially, we are giving chickens the right type of light at the right time to stimulate all of their senses in the best way to help them grow and live well.

How can animal-centric lighting help chickens grow better and healthier?

One of the issues in the modern poultry industry is that chickens are sometimes genetically modified, so that their bodies are so much bigger and heavier than what their legs can support and they end up collapsing on the floor. By giving chickens more green or blue lighting, you can help to improve their bone formation, resulting in stronger legs. On the other side of the spectrum, by giving chickens more

red lighting, which can penetrate through their skull and signal the brain, you can stimulate their reproductive hormones and make sure that their egg laying cycles are natural and remain constant.

Sufficient lighting also helps to support chickens’ eye development. Unfortunately, many chicken barns use lighting with an illuminance of just 4–10lux, so they are very dim. This is mainly because farmers want to reduce chickens’ movement, because the more they move, the more energy they will burn, which means farmers need to feed them more. With animal-centric lighting, we can provide more natural lighting to support chickens’ comfort and embed feeding routines with light to make sure they eat the right amount of food and take a more holistic approach to fitness.

What about the well-being of chickens?

Apart from physical well-being, light also plays an important role in the emotional and social well-being of chickens. Chickens have the ability to see and respond to much wider wavelengths of light than humans. If you install general lighting for humans in a chicken barn, chickens won’t be able to see their environment clearly because you are not giving them the kind of light that they need. We believe a reason why chickens fight in barns is because they can barely see each other and so they don’t know if they are standing next to another chicken or another species. By giving them the right light, they will be able to recognise each other and be more social, so farmers don’t necessarily need to cut their beaks to prevent them from pecking at each other.



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Just like humans, chickens have routines before they go to sleep, which normally include finding a resting place and preparing their minds for sleep. If you switch off the lights in the barn and there's complete darkness in a split second, the chickens will feel very stressed. So, having lighting that dims gradually helps prepare them for sleep and reduces their fear. Waking up needs specific lighting as well to mimic natural sunrise, which sends wake-up signals to chickens through its changing light spectrums and light characteristics.

What is your opinion on the future of plant- and animal-centric lighting?

Plant- and animal-centric lighting will become smarter, more user-friendly and more automated with artificial intelligence to drive outcomes based on growers' objectives and well-being goals. One

day, lighting systems could even "communicate" with plants and animals. Currently, the market size of plant-centric lighting is growing at a 20-per-cent rate year-on-year and it will keep on growing. Animal-centric lighting has potential too, as nowadays consumers are more concerned about animals' well-being. Aquaculture lighting is another promising area because fish are strongly influenced by light. You can use a certain kind of light to drive fish to or away from a specific place for feeding or to avoid parasites and bacteria. Also, you can use light to increase the feed conversion and make sure the fish grow and develop in a healthy way. There are many applications ahead of us where we can enhance the health and well-being of plants and animals and create business benefits with light.



Human-centric lighting

It is estimated that the human-centric lighting market will boom from US\$1.2bn in 2018 to US\$6bn by 2025. WiZ Connected Lighting Co Ltd, a smart connected lighting company that is part of the Signify group (formerly Philips Lighting), has always strived to make lighting catered to people's needs and well-being. Nicolas Bouyt, market director (OEM), and Wang Yi-shan, market director (consumer), talk about human-centric lighting and how it can make a difference in people's everyday lives

What is human-centric lighting?

Human-centric lighting means that instead of having the same lighting all through the day, you have lighting that is actively adapted to your lifestyle or work style so that it changes according to your health, needs and activities. The fundamental idea of human-centric lighting is that it puts humans at the centre of a system, so that if you want a specific kind of light for motivation, relaxation or fun, you can have it as you wish.

Is human-centric lighting a new concept?

The idea that artificial light should adapt to humans' needs is not that new, but before, we couldn't make it too human-centric because the technologies weren't there yet. For example, the

recent emergence of LEDs has enabled us to have finer control of light colours, so that by mixing red, green and blue we can create many different wavelengths of light for specific needs and have fun with them. All of the new technologies, including IoT, smart home and voice control technologies also play a part in realising more human-centric lighting. Together with highly flexible and sophisticated systems, we can have better control, more access to many possibilities of lighting scenarios and have unique lighting experiences today.



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