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By Randy Reid



ON THE COVER Princeton's Firestone Library Photo Credit: designing lighting

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EDITORIAL DIRECTOR'S NOTEPAD



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designing lighting is focused on the Business of Lighting Design™ and provides business information to the lighting design community. In addition to the website, designing lighting publishes bi-monthly online magazines featuring original content, interviews within the community and highlights successful award winning lighting designs. While designing lighting is based in the U.S., it has contributors from Europe and is developing a global presence. (ISSN 2693-9223)

Statements and opinions expressed in articles and editorials in dl are the expressions of contributors and do not necessarily represent the policies or opinions of the EdisonReport. Advertisements appearing in the publication are the sole responsibility of the advertiser.

A Tornado Blows Out a Candle

I returned to Nashville Friday morning, 10 DEC, after a very successful evening celebrating with friends in New York from the IESNYC, DLFNY, IALD and WILD. I went for a run in the afternoon taking advantage of the unseasonably warm December day. Later, my wife and I joined dear friends for a Christmas dinner in downtown Nashville. A quick drink at the bar and we were seated at 7pm. These are close friends and when we dine out, we pray immediately after ordering the appetizers. That way when the food arrives, we can immediately dig in.



The tacky LED candle on the table seemed out of place at such an upscale restaurant.

By 8:30 we were stuffed and slowly finishing our wine as the waiter gently pushed us because he had to turn the table over. We took the hint and left about 8:45 and began hitting the honkey-tonks.

We ended up at The Stage, where the crowd of tourists were too young and too drunk, and the music was far too twangy. There was a light sprinkle in the air. At 9:30 we moved to Barlines at the Omni where a three-person band sang the Eagles and Fleetwood Mac. Great comfort music. We left at 10:30, home by 11 and fast asleep at 11:30.

Little did we know that as we finished our meal the most devastating tornado ever in the state of Kentucky was hitting the Mayfield Consumer Products candle factory about two hours north.

Kyanna Parsons-Perez was one of 110 people trapped inside and she was crying, begging for help on Facebook live. She and about 44 people were rescued. As of this writing about 70 people from the factory are missing.

The candle factory, started by a local woman, was one of the largest employers in Mayfield, and many of the employees were working extra hours because of the holiday season.

An article in the New York Times by **Rick Rojas and Jamie McGee** described the devastation, "And the candle factory was nothing more than a spread of assorted debris. The only indication of what it once was: The scents of vanilla and lavender, along with aromas that conjured up springtime and fresh laundry..."

You and I and Kyanna are all in the same business: Lighting. Only she makes candles—perhaps the most beautiful light ever. You and I are handsomely rewarded for what we do; she and her peers who perished likely earn little more than minimum wage.

There is a lot to think about and a lot to pray for this holiday season.

The American Red Cross is making it easy to send a quick \$10 donation simply by texting "REDCROSS" addressed to the number, 90999.

Kandy Reid

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The State of the Lighting Design Community: STRONG!

By RANDY REID

I have spent the past 30 days trying to better understand our tagline, The Business of Lighting Design[™] and what the future looks like.

I interviewed three principals in three different large firms across the country, interviewed two associates with different firms, talked informally with several designers at a New York Holiday Party and conducted an online survey where we received 95 responses.

On average, how many days per week do you spend in the office?



These results were surprising. When the first survey was published, the original choices were 1 day thru 5 days and we immediately received an email asking why 0 was not an option. Quickly we added the zero-option to the survey and to my surprise it was the second most popular response at 23%, following closely at 5 days at 27%.

In 2022, do you plan to spend more days in the office? 60% of the respondents do not plan on spending more time in the office in 2022.





These first two questions get to the heart of one of the most important issues because if the lighting designers are not in the office, how will the reps and regional managers pitch new products. There is no clear answer, but there is clear acknowledgement that lighting designers want to see and touch the products in person.



Did productivity in your firm increase or decrease during the pandemic?

The survey shows that productivity stayed the same for the majority of the respondents, but my in-person interviews told a different story. Without exception, I heard detailed stories about productivity increasing because of the lack of commute, less water-cooler talk, and less visits from reps. The designers I spoke with said they would never go back to a daily 2-hour commute and 2 or 3 lunch and learns per week.

How many in-person visits did you receive per week from reps prior to COVID and how many in-person visits did you receive per week from reps now?

Pre-COVID: an average of 2.1 **Now:** an average of .61



What is the best venue for reps to introduce new products with you?
Answered: 92 Skipped: 3



The results show in person at designer's office at 46% followed by webinar/video conference at 23% and in person at rep's office or showroom at 17%. Email was only 1%. This is good news for the rep as it shows that the in-person visit to the designer is still preferred even if they aren't in the office as much.

The designers are spending less time in the office and will never go back to the pre-COVID days, but they still want to see product in person.

How is the demand for lighting design services today?



It is great news that 52% show strong or moderately strong, compared to 13% showing weak or moderately weak. During the discussions, it was apparent that there is a real issue finding design talent.

What % of your jobs have late deliveries

Answered: 91 Skipped: 4



44% of the jobs have late deliveries. Designers tell me that another big consequence of the supply chain crises is mockups. There simply isn't time to wait two to three months for samples and a second two to three months for production.

Conclusion.

The designers are spending less time in the office and will never go back to the pre-COVID days, but they still want to see product in person. The trick is to have an exciting enough product to get the meeting. The demand for designers is strong, but supply chain issues cause problems throughout the process.

LIGHTFAIR 2022, THAT IS THE QUESTION



By JAMES R. BENYA, PE, FIES, FIALD

Today, LightFair is the premier lighting industry event in North America and a major stage for worldwide lighting. The origin of LightFair was 40 years ago. Prior to 1980, lighting trade shows were at best a sidelight of the IES Annual Conference and a minor part of electrical construction trade shows. Lighting World 1980 changed all that, taking center stage away from IES and other small, technical paper-type conferences. The year 1990 was the beginning in which the industry now supports LightFair and other major trade shows in lighting throughout the world.

Today, LightFair is the premier lighting industry event in North America and a major stage for worldwide lighting. The huge show floor, hundreds of exhibits, and dozens of seminars and educational programs are primary reasons to attend. LightFair's complimentary combination of show floor, awards programs, committee meetings, and social events activities creates an atmosphere like no other.

But the pandemic was hard on the industry and especially on LightFair. Without a show in 2020 and a modest event in 2021, the momentum seems lost. The 2021 Javits Show was reminiscent of LightFair in the early 1990's in many ways, having a personal scale and a refreshing renaissance of spirit. But the empty booth spaces where the biggest companies were supposed to be, told a story of caution and redirection. Can any trade show as we know them stand up to the online world that seems to have taken over the direct marketing, hands-on product introductions and educational seminars that only a major trade show and conference like LightFair was able to do before?

Here are 5 reasons why the answer is yes and why LightFair 2022 deserves your support by being there.

1. The Best Lighting Updater on the Planet

Automatic updates of all kinds are a blessing and a curse. In a big hurry you receive marketing that has been selected for you. Think of LightFair as a manual update. Many of the exhibits will surprise and change your ideas about lighting products, and you are free to pick and choose the updates you want as fast or as slowly as you want. You can start with the



big "major" company booths at the front and then wander among the medium or smaller booths ever looking for the innovations and creativity hidden inside. Every year I find at least one major that is doing the kind of innovation that is truly surprising, and I find a small start up that blows my mind. After two days on the show floor I begin to see the future of lighting and begin to fantasize how to use it in my work. I can take a product in my hands and ask their inventors why and how it was conceived. Try doing that with mass email marketing.

2. People - In Person

Talking heads on a Zoom call are better than a phone call, I guess. Yes, you receive the information, but the ability to **communicate** is limited and often the sincerity of the message is fleeting due to trendy production, even among friends and colleagues. Aside from my local lighting agents (who make the commerce of our industry happen) the in-person connection at LightFair can establish career long relationships that I have often found to be priceless. Take advantage to meet and establish relationships throughout the industry – this work will pay



off in coming years, whether your new acquaintance is a lighting company president, an up-and-coming product developer, a sales representative, a competitor or a real lighting expert. For instance, I met Shuji Nakamura (Nobel Prize winner) in a booth in 2013 and learned secrets about his violet engine technology, and ended up helping develop Soraa's Snap system.

3. The Meaning of "Event"

I especially enjoy and live for an event. An event is meeting old friends and making new ones, attending conference programs and seminars, hitting the show floor, having interesting and intense discussions, trying to do too much in a day for several days in a row, eating on the fly, partying every evening, and not wanting to sleep or leave. LightFair is a lot of work for most people, but I have made it a point to ensure the socialization is equally important and contributed mightily to it. My favorite big events are the award dinners, but I also love the private parties or the casual small groups getting together for a meal. Beyond the event, friendships and trusts are developed that last a career.

4. Cost Benefit

By moving around, LightFair helps by having shows in New York (2021), Las Vegas (2022), back to New York (2023), and somewhere else in 2024. Alternating cities purposely allows smaller businesses to vary their attendance by location. As a lighting designer, I consider LightFair to be a good investment for me and my staff, because of the compressed focus and learning opportunities. I can gain a year's worth of catching up in two days on the show floor, and there are usually several seminar topics that bring my knowledge forward faster than any other way. But perhaps most importantly, the collegial relationships developed at LightFair always seem to pay off when in the course of everyday business back home, a problem or issue comes up and those personal contacts are invaluable in solving project-related programs in the best of possible ways.



5. LightFair is Us and Our Industry

Any legitimate industry needs layers of science, style, research, critique, debate, standards, and leadership to survive and thrive. Lighting is evolving very fast; it has become an international marketplace that relies increasingly on foreign materials and components, it is demanding more of our domestic organizations like IES, IALD, NEMA, DOE, DLC, NAED, NAILD, NECA, IBEW, NLB, ALA, and others, and the speed of technological change requires all participants to work together to achieve efficiency and human wealth and productivity while maintaining quality and safety in the marketplace. Where domestic companies once had little competition except from European highend companies, our domestic market is now offering products from all over the world with tantalizing design and even more interesting price points.

But to understand the real importance of LightFair is first to realize that both IES and IALD are co-owners of LightFair along with International Market Centers. If you are a member of IALD and/or IES, you own a piece of the show. LightFair makes a profit, and 2/3 of it flows back into these two leading industry organizations. IES and IALD leaders and members contribute thousands of hours of time and effort towards every LightFair because the profits are what make our industry run and keeps membership fees in these organizations modest. Both IES and IALD use the funds to hire headquarters personnel, develop and publish standards and educational materials, and to provide well-respected, industry-wide representation of our industry's interests in domestic and international standards and legal matters. Whether you are a designer, salesperson, engineer, manufacturer, importer, distributor, contractor or supplier of materials and components, remember that the health of the lighting industry starts with the health of our leadership organizations and our camaraderie as an industry. The path leads back to LightFair, where we come together and all benefit in many ways. Please, attend.

But to understand the real importance of LightFair is first to realize that both IES and IALD are co-owners of LightFair along with International Market Centers. If you are a member of IALD and/or IES, you own a piece of the show. LightFair makes a profit, and 2/3 of it flows back into these two leading industry organizations.



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Reveal Design Group Lands First US Google Store

By RANDY REID



When Google decided to establish its first permanent brick and mortar store in the U.S., Reveal Design Group got the call for the lighting design. Levia Lew, Principal, and Josh Klein, Senior Designer at Reveal Design Group, gave me a behind-the-scenes look at their work at the New York store in Chelsea.

Reddymade was the architect and interior designer who hired Reveal. The design took about one year, and the installation occurred right in the middle of the pandemic.

Upon entering the store, one is greeted by a German-constructed glass cathedral structure that runs from floor to ceiling and features five different media panels. The ceiling is lit with the ALW Moon Ring 1.5. A back-lit initial "G" is embedded in the floor as a constant reminder that Google is the future. When standing in the structure one almost has the feeling of being transported into the future in this temple of technology.

Levia explained that there were many challenges designing the lighting with this LEED Platinum building, the most obvious being the huge amount of daylight coming through the large floor-to-ceiling display windows--think of a rectangle with two sides consisting completely of windows.

The solution was to light with fixtures that could dim to 1% using the USAI BeveLED 2.2 LED adjustable downlights and wall wash fixtures at 3000K Because the apertures are trimless, the luminaires simply disappear in the ceiling. The 1% dimming is perfect given the generous helpfulness of daylight.



They wanted a nice clean showroom floor but didn't want anything that was too warm given the abundance of daylighting or too cool since they were trying to replicate a residential look for their consumer products.



Lighting a retail store while making the consumer feel comfortable to envision the products in their home also needed to be addressed. The team wanted a nice clean showroom floor but didn't want anything that was too warm given the abundance of daylighting or too cool since they were trying to replicate a residential look. They settled on 3000k throughout the store including the shelving.

As with any design, problems arose. Issues were magnified by the fact that for several months in 2020 they couldn't visit the site because of COVID. It was especially frustrating because the Reveal office is only ten blocks away.

During construction things would get moved around and the Reveal team would have to relay the reflective ceiling plan on the spot. Levia recalled, "One morning we received a call as the ductwork was being installed in the exact space where the downlights were to be mounted. Even though the duct moved just a couple of feet, half of the store had to be re-laid out." Look behind most home-office desks and even today you will see a hornet's nest of tangled wires. There was not one wire visible in the entire store including the product on the shelves, a striking display where simplicity meets elegance. The devices were positioned with a slight protrusion from the wall and subtly lit from the top front edge by sources that were not visible. This protrusion coupled with the unseen lights caused a slight shadow giving the impression of flotation. This part of the design was carried out masterfully.

The store features various product sales rooms containing more flexible shelving. Google wanted the transition between the main floor and the rooms to be seamless. Unlike the static floating display in the main area, display products in the sales rooms frequently change. These adaptive displays require more general lighting to allow for the products to be changed without adjusting the lighting. iGuzzini Laser Blade was used in one of these room for the low-profile aperture that didn't compete with the room setup.

Levia explained that there were numerous changes and delays, but most of the lighting was procured before the supply chain crises, so no significant shortages occurred.

This is Google's first store in the U.S. and my bet is if they added a second store, Reveal Design Group will again get the call. \blacksquare

This protrusion coupled with the unseen lights caused a slight shadow giving the impression of flotation.







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designing lighting (dl) Names Ilva Dodaj 2021 Lighting Designer of the Year

We were first introduced to Ilva during our preparation for April's article **Moynihan Train Hall Welcomes the World Back to New York City**. After several zoom calls and an in-person walk through at Moynihan it became clear that Ilva amassed world-class skills as she was designing many beautiful and high-visibility projects.

We sat down with Ilva earlier this month to learn more about her fascinating story.

She is a native of Albania and arrived in New York City about 18 years ago, graduating from the Spitzer School of Architecture.

Ilva joined DGA in 2007 while working toward a Bachelor of Architecture degree at the City College of New York (CCNY). Upon graduating in 2011 she joined DGA full time. During her time at DGA she has transitioned through many roles, becoming a director in 2021. Her extensive portfolio consists of over 70 projects, many award-winning, including transportation, infrastructure, historical preservation, schools, offices, public parks, retail centers, hospitality, and master plans.

As an architectural designer with over 13 years' experience in the field of architectural lighting she has led and managed the design of numerous and diverse projects across the Unites States and Canada. Notable recent projects include:

- The newly opened Moynihan Train Hall
- Delta's new terminal at LaGuardia Airport
- Charlotte International Airport Terminal Expansion
- Interior of Toronto's "front door," its Union Station
- VIA Centro Plaza
- Brightline Miami Terminal as well as Fort Lauderdale and West Palm Beach Stations
- The Mario M. Cuomo Bridge
- Maggie Daley Park
- A New Terminal in the Tri-State Area

In addition to designing and managing challenging lighting projects, Ilva is also an Adjunct Professor at the School of Architecture, at the City College of New York. She teaches two class, one of which is Environmental Systems, a core technology course. She is also a co-creator andco-instructor with Domingo Gonzalez of the first Architectural Lighting elective in the Architecture program at CCNY.



Ilva's volunteer work in our industry is extensive:

- Illuminating Engineering Society (IES) Professional member since 2012
- Long standing Member of IES Education, Library and Office Lighting Committee
- Member of IES Airports and Heliports Lighting Committee
- International Association of Lighting Designers (IALD) member since 2015
- American Institute of Architects (AIA) member (associate level) since 2011
- Speaker at LEDUCATION 2021 Conference
- Lumen Awards Judge 2020 for IES New York City section
- IES Illuminating Awards Online Judge in 2020 and 2021
- CCNY invited Studio Critic in Final Studio/Thesis Reviews

In 2018, Ilva was the recipient of the 40 Under 40 Lighting Designer of North America Award for demonstrated excellence as an architectural lighting designer. She has received numerous awards for her projects including an IESNYC Lumen Award, various IES Illumination Awards, LIT Design Award, Lucy G. Moses Preservation Award, and a GE Edison Award, just to name a few.

In our discussion she gave much credit to many mentors, specifically the ones within DGA notably Domingo Gonzalez himself who inspired her to join his architectural lighting firm upon graduation. She also credits the projects and talented design and engineering teams she has worked with during her tenure at DGA. Above all, she credits her parents, siblings and partner who have continuously supported and encouraged her dreams and ambitions.

Congratulations to Ilva Dodaj, *designing lighting's (dl)* Lighting Designer of the Year. ■

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COMING 2022



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Brighter Days Make for **Better Nights**

By MAY WOO, ROHAN NAGARE, PIERS MACNAUGHTON, MARIANA FIGUEIRO



Executive Summary

Access to daylight at home is not just a desirable amenity but is a fundamental physiological requirement. We are an outdoor species, having evolved in the natural world around us with a 12-month cycle of the seasons and a 24-hour cycle of day and night. Circadian systems have evolved in nearly all species to regulate physiology and behavior in response to daily variations in daylight. The amount of daylight we are exposed to, or the lack thereof, has a significant influence on the quality of our sleep, mood, and health.

The REVOLV study, conducted by the Light and Health Research Center (LHRC) at the Icahn School of Medicine at Mount Sinai, sought to study the impact of daylight on physiological, behavioral, and subjective measures of health in a real-world environment. Understanding these dynamics in practice are key to designing buildings that are optimized for human health and well-being

The Study

20 residents living in the EXO Apartments in Reston, Virginia, were exposed to two experimental conditions for a period of 1 week each in their apartment.



windows that tint or clear based on the presence and timing of direct solar radiation or based on participant's own control.



PARTICIPANTS	WEEK 1	WEEK 2	WEEK 3	WEEK 4
10	BASELINE	SMART WINDOWS	BASELINE	BLINDS
10	BASELINE	BLINDS	BASELINE	SMART WINDOWS
ENVIRONMENTAL MONITORING	0			
SLEEP TRACKING	J)			
SURVEYS	Ę.			
PERSONAL LIGHT	M			

Throughout the entire study, participants' sleep patterns were recorded using wrist-worn sleep trackers and surveys related to physical and mental health were completed. Participants also wore a personal light monitor called a Daysimeter during the day to record their activity patterns and personal light exposures during the intervention periods.

On the first and last days of each intervention, surveys of selfreported vitality were completed every 4 hours throughout the day. In the evening hours, participants collected 10 saliva samples under a researcher's supervision. These samples were sent to the lab at Mount Sinai to be analyzed for dim light melatonin onset, which marks the start of melatonin production in the body - the hormone that triggers sleepiness.



7:00 am	7:30 pm	10:00 pm
11:00 am	8:00 pm	10:30 pm
3:00 pm	8:30 pm	11:00 pm
7:00 pm	9:00 pm	11:30 pm
11:00 pm	9:30 pm	12:00 am

THE RESULTS

Melatonin

Bright days and dark nights are the main environmental factors that regulates the body's internal clock, keeping it in sync with the day/night cycle. The Smart Windows condition resulted greater alignment of circadian rhythms with the external cycle, resulting in consistent melatonin onset. In contrast, participants exhibited a 15-minute delay in melatonin onset over the course of the week in the Blinds condition.





Sleep

Participants went to sleep 22 minutes earlier, resulting in a total of 16 minutes more sleep each night, in the Smart Windows condition. Their sleep was also more consistent from one day to the next, a sign of good sleep hygiene. These impacts were likely driven by the improved daytime circadianeffective light levels imparted by the Smart Windows, supporting the existing research on the benefits of short wavelength light on human circadian rhythm entrainment and sleep quality.



Alertness and Mental Health

Providing the optimal light conditions indoors not only impacts circadian rhythm and sleep but also impacts daytime energy levels and mental health. While in the Smart Windows condition, residents were 11% less anxious and 9% less stressed than when they were in the Blinds condition. They also demonstrated a distinct cycle of high vitality throughout the day, low energy at night, and high vitality again after waking the next morning – a cycle that remained relatively consistent from the start to end of the week. Meanwhile, in the Blinds condition, they exhibited a delay in peak vitality, higher nighttime energy levels, and lower morning vitality at the end of the week compared to the start.



Conclusions

This study highlights the importance of exposure to a robust light-dark on sleep quality and mental health, and replicates the physiological mechanism shown in previous laboratory studies in a real-world environment. If anything, these results confirm what we already know from the theory: we need bright days and dark nights to improve our sleep. Better sleep is linked to better overall mood and greater overall daytime alertness and energy levels.

KEY FINDINGS

Sleep

Participants went to sleep 22 minutes earlier and slept 16 minutes longer in the Smart Windows condition. Their sleep was also more consistent from one day to the next, a sign of good sleep hygiene. These impacts were likely driven by the improved daytime circadianeffective light levels imparted by the Smart Windows

SMART WINDOWS	BLINDS
Earlier sleep onset by 22 min	Sleep debt compensation on Friday night

Melatonin

of the week

Daylight is the main environmental cue that regulates the body's internal clock, keeping it in sync with the day/night cycle. The Smart Windows condition resulted in greater alignment of the circadian rhythm with the sun cycle, resulting in consistent timing of melatonin release (the sleep hormone)

SMART WINDOWS	BLINDS		
Consistent	15 minutes delay		
onset	of the week		



Alertness & Mental Health

Providing optimal light indoors not only impacts sleep but also daytime energy levels and mental health. While in the Smart Windows condition, residents demonstrated a distinct cycle of high morning and daytime alertness and winding down before bed - a cycle that remained relatively consistent from the start to end of the week. Meanwhile, in the Blinds condition, they exhibited higher nighttime energy levels and lower morning vitality. Participants also reported 11% lower levels of anxiety and 9% lower stress while in the Smart Windows condition

SMART WINDOWS BLINDS

Consistent cvcle of vitality with high morning and daytime energy levels

Delayed peak vitality, high nighttime energy levels and low morning vitality



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Emphasizing Design and Engineering at

AE Design



By RANDY REID WITH KATIE SMITH

AE believes spaces should be "designed together to work together."



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on Brooks and Jeff Mullikin met each other when studying Architectural Engineering with a focus in lighting design at the University of Colorado Boulder. After working at the same firm and eventually parting ways, Jon and Jeff found each

other once again and recognized the need for technology and creativity in the lighting world. Together, they began Architectural Engineering Design Group Incorporated, where they aimed to take education and the passion of lighting into an engineering aspect, with creativity included. Now a simplified version of the name, AE Design (Architectural Engineering) was created emphasizing their role as designers in addition to engineers.

Jon and Jeff recognized the need for technology in architectural engineering, including but not limited to low voltage, networking for computers, audiovisual design, and security system design. These are all things that are typically missing in electrical designs and not often included in general power and lighting designs that they wanted in their business. They wanted to specialize in what they're passionate about, so the duo found a way to combine their passions and craft a successful business.

When speaking about their business, they emphasize the importance of creativity. They want their staff to feel comfortable taking their education and passion for lighting, see it in an engineering aspect and continue to add creativity into it. Additionally, to their knowledge, AE Design is one of the only firms in the nation that work in this collaborative, innovative capacity. This means that they're technically their own competition, communicating how they're different from other firms instead of why they're better than other firms. Most competitors offer lighting and power, where lighting and power and power are separate entities. AE Designs has bridged the gap between these entities, allowing individuals to have a comprehensible view of all aspects in their own design work.

Addie Smith, a Senior Lighting Designer, states that the office creates a good work-life balance, where "there's an attitude of openness and reasonability," which allows for personal and professional growth. She also notes that there's a casual, friendly, collaborative environment in the office where work doesn't feel demanding or forceful but enjoyable. Andi Walter, a Lighting Designer, explained, "The collaborative environment between lighting, technology, and design in the office allows for empathetic lighting designs when working with other aspects."

One of their more recent projects is Sawmill Market, an artisan food hall in Albuquerque, New Mexico. Sawmill Market is the center of an old industrial neighborhood that was completely abandoned but now revitalized to bring tourism and money to Albuquerque, a famously struggling area, while also attempting to bring awareness to the heritage of New Mexico. The abandoned warehouse was rebuilt and took advantage of current trends to create a centerpiece for the community to gather. This project was completed in March 2020, which meant this dining hall-style business opened at the beginning of the COVID-19 pandemic. While other businesses suffered, the spacious outdoor seating with lighting created an environment for the community to gather at a safe distance and enjoy a nice meal out of the house. The project took around six to eight months from start to finish, with about fifteen different lighting manufacturers, but their lighting design allowed for each space to have its own unique identity.

Going along with unique identities, is at the core of AE Design. The company has the ability to work with individual aspects of lighting design, power, or technology, but tend to market towards their ability to do them all combined. AE believes spaces should be "designed together to work together." Creating all these aspects in one package together means that there's a common language, integrating the aspects of technology with lighting, which reduces material costs and is a better process for construction. Power engineers help the lighting and technology people make sure that the systems work, and these groups work collaboratively in doing so. AE Design listens to the client needs and can tailor their scope to said needs. They can offer conceptual design only, complete lighting design, complete lighting controls design, as well as electrical engineering design. Additionally, they have the resources to pull together the perfect team for a project because they have employees





from a variety of different disciplines. Rather their education is in architecture, interior design, engineering fields, or even theatre.

Jon and Jeff also heavily emphasized how education is important to them and that they didn't want to have any physical barriers between their staff and educational growth. They help fund employees to attend classes, courses, and more to grow in their education, with the expectation that they will come back and share this knowledge with the team. Learning externally is just as important as learning internally, and that it not only aids the individual but the team as a whole in growing professionally. They also bring reps in, who set up a table for a week at a time, allowing staff members to come by and learn in a hands-on way whenever they are in the office. This is something a lot of companies have struggled to navigate with when working remotely and with the era of COVID-19, but AE Design has adequately found a solution.

As a whole, AE Design has taken passion and creativity and molded them into the business of lighting, allowing for a collaborative, combined experience of technology, design, and lighting to blend together. Their company allows for individuals to grow in their own work, but in a teamwork setting also, creating a comfortable environment for one to learn more outside of their respective field. Unique from most firms, they focus on being designers. AE Design has crafted something unique to offer cohesive services to businesses across the nation, aiming to continue to allow technology, architectural engineering, designs, and lighting to be blended into one. ■



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A Decade in the Making,

Firestone library is an excellent example of different technologies playing very well together 

Excels with Mixed Technology.

By RANDY REID

What to do. The design began in 2010 and because Firestone Library at Princeton University is a working library, the lighting took almost a decade to design and install—which coincides with the decade that was the fastest transformations in the history of lighting.

I met the lighting designer, Enrique Garcia-Carrera, of Fisher Marantz Stone at the Firestone Library for a firsthand tour of this Tesla Award winning job. Princeton's Firestone Library is one of the nation's largest university libraries, featuring miles and miles of stacks of books. Enrique explained that lighting the stacks was the largest task and once FMS solved the book lighting, the remainder of the job would be relatively easy.





As I learned during the walk-through, lighting books is hard.

At the start of the design in 2010, IES RP-4 called for library books to have 30 vertical footcandles at 30 inches from the floor, meaning that the top shelf would need to have 100 to 200 footcandles to meet this knee-high requirement. FMS wanted to convince the library that 30 fc at 30 inches was too much light. After several mockups, they recommended 17 footcandles to the University.

Enrique expected to bargain with Princeton on the light levels. He explained, "Usually the client wants us to have higher light levels and we have to inform the client that current energy codes don't allow those previous light levels." Fortunately, Princeton is on a drive to be carbon neutral by 2046, the University's 300th anniversary, and the Princeton team wanted even lower levels in an effort to beat the 2046 carbon neutral date. After several more mock-ups all agreed to 10 footcandles, one-third of the **IES Recommended Practice. Enrique** explained, "Even when we were lighting below the IES RP's we were still improving uniformity. The tops of the stacks have less light and the bottom has more light, as there were many stacks with almost no light on the bottom."

Other areas of the building ended up with LED, but Enrique explained they just missed the LED revolution, "In 2010 to 2011, we were starting the



nebulous era of LEDs and we knew that higher LED efficacies and lower costs were around the corner, but we were not there yet, so we lit the stacks with T5 Fluorescent."

To achieve maximum uniformity, FMS used a narrow batwing distribution providing with maximum candlepower at the bottom of the stack and very little spill at the top. At the time, very few manufacturers could do this, as standard products did not fit the brightness control or the form factor and dimensional requirements that were envisioned. Only one manufacturer, Elliptipar, fit the bill and miles and miles of stacks were lit with the job completing in 2019. To save further energy, the design called for a building-wide intelligent control system (Lutron Quantum), which allowed for different dimming levels throughout the library. The stack aisles were outfitted with a motion sensor on each end. During normal library operation hours, the stacks remained illuminated at full output, then in the evening when the library is not open to the public, the motion sensors are activated. During our tour, before the library opened to the public, I tried tricking the sensors, but to no avail. There were no false triggers, and the lights only came up when I turned into the aisle but never when I passed by an aisle. The ramping was slow enough that it was not jarring, but fast enough to be useful.

A high traffic and highly visible area is the Trustee Room featuring Scandinavian style pendants from the 1930's fabricated by Kurt Versen The incandescent silver bowl lamp was the perfect accompaniment for their mid-century Saturn ceiling pendants. Because the design started in 2010 there were not any acceptable silver bowl LED lamps on the market. At the time, FMS tested a few brands and those early LED's had about 10% of the light that was needed. So incandescent silver bowls was the only choice.



Enrique brought me to the atrium area where the rare books are kept, which required a much higher level of security. The atrium is an enclosed area featuring skylights where the exterior of the new building meets the exterior of the original Gothic style building. FMSP found a fixture from Santa & Cole in Barcelona measuring 8 to 9 feet in diameter that looked concurrently semi- modern as well as semi-classical, complimenting the exterior of both buildings. The original luminaire was designed for CFL, but high CRI LEDs were used instead. The lobby is let with an LED "skylight" featuring LEDs from GE Current, a Daintree company. Enrique explained that the 4000K skylight consists of small panels consisting of LEDs every 4 inches on center with a large diffuse round panel. While the majority of the library is 3000K, the cooler temperature helps create the effect of an actual skylight.

Another significant challenge was lighting the artifact room which is a glass structure surrounded by a hall featuring large room-size windows



Because these are rare books, security cameras are everywhere; FMS had to consider the daylighting and the cameras. Enrique explained, "We added task lighting at the table to help strike the right balance for the various weather, times of the day, and times of the year. It was tricky as we needed enough light for the people and the cameras, but not too much light that could damage the rare books." one side. Princeton was very concerned about IR leaking into the artifact room from the outside windows. FMS had to make two sets of AGI32 calculations: one for the daylighting entering the building and another calculation for the daylighting penetrating the second set of glass. LED was used throughout the artifact room.

As we approached the three lower floors Enrique mentioned the nice tall plenum on the upper floors but there was no plenum on the floors below ground. He used the same fixtures, only instead of recessed-

mount they were ceiling-mount against the exposed concrete deck.

Before finishing our tour, one last time, I tried to trick the motion sensors and was not successful. I stood there staring at the fluorescent fixtures and Enrique reminded me that designers used to combine fluorescent, CFL, metal halide and incandescent all the time—and it was a rainbow of different colors that they managed to make it work. On this project he combined LED, incandescent silver bowl and fluorescent very well. He said, the story is the same as he sees on any project with a combination of light sources. He did say that the issue is better with LED, but not completely solved, explaining, "It is rare to have the same manufacturer throughout any large jobs and the LEDS have different chips and those chips have different color tolerances. We expect them all to match but it doesn't always happen."

Firestone library is an excellent example of different technologies playing very well together. ■



"We added task lighting at the table to help strike the right balance for the various weather, times of the day, and times of the year. It was tricky as we needed enough light for the people and the cameras, but not too much light that could damage the rare books."

— Enrique Garcia-Carrera



DOE Profiles National Building Stock

By CRAIG DILOUIE

Commercial buildings in the United States are getting larger and more commonly include energy-saving features like LED lighting and occupancy sensors, according to the U.S. Department of Energy's 2018 Commercial Buildings Energy Consumption Survey (CBECS), published in September 2021.

The CBECS is a survey conducted roughly every five years by the Energy Information Administration at the DOE. A large sampling of buildings are used to generate data that is then extrapolated for national estimates covering a wide range of building characteristics, such as region, activity, size, age, and equipment.

What does the data tell us about the estimated 5.9 million commercial buildings in the United States?

Building snapshot

From 2012 to 2018, the estimated number of U.S. commercial buildings grew by 6%, while total floorspace grew 11% to 97 billion sq.ft. An estimated 357,000 buildings were built 2013 to 2018, representing 7.5 billion sq.ft.

The number of education, lodging, warehouse, public assembly, worship, and service buildings increased, while some markets, such as office, healthcare, food sales/service, and mercantile, decreased. By floorspace, the largest markets were office, mercantile, warehouse, and education.

The South (Census region) had the largest population of commercial buildings, followed by the Midwest. The West came in third while populated by buildings of the largest median size. The smallest population of buildings and the oldest in median years resided in the Northeast. A total of 86 million people worked in these buildings, with a median 1,175 sq.ft. per worker, 14% more space than in 2012.

Seventy percent of commercial buildings were 10,000 sq.ft. or smaller, down from around 75% in 2012. For all buildings, the median building size was 5,400 sq.ft. Buildings over 100,000 sq.ft. represented 2.4% of the total building population but 34% of the floorspace.

Lighting and controls

The 2018 CBECS reveals a remarkable technological shift toward LED adoption at the expense of traditional lighting. In 2018, standard fluorescent lighting covered 76% of commercial building floorspace, a decline from 92% in 2012. Incandescent declined from 44% to 22% and HID 27% to 12%. LED, meanwhile, increased from 25% to 64% of floorspace, installed in 2.6 million buildings, more than five times more buildings than in 2012.





Lighting installed as percentage of floorspace (sq.ft.) in five major building types.

	Warehouse & Storage	Office	Mercantile	Education	All Health Care
Incandescent	10%	21%	35%	17%	33%
Standard fluorescent	66%	79%	83%	83%	84%
Compact fluorescent	17%	44%	52%	31%	59%
High-intensity discharge (HID)	11%	10%	9%	14%	21%
Halogen	7%	13%	35%	12%	27%
LED	47%	74%	75%	63%	77%

Lighting controls adoption was a mixed bag in terms of adoption, with occupancy sensors making the most gains. In 2018, occupancy sensors were installed in more than 1 million buildings controlling more than 44 billion sq.ft., 26% more buildings than in 2012 and 24% more floorspace. In 2018, occupancy sensors controlled lighting in 17% of all commercial buildings but 46% of all commercial building floorspace. Daylight harvesting modestly increased from 7% to 7.5% of floorspace, increasing from 6.1 to 7.2 billion sq.ft. in 138,000 buildings. Building automation systems for lighting increased from 14% to 17%, increasing from 12 to 16.7 billion sq.ft. in 317,000 buildings. Light scheduling, however, remained flat at about 35% of floorspace. Multilevel lighting and dimming modestly declined from 17% to 15% of floorspace, which is somewhat surprising due to the inherent controllability of LED lighting and suggesting some dimming for energy management perhaps was not covered in the responses. Demandresponsive lighting declined from 5% to 2%. For the first time, the CBECS included plug load control, which showed use in less than 1% of buildings and around 2% of floorspace in 2018.



Lighting controls installed as percentage of floorspace (sq.ft.) in five major building types.

	Warehouse & Storage	Office	Mercantile	Education	All Health Care
Light scheduling	16%	46%	65%	35%	44%
Occupancy sensors	40%	62%	49%	57%	70%
Multi-level lighting or dimming	4%	21%	16%	15%	29%
Daylight harvesting	2%	15%	13%	6%	14%
Building automation system (BAS) for lighting	5%	22%	40%	24%	22%

A simple conclusion here is that the majority of buildings and floorspace remain untapped for lighting automation.

Similarly, there remains a persistent lighting upgrade opportunity. These upgrades are most attractive for buildings with older lighting systems, which tend to overlight spaces using obsolete technology. Add long operating hours and high energy rates, and the building may be a good candidate for a lighting upgrade.

The 2018 CBECS estimated the median age of all commercial buildings to be 36 years and that about 2.7 million buildings (46% of all buildings), constituting 39.8 billion sq.ft. (41% of all floorspace), were built before 1980. CBECS estimated that 2.4 million of these buildings, representing 25 billion sq.ft., have not received a lighting upgrade.

Interestingly, CBECS also reported a significant amount of floorspace illuminated by LED—24.9 billion sq.ft. suggesting at least piecemeal upgrades, such as exit sign replacements and installation of LED linear replacement lamps, have occurred. Putting the opportunity another way, if every standard fluorescent lamp were suitable for upgrade, this alone would represent lighting covering four out of five square feet in seven out of 10 buildings.

Mine the data

Overall, the 2018 CBECS offers a plethora of information that can be used for rich insights into the commercial buildings

market. How many education buildings are in the Northeast, and what's their median age? What's the total floorspace of office buildings built before 1990, and what's the average per worker? CBECS has an estimate for these and many other questions.

Note, however, that the results are estimates based on a sample population. It's also important to view the results with an educated eye to interpret some of the results and to remember that how some data appears depends on how the question was interpreted by both DOE and the respondent.

Check out the 2018 CBECS, available free in a series of tables, at: https://www. eia.gov/consumption/commercial/ data/2018/index.php.

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THE BEAU OF THE BEATREC

By STEF SCHWALB

My first trip out of state post-pandemic was this past fall to Rhode Island. I went to the Jersey shore over the summer, but I don't count that as real travel because we went by car and weren't headed anywhere new. Being a lover of all things lighting (convenient for a columnist in this magazine, right?) and Halloween as well, a friend and I headed to Providence to check out the Jack-o-Lantern Spectacular at the Roger Williams Zoo. While there, we checked into a new hotel I was curious to experience firsthand after I received some preview images of the space. Suffice to say, The Beatrice did not disappoint.

Developed by Joseph R. Paolino, Jr. of Paolino Properties, the hotel is inspired by his mother—Beatrice Temkin—a lifelong resident of Rhode Island, and throughout its comfortable surroundings, guests will find accents and touches inspired by her that infuse style, warmth, and a welcoming spirit.

Photo Credit: The Beatrice

Seatrice)

A New Hotel in Providence Features Chic Design and Fabulous Fixtures

The 47-room boutique property was designed by a local firm, ZDS Architecture & Interiors, and is situated in the heart of downtown in the historic 1887 Exchange Street Building. Here modernday, luxe amenities mesh seamlessly with the property's rich history, and the stylish atmosphere features gorgeous décor, timeless design, and

several custom fixtures that excel as both fashionable and functional. On view in the lobby, the accommodations, the hallways, and onsite Ignazio Cipriani's Bellini Restaurant, there's plenty to take in. The hotel also boasts the private Rooftop Bar for guests and member use, which sports spectacular views of the city. (It wasn't open when we were there—but that's just something to look forward during a future stay!) To get more details on how it all came together, we connected with Eric N. Zuena, Principal/Founder of ZDS, for insights on how the general design aesthetic and the hotel's location influenced his firm's lighting choices (among other things).

"For over 100 years, the original historic Exchange Street Building stood separated from other historic structures by an alley. In the 1980's, these other historic structures were razed making way for 100 Westminster, a 20-story office tower," explains Zuena. "During that construction project, the alley was enclosed creating contiguous interior circulation between the new high rise and our five-story historic structure." When ZDS was initially asked to study the opportunity to convert the Exchange Street Building to a hotel, adds Zuena, one of the challenges the team faced was that the lobby had two access points—one from the Business District off Westminster Street, and the other from Kennedy









Plaza and Burnside Park. "The path of travel is considered a pedestrian artery from the train station and our Capitol building heading south all the way through Downtown Providence," he says. "The intent was to open the caps of this interior court with large non-reflective glass and mark the center of the atrium with a 24-inch-long crystal monumental fixture that can be seen from afar."

This fixture is indeed a sight to behold as guests enter the lobby, and whether viewed from above or below, how the light reflects off its surface is simply extraordinary. Because of the restrictions of the space, custom fixtures played an important role in the design approach overall. "Another significant characteristic of the building was that its slender depth called for a single-loaded corridor," notes Zuena. "These corridors on Levels 2 and 3 look down into the lobby atrium and through this crystal fixture, which is certainly the public space's main event." When guests leave their room, he adds, they have a breathtaking view of this magnificent fixture through several historic portals in the historic brick wall.

Since the past and present are merged into the hotel's surroundings, it provided Zuena and his team with the ability to get creative and innovative with the project. "Much of the design was inspired by the juxtaposition of these rustic historic surfaces against the more refined new surfaces of the

property," explains Zuena. "A continuous shimmering terrazzo floor, a monumental three-story crystal light fixture, and plush furnishings are all anchored by an Italian tile mosaic portrait of [the matriarch] Beatrice." This dichotomy was by design, he adds, and that gives the property an upscale eclecticism that positions the hotel in a class of its own.

While the pandemic has kept some design firms stalled in proceeding with projects, ZDS is showing no signs of slowing down, and when it comes trends Zuena is seeing in the industry right now, he says that he continues to see a large shift to LED over the past several years. However, he also admits not all LEDs provide the warm, inviting moods that our less energy-efficient incandescent friends can provide. "Through smaller or more narrow apertures, linear housing, and higher output with lower voltage, we're having fun integrating these new technologies into the spaces we design," Zuena concludes. "At The Beatrice and at the Bellini restaurant, we used colored theatrical lenses to give our LED fixtures the warmth and mood we desired." ■

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lighting directions include: direct/indirect lighting, direct only and indirect only. Color temperature switches change the CCT in each direction and can be set at 3000K, 3500K or 4000K.

> Lucifer Lighting unveils its latest and smallest recessed product family, ATOMOS: a series of miniature downlights. Pronounced at-OH-mōs, ATOMOS is a compact downlight family with 1" and 2" apertures available in round and square, in trimless and flanged profiles for plaster and wood ceilings and perfect for use with residential, hospitality and commercial interiors. This LED range is available in multiple static white color temperatures or in Dim Warm (3000K at full brightness, down to 1800K when fully dimmed).



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Secto DESIGN



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THE CITY IS B



ACK-KINDA.





By JEAN JACQUES, SDA LIGHTING & CONTROLS

It was Monday March 9th... our weekly agency sales meeting was starting in about 15 minutes. The big debate was whether or not LEDucation should still happen considering all the news on this new Covid thing hitting the headlines. Post meeting there were a lot of calls, lots of chatter but nothing definitive... then on Thursday March 12th, Broadway shut down. Broadway shutting down was BIG.

After that, everything changed.

Twenty months later Broadway has re-opened, the Knicks are playing to sold-out crowds at MSG...the City is open again...well kinda open.

LightFair at Javits was proof that there is a genuine **"want to get back"** to some sort of normal behavior. Catching up with factory partners, specifiers, lighting friends... the general consensus was that it felt really good to be seeing people live and in person again. A few short weeks later another design show, BDNY, at Javits with a larger footprint and much higher attendance...that felt even more normal.

I decided to walk East after leaving Javits, through Midtown and found myself by my old office at Broadway & 21st Street...it was abundantly clear, we've got a long way to go before "normal".

I found that the two neighborhood Starbucks were gone and were now completely emptied out, unoccupied spaces. Several of our old go-to restaurants were closed, the corner deli was boarded up and it was also noticeable that there just weren't that many people on the street, not like what it used to be.

The City is somewhat off kilter...unbalanced. The City is still finding its way back...reshaping itself.

Businesses are going through a reshaping. A couple of years ago most of us used to associate the word "hybrid" with high efficiency/ high mileage vehicles, now-a-days the new association is with what is to become of the next version of the commercial office.

There's a lot to be gained through person-to-person interaction and collaboration. Personally, I love the structure that being-in-the-office provides me with daily but I can't discount the convenience of not having to deal with a New York City commute and how that cuts into my daily productivity. A company like Spotify for example who occupied 16 floors at 4 World Trade Center introduced their "Work from Anywhere" initiative earlier this year. Basically, their teams have the option to work from anywhere...in the world.

There's likely a happy medium in there somewhere which is why so many NYC firms are adopting a hybrid model. In the near term, we're looking at an environment where inside team members can split their work week as a way to capture the best of both worlds. At the moment, the office situation in NYC is still very much a mixed bag.

So how does an outside sales person or regional brand manager navigate this new environment? An environment which is today, still in flux. It's challenging.

Let's get this out of the way: if you plan on doing business as a salesperson in NYC, you have to be vaccinated (with few exceptions). Currently, New York City mandates are making it extremely difficult to navigate the city as a non-vaccinated New Yorker, let alone request entry to a client's offices.

Through the lens of an outside salesperson Covid has certainly had a transformative effect on the sales process. As the first several months of the pandemic hit, salespeople were scrambling to keep the work already in the pipeline viable while trying to figure out how to keep their book of new business flowing. All while the world and in particular the NYC construction market had slammed the brakes. They were forced to shift focus to additional areas of businesses to replace the time and effort they would normally spend facing customer.

Coupled with all the newfound screen time, I would suggest that workloads have increased and response times in theory should be faster as a result of being trapped for so long behind laptops. As they've been transitioning back on the street and conducting more in person meetings,-- this will all now need to be juggled. Time management will be more important than ever.

While our audience for in person presentations has shrunk in the near term, it won't go away completely. Instead, sales teams are getting used to having a small in-person contingent with specifiers reviewing physical product, while their colleagues are participating in real time virtually. Today's sales person has to know product, be tech savvy and feel comfortable in front of a camera. And if you're also the camera person/ content creator/ creative director of your own blog or social media site...that works too. So yes, we've all made some adjustments and learned a few things out of necessity. I think one of the classic rules still applies... we're in a relationship business. Of course, a product has to specifiable, brand support is critical...that's a given. But let's face it, the rep's role as the gatekeeper of information is no longer the case. That used to be the situation before all fixture data sheets went online. That direct access has opened up even further since Covid.

Among other things, today's reps still serve as bridges, connectors, facilitators. That's a critical piece of the equation on both the spec side and the buying side. The good one's clean up a lot of spills behind the scenes...specifiers certainly respect and appreciate that. In many cases, over time you become a part of their team.

Covid has served as a bit of a litmus test in evaluating the nature of many client relationships. In some cases, you may not have found your connection as strong as you thought and conversely you may have found the opportunity to strengthen relationships in Covid...even virtually.

There's been a lot of change, a lot of lessons learned, and new skills acquired.

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Circular Lighting: The Frontiers of Sustainable Development



here's a quiet revolution afoot. Business models are slowly changing as industries move away from the traditional linear model of "take, make, waste" production and towards a circular economy – one that is inherently restorative by design. That means it aims to keep products and materials at their highest utility and value. Some of the world's top companies are shifting to this more sustainable mode of production. And, of course, the lighting industry isn't immune to these changes. Luminaire design is set to undergo a major



upheaval in 2022 due to key legislation including the Eco Design regulations and the Environment Bill.

EU Circular Economy Policies are Impacting Lighting Product Design and Business Models. The EU is driving change to achieve its vision for a Circular Economy through a combination of strategies and regulations that address a product's entire life cycle. New requirements are emerging addressing such diverse issues as the quality and variety of the plastics used in a product, increased information requirements on the chemical substances and critical raw materials it contains, making products easier to repair and upgrade and requiring removable and replaceable components. Incentives for industry and consumers to opt for more circular products include the introduction of a reparability score and new labels, and discussions to render 'non-circular' products more expensive, for example via the eco-modulation of WEEE fees. All these developments have a direct impact on product design and business models.

The rules look set to fundamentally change the way we design and manufacture light fittings. For ease of serviceability, products need a modular construction, and this means that circularity begins at the design and production stage. In order to move to a more sustainable society we must naturally tackle carbon emissions, but we need to also look at the way we are making products in what is very much a consumer based society.

For the last 15 years, the contribution of LED technology to energy savings has been a significant factor—accounting for at least 30% of the overall picture of eco-lighting. With LED technology firmly taking root it is now time to enter in the phase of redesigning the fittings to further take care of the environment. This is about circular economy, easier maintenance and removing plastics from this field. The term Circular Economy is gaining a resonance across the lighting industry as it presents its own challenges and opportunities. As global demand for lighting grows, the adoption of circular economy principles in the lighting industry will allow users to pay only for the light, not for the equipment. Transformation to a circular economy is essential if manufacturing is to be sustainable. This will become ever more important as demand for resources rises, and energy costs increase.

Sustainability is a complex and sometimes nebulous concept that may have different meanings to different people. For some, it clearly signals environmental objectives. But others take a broader view of the concept to encompass social, economic and political dimensions. The UN's Sustainable Development Goals include objectives on climate change, environmental degradation, poverty, inequality, peace and justice. The individual elements of this broader definition of sustainability will have different implications for business strategies and operations-as companies seek to address the new environmental imperative, they will also have to understand the connections to the broader dimensions of sustainability and act in a manner that advances both its environmental and broader elements.



Multiple industries are progressively investing in Internet of Things environmental sustainability initiatives to improve quality of life while safeguarding natural resources. There are many different current and upcoming governmental actions that are expected to increase circularity across the world. In particular, the EU has released the Circular Economy Action Plan as a part of the Green Deal and China recently released their 14th Five-Year Plan (2021-2025) for Circular Economy Development, which will accelerate its adoption. Some studies predict that the world will achieve over 10.5% circularity by 2030, as sustainability efforts and incoming legislation start to take effect. More than ever, we see that it can't be only one country or company that has the ability to manage the transition to a circular economy. It's all about collaboration.

It is no surprise that IoT has emerged as the future of smart living and environmental sustainability. Technology innovation has the potential to help our global society transition to better environmental stewardship. Multiple industries are progressively investing in Internet of Things environmental sustainability initiatives to improve quality of life while safeguarding natural resources. IoT has become the driving force behind the adoption of circular economy principles. Be it automating devices for self-monitoring or improving designs for recycling, companies leverage IoT technology for transitioning to a circular economy and reducing our carbon footprint. IoT innovation is truly a game-changer for the advancement of a sustainable environment.

The Internet of Things (IoT) opens several avenues of opportunity for the lighting industry, and there is also Lighting as a Service (LaaS), LaaS could be crucial... LaaS is a fairly simple concept in principal, manufactures install, maintain and operate lighting systems with no upfront cost for customers. With the savings made on energy bills and the upfront cost of the products and installation, the end user should easily be able to afford a lighting system that exactly meets their needs.

As the latest figures released by CSIL show that more than 80% of all lighting sold in the EU four years ago was non-serviceable the cynic in me might suggest that after LEDs decimated replacement cycles of lamps, the rise of sealed in fixtures is a way for manufactures to claw back some much-needed income. But it needn't be that way – LaaS presents a real opportunity for manufactures to earn a steady income and control in an age when being green is a must for multinational businesses. The onus would be on manufacturers to ensure serviceability and that raw materials return to the economy and not landfill. A complete 180 degree about-turn compared with the current outlook of some manufacturers. LaaS provides end users with an opportunity to implement the latest technology without the huge upfront cost normally associated with such endeavours. Service, as the name would suggest, means manufacturers will be forced to compete to provide the very best performance to the end user. With LaaS, it would also be in the manufacturer's best interest to provide products that last, and responsibly manage the ones that don't. End users that have been slow to adopt LED thus far due to high initial investment costs will be able to reap the benefits of reduced energy usage and bills, providing both a boost to their finances and to the planet.

LaaS also protects consumers from the ongoing protocol wars taking place between IoT lighting providers. At this stage, we don't know whether it will be Zigbee, Zwave, Bluetooth or one of the many other protocols that corners the IoT lighting market – but LaaS consumers won't suffer regardless of who wins, as their lighting service provider would be responsible for replacing any defunct equipment.

Lastly, the Lighting industry as a whole will be the real winner if LaaS sees a growth in adoption, as it will necessitate a move to a truly circular economy. However, once the impact of throwing away, rather than reusing light fittings or lamps is felt on a manufacturer's bottom line rather than the conscience of individual consumers, policies will be put in place to make a change. Manufacturers themselves will make money by ensuring their fittings are easily serviceable, and lamps last as long as advertised. Modularity – whereby fittings are made with replaceable parts, can also be utilised by manufacturers as a means to reduce waste, and costs. Without LaaS though, modularity is impractical as consumers would lack the expertise to replace 'parts' of fittings whilst the cost of developing modular fittings may be prohibitive to manufacturers.

With 3D printing, Lighting industry could manufacture locally which reduces transport distances for materials, parts and final products. Products are only printed when customers need them to avoid large stock storage. Due to the light weight of polycarbonate, less energy is used during transportation, this drastically reduces CO2 emissions. Compared to traditional aluminium die casting production methods, 3D printing requires far less energy and material. This brings a reduction up to 75% on the carbon footprint. Together with the reduced transportation footprint and the standard use of LED lights, 3D printed luminaires are the most energy efficient choice.

3D printed lighting would be a highly flexible, more sustainable form of manufacturing, using a 100% recyclable polycarbonate material, which allows luminaires to be bespoke designed or tailored to customer's exact needs and recycled at the end of their life, supporting a circular economy. 3D printed lighting would help industry made a more significant positive impact global sustainability goals. 3D printed luminaires are printed with a 100% recyclable polycarbonate and are designed to be fully re-used at the end of their lifetime, avoiding waste of material. 3D printed luminaires can be even designed online by customers... customer can define the shape, size and material, with a vast choice in shapes and materials, slect the texture and the pattern, determine the lighting delights like the right lumen output, driver sttings, optics and other options... and finally confirm the design, lighting manufacturer will print and deliver the

product that customer designed on this online process. Compared to traditional luminaires, these smart innovative circular designs use no paint, less parts and less screws.

In lighting design, we need to be open to reusing existing equipment in our projects. We also need to consider second-hand equipment and encourage original equipment manufacturers and refurbishment companies to provide parts, services, warranties, and support for such equipment. It is also necessary to engage lighting equipment manufacturers in discussions of product life, not just warranty periods. The design life of the lighting equipment and continued availability of parts and a repair service is essential in understanding how lighting products should be assessed during specification and at end of use in installations.

As humans, we have adopted a linear and unsustainable approach to resources: we take, make and dispose. Because of the way we extract resources, process and transport materials, fuels and food, material use is expected to double by 2060. There is, therefore, an environmental and economic imperative to change the way we produce and consume, to rethink and redesign products, components and packaging they come in. Truly embracing the circular economy philosophy requires significant change to existing practices across the lighting and building industries.

The transition to a circular economy will be a lengthy one. It's also an irreversible one. Once we shift to this sort of economy, we'll never go back. As part of the global community we all have to look very seriously at our legacy and adjust how we live now. Ultimately circular lighting advances the move towards a more energy efficient society.

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BRIGHT LIGHTS, BIG CITY

By STEF SCHWALB

BDNY Heads Back to NYC as New Lighting Exhibitors Illuminate Our Hopes for Hospitality



November was a big month in New York City. Not only did the holiday season get under way with some well-needed festive sights and sounds, but Boutique Design New York (BDNY) returned to the Javits Center for this year's iteration; and it's safe to say from the good vibes on the show floor that attendees were ready to celebrate its triumphant return. As the leading trade fair and conference for hospitality's boutique and lifestyle design community, the event brings together architects, designers, developers, hoteliers, purchasing agents, and owners with manufacturers to discover new products in lighting, furniture, flooring, fabrics, art & accessories, wall coverings, and more. Taking place over two days each November (save for 2020), this year BDNY was co-located with ICFF (International Contemporary Furniture Fair) + WantedDesign Manhattan as well as HX: The Hotel Experience



Powered by AAHOA. There was much to take in, but we were able to catch up with two first-time exhibitors to get their take on the experience, industry trends, and what they think the lighting sector will look like in a post-pandemic world.

As a first-time exhibitor, experiencing a tradeshow like BDNY is an exhilarating experience. The lavits Center is a sight to behold, and with all Covid protocols in place, the buzz inside was (pardon the pun) electric. "We were particularly excited to participate in the 2021 BDNY show for several reasons, starting with the absence of an in-person hospitality event in NYC for several years and the excitement for clients to finally see products and connect with vendors in person," says Frank Leyon, principal at **BEACON Custom** Lighting. "Having ICFF + WantedDesign at the Javits simultaneously was an added bonus as it diversified the audience. Beacon Custom Lighting is a great example that high-end product design must be experienced in person. Even with the greatest photography and digital collateral. pictures never fully capture our product's unique artistry and vibe."

In fact, speaking of BEACON products, the company was a Finalist as a Best of BDNY Product Design Competition Honoree for its Pond Pendant, which prompted us to wonder what trends the company is seeing in the market. "More so than ever, better hospitality companies and high-end interior design/architecture firms are looking for one-of-a-kind, customizable, high-end products," notes Leyon. "We believe the main reason why our focused introduction— Pond—had such a big response at BDNY was that we presented a design nobody had ever seen before. It isn't any longer just about functionality and USB ports in lamp



bases but beauty, functionality, and quality equally contributing to the design."

Now that we are living in a post-pandemic world, we were also curious if the demand for custom lighting requests is rising with so many people in work-from-home and/or hybrid-work situations. "Since 1997, the majority of our business has been custom work. The biggest change we have been observing is that our customer base used to be 80% pure, high-end hospitality and is now steadily shifting towards A&D clients leveraging their access and ability to effectively use custom manufacturing to expand their business," reveals Leyon. With the majority of BEACON's clients not purchasing anything mass-produced or off-theshelf, he continues, they recently added several electrical engineers and graphics employees to help with turnaround and response time for custom drawings. "We do not believe that demand for highquality, unique designs will wane anytime soon!"



Also excited about making its big debut at BDNY was Zafferano America, a winner among the Best of BDNY Product Design Competition Honorees for its Pina Pro Lamp – Black. "This is our first year of doing BDNY, so my boss is pretty pleased about that—we were really excited," David M. Bryant, Lighting Sales Manager. "I had been at BDNY three years ago with another company, so I told him that it's a good show for hospitality—heavy hitters from the hotel industry are there and restaurant groups—and he was convinced. We did get good foot traffic, a lot of good people, and good leads. It was a good quality show."

BDNY was actually among three tradeshows the company participated in this past year, and they have no intention of slowing down come 2022. "My boss loves great tradeshows, so we did Dallas Market in June, NY Now in August, and then BDNY in November," notes Bryant. "We're planning to do about six next year; 2020 obviously knocked us out, but in 2021 we weren't sitting idle at all. Because we don't have a showroom in New York City yet—we're opening one next fall—this is one way we do business. These trade shows really pay off well for us."

As far as trends Bryant is seeing in the market, he does see the impact of Covid having an effect on customer interest and needs. "I think cordless is taking off because with the pandemic, people were building all of these outside structures—whether it be restaurants, hotels, or bars—and you need lighting outside," explains Bryant. "One of the ways I pitch my lighting is I go to a restaurant, I have a drink or a bite to eat, and I put the lamp on a table that clearly doesn't have tabletop lighting outdoors. It's an instant hit. Outdoor spaces need outdoor lighting, and of course it has to be cordless. People seem to like portables, LED, and no cords."

Bryant also believes everyone he's met in the hotel and restaurant industries could use Zafferano America lamps everywhere. "It's a very versatile product and something everyone is needing right now," he notes. "They didn't realize they needed it, but they know it when they see it. They say, 'yes, we could use that,' and it's fun to see." That's not just the case with consumer interest at home or hospitality venues either. New clients are emerging in the commercial and contract space, too. "I think a lot of people wherever they're working-whether it's a mix of hybrid or at home—want to make their space as comfortable as possible," concludes Bryant, "so these table lights are being used in a lot of offices as well. We recently did a WeWork a project and they bought a bunch of lights and put them in the waiting areas and some desks because it just looks more inviting."



Pina Pro Lamp Photo Credit: zafferanoamerica.com

"I think a lot of people wherever they're working—whether it's a mix of hybrid or at home—want to make their space as comfortable as possible, so these table lights are being used in a lot of offices as well. "

David M. Bryant

BEST LIGHTING PRODUCTS LAUNCHED IN 2021

Call for Nominations

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Demonstrates exceptional technical innovation and significantly improves how effectively and efficiently high-quality lighting can be specified and installed, or introduces new applications to highquality lighting opportunities..

The Art of Lighting Award

Provides outstanding aesthetic appeal and high-quality lighting, based on the innovative use of lighting technology, materials or sculptural forms.

Nominations will only be accepted from lighting specifiers. Last day to submit is December 31, 2021. Visit NLB.org for more info



INTERNATIONAL ASSOCIATION OF LIGHTING DESIGNERS

IALD

CHICAGO – The IALD Nominations and Elections Committee is proud to announce the results of the 2022 IALD Elections. Please join us in congratulating the newly elected and re-elected members of the IALD Board of Directors and IALD Membership Committee. We are excited to welcome these seven exceptional industry leaders for their terms set to begin 1 January 2022:

IALD BOARD OF DIRECTORS

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COMMITTEE MEMBERS Qini Huang, IALD, CLD

VieLux Design International Inc. Montreal, Canada

Archit Jain, IALD Oculus Light Studio LLC Culver City, CA USA

ANNE BUREAU, IALD

Anne Bureau opened her lighting design studio in 1995. In 2011, she founded the lighting design office WONDERFULIGHT in Bordeaux (France). Anne has worked on numerous projects such as: Hotel Cheval Blanc in Paris / Chapelle Corneille in Rouen (concert hall for Normandy Region) / Cathar castles of Puilaurens and Quéribus / Foundation Vincent Van Gogh in Arles / Orangerie's museum in Paris.

Since the beginning of her career, Anne has been involved in the lighting design community. Since 1996, she has been a member and past president of ACE (French lighting designer's association). Anne has been a professional member of IALD since 2014 and a member of its Board of Directors since 2020. Anne is also a member of the organization board of EILD (Encuentro Iberoaméricano de Lighting design). Anne lectures at the international level (Enlighten, PLDC, EILD...) and has led numerous workshops all around the world.

Anne's passion about light as always be much wider that her interest in lighting: as an example, she graduated in industrial design in 1993 from ENSCI (Paris) with a final thesis about the Night, including a chapter about circadian rhythms. Anne is interested in artistical, cultural, medical, scientific, and sociological aspects of light with a neverending curiosity.

ABOUT THE INTERNATIONAL ASSOCIATION OF LIGHTING DESIGNERS (IALD)

The International Association of Lighting Designers (IALD), established in 1969, is an international organization supporting a network of more than 1,500 lighting design professionals who satisfy its rigorous qualification process. IALD strives to set the global standard for lighting design excellence by promoting the advancement and recognition of professional lighting designers, cultivating the universal acknowledgement and appreciation of the Power of Light in human life.

For more information, please visit iald.org.

RACHEL FITZGERALD, IALD, CLD

Rachel Fitzgerald, IALD, CLD, IES, LC, LEED AP BD+C is the discipline lead for lighting design and a Senior Associate with global design firm Stantec. A graduate of the University of Colorado's lighting program, she has more than 19 years of experience in lighting design. Rachel provides significant expertise to Stantec's buildings and master plans globally. Her talent and commitment to the design of highly-sustainable and humancentric spaces has been recognized with more than three dozen design awards.

Rachel's drive to create a world where lighting plays a more impactful role manifests itself through her industry involvement. She's passionate about mentoring junior staff to further best practices and is an in- demand speaker who shares knowledge and passion about lighting. She teaches a senior design class at the University of Colorado and is excited about fostering the next generation of lighting designers. She's involved with technical committees with the IES and serves on the WELL light concept advisory. Rachel became an Associate Member of the IALD in 2006 and a Professional Member in 2012. She has served the IALD as co-coordinator for the Rocky Mountain chapter since 2014 and a term on the IALD Board of Directors.

MARIEL FUENTES, IALD

Mariel Fuentes is Chilean, the founder and Creative director of LDLuz - Lighting Design in Barcelona, Spain. She holds a master's degree in Interior Design from the Universidad de Salamanca in Spain, and completed her architectural studies at the Universidad de Chile. Prior to establishing LDLuz in 2016, she worked nearly 11 years for renowned studios in Spain specializing in architectural lighting design.

Dedicated to promoting lighting design as a recognized discipline, Mariel is deeply involved in the lighting community, and currently serves on the Board of Directors of the International Association of Lighting Design (IALD) since 2018, and the Board of Directors of the Professional Association of Lighting Designers in Spain (APDI) since 2012. A huge contributor to lighting ducation, she is a professor of the Lighting Design Master's Program at the Polytechnic University of Barcelona (UPC) and teaches at the BAU-Centre Universitari de Disseny de Barcelona and at IED Escola superior de Disseny, in both Barcelona and Madrid.

ANA SPINA, IALD

Ana Spina is the Studio Leader for FPOV Sydney. Architecture has always been Ana's passion. She has always wanted to work with something that could promote different experiences and sensations, which makes her believe in the power that 'LIGHT' has on people's life.

Ana has been working in the lighting design industry for 20 years, and in that time, she has developed lighting for hospitality, residential and commercial projects in Brazil. Living in Australia since 2016, when she joined FPOV, Ana is developing her skills in the Australian market and supporting the Sydney team projects and clients.

Ana was previously elected to serve as an IALD Director at Large for 2020-2021, where she is a professional member and she is a member of the Brazilian Association of Lighting Designers (AsBAI). Ana volunteered for 4 years assisting the social group organising events and attending the Brazilian construction compliance/standards organisation meetings to discuss the future of lighting design in the Country.

Ana has participated in various meetings and seminars around other disciplines, making her comfortable in sharing her experiences, listening to people in the industry and promoting the Lighting Design practice.

ARAM EBBEN, IALD

As Director and Managing Principal of the Lighting Design group within EXP, Aram Ebben, along with the team of designers at EXP, combines illumination artistry with technical expertise to create award winning lighting designs worldwide. Aram's interest in the visual arts coalesced with his education in scenography. Focusing on lighting for experience design, his project designs have taken him literally around the world working on a variety of diverse projects that have ranged from major theme parks and aquariums, to high end destination resorts and conference centers.

Aram a Certified Lighting Designer (CLD), is LEED AP accredited and is passionately committed to promoting responsible design, lighting education and mentorship. He firmly believes that our future rests in the hands of our young designers and that we all owe it to them to leave this planet better off than when we found it. Aram has sat on the International Board of the Themed Entertainment Association and is currently an Adjunct Professor at the University of Central Florida.

QINI HUANG, IALD, CLD

Qini (Méko) Huang is a lighting designer with over 13 years of experience in lighting design

and project management for projects across Canada and internationally. The projects she worked on range from architectural, transportation, hospitality, commercial, entertainment, landscape and public spaces and so on.

With work experience in lighting technologies and a background in computer science, Qini (Méko) brings innovative, practical and economically viable lighting solutions combined with an aesthetic mindset. The principles of her design are to provide a pleasing experience to users foremost, while illuminating spaces and places.

Qini (Méko) is a professional member of the IALD, as well as a Certified Lighting Designer (CLD). She understands the role of lighting in architectural and interior design. She aims to utilize her extensive experience and knowledge of lighting equipment and systems to enhance and strengthen the end design. She also uses her understanding of sustainability concepts in her design with the help of LEED and WELL design principles.

ARCHIT JAIN, IALD

As co-founder and principal of Oculus Light Studio, Archit Jain brings extensive expertise and a cross-cultural sensibility to his lighting design projects. Born and raised in New Delhi, India, where he studied architecture at the School of Planning and Architecture, Archit worked as an architect and then moved to Los Angeles, USA on a scholarship, for a Masters in Building Science at the University of Southern California

Archit has practiced as a professional lighting designer for over 22 years. He started his own Los Angeles- based studio in 2012, leading the firm's varied range of projects, from commercial buildings, museums, and landscapes, to retail environments, hotels, restaurants, and residences. For every project, the firm's exemplary service provides leading edge design along with a healthy dose of pragmatism to the process and the final product. This has led to growth every year, and to date the firm has won over 70 design awards, including 2 IALD awards.

Archit plays an active role in the local lighting community, along with lectures and critiques at area colleges and national and international lighting forums. He bridges cultures, has traveled widely, and appreciates both the differences and common threads that distinguish and connect people around the globe. UPCOMING SHOWS

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DALLAS	NEW ORLEANS	DALLAS
29 SEP - 1 OCT 2022	5-6 OCT 2022	10-13 OCT 2022
ENLIGHTEN AMERICAS 2022	LI <mark>G</mark> HT SPEC MIDWEST	STREET PHO AREA LIGHTING
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designing lighting

salutes and thanks its advertisers for their support. We applaud the achievements of lighting practitioners and recognize the importance of their work in architecture and design.



Up Close with Fabio

By RANDY REID AND KATIE SMITH

Fabio Zaniboni brings a unique perspective on the lighting industry and is a self-described "mix of everything." Zaniboni was raised in Italy, Paris and South America. Starting at a young age, he immersed himself in the arts and sciences, providing him with a remarkable background to his Masters in Engineering. He has shared his experiences and knowledge with Fortune 500 companies all around the world. Currently, the Founder and Chief Vision Officer of BubblyNet, Chief Vision Officer of Zaniboni Lighting, and Chairman of Effective Lighting, Zaniboni is constantly drawing from his experiences and his interests in math, engineering, philosophy, and the arts, reinventing his take on the lighting world by focusing on the future.

After moving to the United States from Italy in 2007, Zaniboni focused his passion on lighting. Starting with specificationgrade marine lighting for yachts and cruise ships, he has since created multiple companies, and through each of them he produces art by way of lighting. After adding architectural lighting to his portfolio, he created Zaniboni Lighting and kept the two businesses separate. That's when he realized that there was more to lighting than light simply reflecting off things. He believes that "lighting is no longer a service for architecture, but has its own meaning and its own value." What does this mean to Zaniboni? "Architectural

lighting is rapidly converging with stage lighting with the added complexity of human interaction," he explains.

During LightFair 2009-2010 Zaniboni and his company went against the norm and featured a full product range only in LED. He was thinking 5 to 10 years ahead. He rejected all previous technologies and bet fully on the future of LED, which set his companies apart early on. At this point, none of his peers believed his company would survive, yet he was determined and went on to develop high-quality LED lighting, resulting in rapid success and popularity evidenced in both company growth

and numerous awards, such as fastest growing lighting company several years in a row.

Zaniboni started out in the lighting industry as somewhat of an outsider. He was not one of the typical professionals who spent their life doing lighting. Zaniboni's impressive background includes living and working in 40 countries in many diverse industries, in which he gained the experience and knowledge that helps him succeed today. For example, while working at a high level position in the automotive industry he was exposed to robotics, the manufacturing process and focusing on future technologies. Other industries he developed for, and gained knowledge in, included telecommunications, aerospace and more.

His experiences also include being a living witness to violence during Argentina's military coup, working in Detroit, Michigan in the 90s navigating local unrest, and sourcing raw materials in war-torn Serbia when it fell to Croatia, necessitating stops at UN check points

along his routes so they knew he was still alive. These experiences exposed him to the basics of human nature and all of its frailties. It gave him lessons and a perspective on life and business not possible to obtain sitting at a desk. He, thus, brings a lot to the table with both vision and perspective. His work history shows strength and a passion for creating.

Zaniboni's latest bet on the future is already paying off. His latest company, BubblyNet, rm built on

is a smart building platform built on Bluetooth Mesh. With open-source wireless controls, it has established a way to make lighting adjustable and comfortable for life. The goal was to create lighting that impacts space, including lighting that combines with fragrances, music, temperature, and so much more. According the Zaniboni, "Lighting, thanks to IoT, can now be a full sensorial experience, interacting with all other facets of space such as sound, air and time in original and unique ways." He feels this creates a metaphorical concert of perceptions and sensations, and makes lighting far more interesting than just the lighting design. BubblyNet is creating a bubble around people of their own preferences and ideal settings.

Additionally, Zaniboni owns Zaniboni Lighting which produces signature lighting with the most up-to-date technology. He describes it as combining aesthetic and quality all into one. All of the products are encapsulated with sleek and modern designs and advanced technology, helping him stay ahead of the lighting game.

When speaking about the future of the lighting market, he encourages outsiders of the lighting field to join, which would allow for improved and innovative ideas in lighting. He believes that the unique perspective outsiders give can aid in finding new concepts in lighting. The market is growing and is on the verge of a new evolution that is going to be much stronger than the evolution we are in and the technology we currently have.

Fabio Zaniboni is a businessman through and through, who took his passions and crafted them into lighting. His unique experience of living in multiple countries and working among so many different fields allows him to continue creating unique technologies. While he is ambitious at what he does, he recognizes that there is so much more to come in the world of lighting in terms of new ideas and innovations. ■

"Architectural lighting is rapidly converging with stage lighting with the added complexity of human interaction."

— Fabio Zaniboni

"lighting is no longer a service for architecture, but has its own meaning and its own value"

— Fabio Zaniboni

Industry Delivers for **Lights on the Spectrum**

By LAWRENCE BERMAN

Founder, Lights on the Spectrum



The grassroots initiative that called on people in the lighting industry to take action on making a positive difference for people who are on the Autism Spectrum has concluded with brilliant results.

The online Auction & Donation Campaign earned \$15,000 for the Autism Society of America, the oldest organization with a mission to improve the lives of people on the Autism Spectrum.

Items in the auction included beautiful light fixtures from top tier manufacturers like Vode, Louis Poulson, and Arturo Alvarez. The auction included experiences that will "Light You Up" like a week's stay at an off-thegrid house in Sequoia National Park, a getaway home in Key West, Stress Relief virtual workshop with Union Yoga, boating for a day with LF Illumination President Loren Kessel, and even a day of surfing with award winning Lighting Designer, Sean O'Connor.

The money generated by Lights on the Spectrum focuses on two areas. One is aimed on making a positive difference in the 80% unemployment rate that people on the Autism Spectrum face. The money will go towards funding the Autism Society of America to promote and expand their services to make successful employment the rule rather than the expectation.

Additionally, Lights on the Spectrum encourages and challenges lighting industry organizations, manufacturers, rep agencies, distributors, lighting designers, showrooms, and others to begin the process of creating a neurodiverse hiring program at their companies. A brighter future can be created for people on the Autism Spectrum through the assistance of the Autism Society of America and their nationwide affiliate offices and network of resources.



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- Bluetooth Technology for Lighting
- · Single Lighting Regulation (SLR) and Ecodesign Requirements
- IEC Updates
- UL Marketing Claim Verification
- And more

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