

BUSINESS PROFILE/Q+A

The Quest for Lighting Quality

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Lighting experts **Peter Ngai**, (lighting consultant to Acuity Brands Lighting) and **Kevin Leadford** (vice president of innovation at Acuity Brands Lighting), discuss the trends and innovations impacting the lighting industry.

What are the implications of the IoT?

“How lighting integrates into the Internet of Things (IoT) is making a lot of buzz in the market, but quality of light has been de-emphasized,” said Ngai. “I agree,” said Leadford. “It was as if the technological revolution came upon us all at once. First, it was the emergence of LEDs and digital controls, then IoT and Visible Light Communications (VLC), and then Bluetooth® and Bluetooth® Low Energy. As lighting professionals, we can’t ignore the paramount importance of quality of light – and fortunately with good design, we can have both!”

Will there be less focus on energy savings?

The emphasis over the past decade on lighting technology can be traced back to the emergence of LEDs for commercial lighting and the focus on energy savings. Lighting accounted for approximately 19% to 38% of energy usage in commercial buildings in 2012 (Source: U.S. Energy Information Administration, *Commercial Buildings Energy Consumption Survey*, 2012). A new era of digital, networked controls emerged with the introduction of LEDs. These lighting controls paved the way for even more energy savings through dimming and environmental sensing advancements that incorporated sensors and fully networked systems into the lighting platforms.

However, energy consumption in the U.S. commercial building sector is projected to grow at only 0.2% from 2019 to 2050. (*Annual Energy Outlook 2020*, U.S. Energy Information Administration, 2020). And here, say Ngai and Leadford, is where we come full circle with technology leading us back to lighting quality. Evolving advancements in

controls are now focusing on the humanistic side of lighting, providing capabilities such as tunable correlated color temperature (CCT) and full-range color tuning. These technologies allow users to select and program color characteristics, including spectra that are tailored to support circadian entrainment.

“Before lighting controls, lighting was static,” said Leadford. “One benefit of digital lighting technology was that it allowed us to move into a world where lighting systems could become dynamic, offering a host of possibilities for enhancing the human experience.”

What are the latest trends in lighting spaces?

Advancements in color tuning technology will provide the means to tune spectra for different purposes. Whereas former color metrics aspired almost exclusively to the qualities of natural light sources like incandescence and daylight, we can now enhance color spectra to achieve more specialized design goals.

Color preference deals with spectra that are considered most pleasant and appealing, independent from their ability to faithfully represent the character of a reference illuminant. The obvious implication is that higher levels of color preference are achievable. Applications that could benefit include residential, hospitality, retail and health care, for example.

Vividness refers to the deeply saturated characteristics of color rendition responsible for vibrancy. It can theoretically be made to exceed that of natural daylight and numerous studies have demonstrated preference for vivid color. Vividness helps us to showcase objects, products, and even scenes or



buildings where rich color rendition is considered important.

“Vividness enhances the appeal of brightly colored objects. Think about a grocery store where produce and colorful packaging are prevalent. A vivid light spectrum will render color more deeply, which also helps with color contrast” said Leadford. However, it should be noted that vividness does not necessarily imply preference and can be overused.

And lastly, *color fidelity* deals with the faithful representation of color relative to a standard such as daylight and incandescent sources. This is important for applications like retail, design, office, classroom, industrial, laboratory and health care where color accuracy can be paramount. Conversely, good color fidelity does not necessarily imply color vividness or color preference.

With color tuning technology we can imagine devices that are tuned to achieve different color qualities at different times, or that are responsive and adaptive as needs change. Consider a patient room and competing goals for illumination while resting (dimmer lighting requirements) vs. physical examination (brighter lighting requirements).

“Specifiers are motivated by better lighting quality even though it is sold at a premium. The commercial market is primarily concerned with price and energy savings but is also using sensing and control technologies to affect lighting systems that are responsive to occupant needs,” said Leadford. “We design for both.”