

electroindustry

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Guiding Lights

Industry focuses beam on health and productivity.

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Publisher | Tracy Cullen
Managing Editor | Jena Passut
Contributing Editors | Ann Brandstadter, Mariela Echeverria, Andrea Goodwin, William E. Green III
Art Director | Jennifer Tillmann
National Sales Manager | Tilman Gerald
The Townsend Group
202.367.2497
tgerald@townsend-group.com

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FROM THE CHAIRMAN

Quality of Light – Quality of Life

The notion of quality can be elusive. In the manufacturing world, quality typically connotes a degree of excellence or a measurable standard by which we compare like items. To a consumer, however, quality can be all of that and much more. Quality can involve personally subjective attributes, such as style and taste. In the lighting world, both types of quality play an important role in our daily lives.

Before 1925 the concepts of a correlated color temperature (CCT) and color rendering index (CRI) for a light source never existed. People lived with light sources that were static in color. They simply screwed in the bulb and accepted whatever light they got. The lighting industry progressed and over time technology was developed to produce a variety of light sources, each with its own CCT and CRI. Still, once you purchased a light source, it remained static. The ability to dynamically change the color of an individual light source across the visible spectrum of the rainbow was virtually out of reach. The light-emitting diode (LED) is changing the game. Most people know LED lighting from their tremendous energy savings, but when coupled with precision controls and communication platforms, a quantum change in lighting quality is emerging in ways we are only beginning to experience.

With LED technology, CCT and a high CRI can now be precisely “dialed in.” But now imagine this: The visual atmosphere for a Friday night home dinner party or movie can be “tuned” to fit personal tastes and styles and even define the quality of the dining experience. With a few taps on a smart device, this idea can be replicated in virtually any space with connected lighting ... each to its own end.

The future of LED lighting goes beyond mood-setting. Today, there is buzz in the lighting industry around circadian rhythms and how electric lighting may enhance human and plant functioning. For example, the agriculture industry is experimenting with LEDs and controls to maximize the quantity and the quality of harvests by adjusting lighting around-the-clock.

NEMA addresses lighting quality from many angles via its five Sections within the Lighting Systems Division. We are also a leading voice in the Lighting Controls Association (LCA) and Daylight Management Council (DMC). The Lighting Sections provide the foundation for the industry to stand on: Standards to ensure efficiency and compatibility; and Government Relations to lead legislators and regulators from Washington to state capitals via voluntary industry Standards and best practices.

The LCA is working to educate the industry—architects and designers, specifiers and contractors, owners and end users—so that we can all benefit from being able to control and adjust our environment efficiently throughout the day, seasons, and years.

And the DMC works to ensure that daylight reaches deep into our living spaces and lives. Doctors and patients, teachers and students, parents and children, pets and plants—all of us—benefit from the creation of better rhythms for our respective settings. Modern LEDs have the potential to align the ebb and flow of daylight and electric light in tune with the cycles of life.

NEMA's Lighting Members are producing high-quality innovation, high-quality products, and high-quality installations that are all leading to a higher quality of light and, in turn, a better quality of life. ☼

Mark J. Glibe

Chairman, NEMA Board of Governors

Light Improves Life: Advancements Lead to Productivity, Well-Being

In our technologically advanced society, many things that make our lives better often go unnoticed as a part of our daily routines. One advanced technology we all experience in multiple ways every day is light.

Change with the Times

For a number of years, the lighting industry focused on how to make available light more efficient and provide longer lifetimes. We went from magnetic ballasts to electronic ballasts to fluorescent tube technology, which then advanced from inefficient T12 to high-efficiency T8 and T5 lamps. To maximize these products we use controls and focus on energy management and tying the lighting into building automation systems that trigger lighting output when occupants are present and dim the lights when sufficient daylight enters the space.

Today, we have seen two disruptive technologies change the way we view light by expanding the capability of light. One of these—LED lighting—is well known and widely accepted. LED lighting provides many benefits: high efficacy, flexibility (in design application), inherent controllability, system integration (from a traditional retrofit to new fixtures), extended longevity, and the ability to produce adjustable lumen output, color temperatures, and light spectrum.

The other emerging disrupter is the Internet of Things (IoT), which allows us to live in a dynamic connected world with technology seamlessly controlling many of the devices in our daily lives, including our lighting systems.

Set the Mood with Lighting

The combination of these advancements leads us to the newest buzzword—human-centric lighting—supported by recent studies on how we can manipulate our environment with light. Studies have shown office workers with direct access to natural light are more productive.¹ As we know, the intensity and color of daylight changes throughout the day. Our eyes sense this, triggering the release of serotonin during the day and melatonin at night, creating our circadian rhythms. Lighting designers can leverage these studies and meet the desired lighting needs of

an office space—and, through controllability, designers can mimic the changes of natural light for all within that space. Because of the success of these studies, we are finding we can control productivity, alertness, and the quality of our daily experience in an office setting.

There have been many cases in which introducing high-quality lighting results in happier, more productive people:

- Hospitals, using human-centric lighting, reduced the length of stay for patients² and helped calm dementia and Alzheimer's disease patients.³
- Shift workers under updated lighting conditions are sleeping better during the day and being more productive at night.⁴
- Schools are using controls to adjust the mood of the classroom and help children remain alert.⁵

This is just the beginning with IoT. In the future, our environment will start to adjust and learn, and lighting infrastructure can help with emergency response. It can also recognize an individual and automatically adjust the lighting to that person's most productive settings.

As our industry focuses on controlling the aspects of our systems, we are elevating our products to a new standard. Yes, we are still concerned with efficiency and long-life reliability, but we now have the ability to change and affect how people feel and how they interact within their environment. These advances allow us all to provide a high quality of light to allow our customers a high quality of life. ☺



Mr. Holstein chairs the NEMA Lighting Systems Division.

- 1 "Impact of Windows and Daylight Exposure on Overall Health and Sleep Quality of Office Workers: A Case-Control Pilot Study," *Journal of Clinical Sleep Medicine*, June 2014, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4031400/>
- 2 "Hospital lighting and patient's health: The influence of daylight and artificial light on the circadian rhythm, length of stay and pain levels of hospital patients," 2018, <http://edepot.wur.nl/454641>
- 3 "The Right Lighting Can Calm Alzheimer's Patients," *HealthDay*, July 24, 2018, <http://bit.ly/LightingCalm>
- 4 "Light and Shift Work," Lighting Research Center, <https://www.lrc.rpi.edu/programs/lightHealth/shiftwork.asp>
- 5 "Illuminating the Effects of Dynamic Lighting on Student Learning," May 2012, <http://education.olemiss.edu/download/Philips-Research.pdf>

Lighting Group Thrives on Collaboration

Karen Willis, Industry Director, Lighting Systems Division, NEMA

The NEMA Lighting Systems Division, made up of five NEMA Product Sections, is a cohesive and collaborative group of Member organizations. The semiannual meetings of the Sections are well-attended, as are two Divisionwide forums conducted during the week, with Members initiating projects and having multiple cross-section discussions. It is this environment that produces the organic growth of collaborative thought.

Members of the Lighting Controls and Light Source Sections have joined forces to create a Dimming Compatibility Program so consumers can easily identify specific light sources (bulbs) that are compatible with specific dimmers. The Luminaire and Emergency Lighting Section Members are using individual expertise to help identify the ambiguity between the *National Electrical Code*®, the National Fire Protection Association (NFPA) *Life Safety Code*®, and UL 924 (regarding luminaires for emergency use) to assist field professionals who confront questions on a daily basis. The Ballast and Driver Section,

Luminaire Section, and Lighting Controls Section, along with other NEMA Product Sections, are tackling the difficult issue of standardized wire color.

These are not just examples of collaboration—they are a reflection of the lighting industry. Lighting products are no longer simple stand-alone devices that connect to a single holder. Multiple devices now communicate with each other in ways unimaginable just 15 years ago.

During the U.S. Department of Energy R&D Workshop held at the end of January, Mr. Steve Chalk, Deputy Assistant Secretary of Energy Efficiency, U.S. Department of Energy, noted that the Energy Information Administration's recently released *Annual Energy Outlook* projects that the largest energy reduction in the building sector for the next 30 years will be lighting. This accomplishment will not come from LED luminaires alone. It will be a result of communication and integration of all aspects of the lighting system, or a collaboration of parts. ☺

EMC Standards Advance Under USNC TAG

Muhammad Ali, Program Manager, NEMA

Work continues to move forward in international electromagnetic compatibility lighting Standards after numerous updates were added last year. Some of the major changes in the 9th edition of CISPR 15:2018, which was published in May, include:

- Radiated disturbance limits in 300 MHz to 1 GHz range
- New definitions for lighting equipment, functional earth, and protective earth
- Introduction of three basic ports: wired network ports, local wired ports, and the enclosure port
- Deletion of the insertion-loss requirements and the associated Annex A

The next maintenance cycle of CISPR 15 is already open. Topics the USNC TAG to CISPR F will explore are:

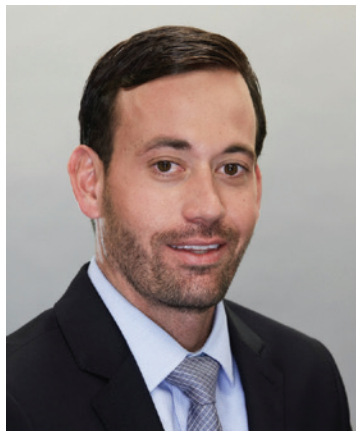
- Control ports testing
- Two different limits of testing
- Scanning frequency limit up to 1 GHz

The USNC TAG to IEC SC 77A, low-frequency phenomena, has also been active, and following are some of its notable work items:

- IEC PT 61000-3-18 continues to work on a technical report defining network characteristics for the application of harmonic emission limits for equipment to be connected to LV distribution systems not currently covered by IEC 61000-3-2 and/or 61000-3-12.
- The U.S. is proposing to update IEC 61000-3-2 by removing the power factor multiplier for lighting products at the third harmonics since most of the electronic devices have a displacement factor close to 1.

Some of the other changes in IEC 61000-3-2 include: revised definitions for active input power and lighting equipment, repeatability clause and Table 1 revisions, and the averaging algorithm. All of these changes will also be considered during the next revision cycle of ANSI/NEMA C82.77. ☺

Medical Device Display Requirements Are Key to Alleviating Safety Concerns



A patient suffering from a heart attack is wheeled into the emergency room of a busy hospital. The doctor calls for an emergency angioplasty to quickly open the blocked artery and reduce the amount of damage to his heart. ER workers set up and switch on an interventional fluoroscopy system, which will guide the doctor through the procedure by imaging the patient's heart in real time. However, the LED backlight on the display monitor is too dim. The doctor can't get a good picture of the heart, and the emergency surgery is called off, all while the patient struggles without treatment. What happened?

Interventional fluoroscopy equipment are complex systems of fine-tuned medical x-ray equipment. Serious issues can occur when someone alters equipment without consideration for the long list of components and connections, including the image display system and image display device. If displays not validated to the exacting Standards manufacturers adhere to during production and installation replace validated displays, patients can end up in a situation just like the one described above. Additional safety concerns may include electric shocks, trauma, misdiagnosis, inadequate or unexpected image quality, and unnecessary radiation dose—all caused by something as seemingly mundane as display monitors.

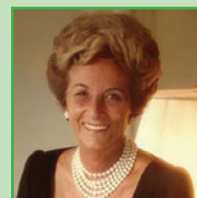
That is why it is so important for potential users of third-party displays, and for the servicers that install them, to be aware of the requirements and Standards for which manufacturers design medical devices. Any organization that plans to perform a modification to a medical device that could affect the image display system needs to develop a validation plan that incorporates the appropriate Standards, technical reports, guidance documents, and design inputs. Awareness of these requirements protects patients, and adherence to them ensures that users meet device safety and performance requirements. ☺

**Andrew Kuhls-Gilcrist, Chair, MITA Interventional Fluoroscopy Working Group;
Senior Manager, XR/VL, Canon Medical Systems USA, Inc.**

White Paper Addresses Display Issues

Third-party displays in medical equipment can cause harm to patients when they are not properly verified, validated, and installed. MITA's recent white paper, *Modification of Image Displays of Interventional X-ray Equipment: Issues to be Considered*, details potential safety and regulatory issues. Download it at www.nema.org/MITAXray. ☺

Shirley Leviton Remembered as Industry Favorite



Shirley Leviton, a beloved leader in the electrical industry, passed away on January 3. Mrs. Leviton was an active member of the board of directors of Leviton Manufacturing Co., Inc., and wife of the company's former CEO and former NEMA Board member, the late Harold Leviton.

"The many employees and people in the industry who came in contact with her sensed her compassion, elegance and intellect," Leviton Manufacturing Co. said in a prepared statement. "She frequently accompanied Harold, visiting the company's facilities, attending company and industry functions. She was beloved by employees and throughout the electrical industry."

Besides her work with the company, Mrs. Leviton served many national and local organizations, including presiding as President of the National Council of Jewish Women and being a recipient of an Honorary Doctorate from Acadia University. She also was a board member of North Shore University Hospital in Manhasset, New York. ☺

ASC Publishes New Standards, Continues Work on Projects

David Richmond,
Program Manager,
Lighting Products and
Systems, NEMA

The ANSI Accredited Standards Committee (ASC) C136 is publishing two new outdoor lighting Standards: ANSI C136.42-2019 *Solid State Lighting Retrofit Kits* and ANSI C136.48-2018 *Wireless Networked Lighting Controllers*.

ANSI C136.42 defines the mechanical and electrical requirements for transforming installed high-intensity discharge roadway lighting and area luminaires to solid-state roadway and area luminaires. This Standard is limited to non-screw base retrofit kits only.

ANSI C136.48 defines the minimum requirements for wireless networked lighting controllers intended for use with roadway and area lighting systems. The core of any networked control system is a network of field devices that are fundamentally producers and consumers of data and exchange information in various ways. Field device networks

include controllers that turn streetlights on and off and may control lighting levels, and monitor performance through software. Controllers route data through gateways that act as bridges to outside networks and may perform other system functions. Field device networks are accessed and managed remotely by a central management system with a user interface. Access may take the form of wired or wireless communication networks.

The committee is open to all materially affected and interested parties. However, to achieve and maintain balance, C136 is actively seeking additional Members in the End User and General Interest membership categories. If interested, please contact David Richmond at David.Richmond@nema.org. ☎

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We Are NEMA – Lighting Systems Division



Clockwise, from top left: Joseph Eaves, Assistant Vice President, Government Relations; Craig Updyke, Director, Trade & Commercial Affairs, Government Relations; Michael Erbesfeld, Program Manager, Lighting Systems Standards; Mark Kohorst, Director – Environment, Health & Safety, Government Relations; David Richmond, Program Manager, Lighting Products & Systems, Operations; Karen Willis, Industry Director, Lighting; Alex Boesenberg, Senior Manager of Regulatory Affairs, Government Relations; Madeleine Bugel, Program Manager, State and International Government Relations. ☎

Photo by Jena Passut

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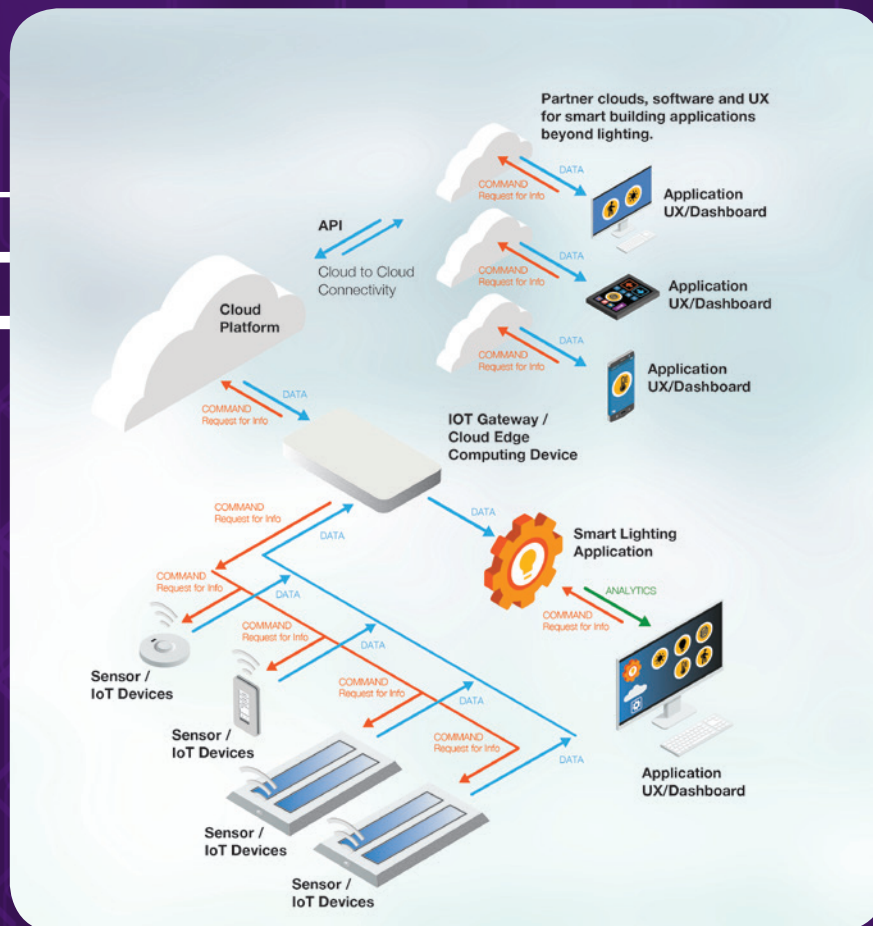


A member of the Panasonic Group **Panasonic**

Lighting Control for Lighting Quality

Data from sensors flows to a server or the cloud, where it is analyzed and used for lighting management. Data can also be shared with other building systems and third-party software.

Image courtesy of OSRAM



Craig DiLouie,
LC, CLCP

Mr. DiLouie is Education Director for the Lighting Controls Association, a council of NEMA dedicated to educating the public about advanced lighting control.

According to a study by the DesignLights Consortium,¹ networked lighting controls can reduce energy consumption by an average of 47 percent. That makes control a powerful tool in managing energy costs, but it captures only a small fraction of its potential value in enhancing quality lighting with LED technology.

Quality lighting is a venerable concept in the lighting industry. It can be defined as lighting that satisfies owner and user requirements, often looking beyond light levels and watts to address visual comfort, space perception, color, and more. The industry accomplishes quality through design best practices and metrics, as well as quality products. Quality lighting can be challenging when the owner doesn't understand its value, resulting in settling for less with a focus on initial cost.

The Role of Building Design

When evaluating the impact of building design on the bottom line, a useful rule of thumb is the 3/30/300 formula, with three being the average cost per square foot for utilities, 30 being real estate, and 300 being employee wages and benefits. We might add 3,000 to the formula for generated revenue.

Investing in new lighting typically focuses on the "3," as the impact of saving wattage is not necessarily holistic to calculate and often delivers a predictable return on investment. However, independent of watts, the quality of lighting can affect the rest of the equation, with even a tiny impact delivering much greater economic value than energy savings alone.

That's where networked lighting control comes in. The system consists of an intelligent network of individually addressable control points, which allow multiple control strategies to combine to maximize energy cost savings. If the system integrates with other building systems, cross-inputs can generate additional savings, such as occupancy sensors triggering the HVAC system. If the system is centralized, data can be fed to a server or the cloud for analysis by software. It is this connectivity and analytics that are the key to unlocking extraordinary new value in lighting quality, based on the adage that information is both power and money.

Let's look at lighting to start with:

- By controlling the light and color output of LED luminaires, the owner can implement recipes for promoting a more human-centric building environment, while mitigating glare and overlighting.
- By monitoring all lighting equipment, the system generates automatic notifications for maintenance response, which can make maintenance more efficient and enhance lighting quality by helping the owner ensure all lighting is operational.
- By monitoring occupancy sensor status, the owner can better understand and manage space utilization, improve operational efficiencies such as cleaning, and gain insights valuable for future building designs.
- Through thermal mapping, the owner can work toward balancing HVAC loads, putting the right light and temperature where needed, and enhancing comfort.
- By monitoring light levels, the owner can anticipate end of life for LED luminaires and gain valuable insights into user light level preferences for future lighting designs.

These capabilities multiply when the networked lighting control system integrates with a building management system and the Internet of Things (IoT). The control system may have the wireless communication, bandwidth, intelligence, and software to deliver data from occupancy and daylight sensors or other integrated sensors to other building systems and third-party software. By adding sensors using ubiquitous luminaires as the physical platform, the owner can geometrically increase available data and associated capabilities, such as inventory tracking and location-based services. For example, in a hospital, radio-frequency identification (RFID) tags could be

placed on wheelchairs and crash carts, with the RFID signal passed through luminaires, enabling hospital staff to locate equipment using apps.

Another example is business process improvement. Theoretically, any aspect of the building's operating environment could be measured, from air quality to water temperature to sound detection. Using a hypothetical water park, Acuity Brands' Michael Skurla identified an example of how data can be used to improve business process efficiency. Based on data generated across the facility, the park's facilities manager can check water consumption for the rides, temperature in the park's restaurant, and whether the lights are on. The manager can ensure there is appropriate staffing for the number of visitors. The lifeguard can determine how many people are in line. The accounting staff can calculate average length of stay per guest and match the number of people in the park to tickets sold. Visitors can find out how busy the park is, average water temperature, and average wait per ride. And the marketing department can calculate the fraction of visitors who take advantage of various attractions and amenities.

In short, all of this information can be used to determine and educate owners on user behavior and preferences, ensure building systems are delivering on these preferences, measure and benchmark the results, and inform future lighting and building designs. The result could impact environmental quality, user satisfaction, owner understanding of what users want, process efficiencies, and cost reduction. By generating evidence of user preferences and satisfying them, and then being able to measure the result, quality becomes more actionable as a business goal to increase user satisfaction and reduce costs. For lighting, networked connectivity and LED technology provide these tools while also providing installation points for additional sensors.

The IoT is young and still maturing, addressing issues such as interoperability, cybersecurity, and how to process a vast volume of data into actionable intelligence. Networked lighting controls, however, are further established and ready to deliver immediate benefits, including the potential for later IoT integration and the ability to better understand and deliver lighting quality. ☼

¹ "DLC Estimates Energy Savings from Networked Lighting Controls," Lighting Controls Association, November 22, 2017, <https://lightingcontrolsassociation.org/2017/11/22/dlc-estimates-energy-savings-from-networked-lighting-controls/>

What's Next for LED Lighting?

Morgan Pattison, Ph.D.

A principal of SSLS, Inc., Morgan Pattison is Senior Technical Advisor to the U.S. Department of Energy Solid-State Lighting Program and lead author of the DOE Solid-State Lighting R&D Opportunities document.

The development of electric light in the 19th century improved efficiency, made lighting safer, reduced costs, and enabled unforeseen additional benefits. Today we are undergoing another major lighting revolution, similar in scale, thanks to LED technology. LED lighting not only saves energy but also expands the frontiers of lighting in new directions to create whole new value propositions. With LEDs, lighting can do far more than it could before—not just in terms of saving energy but also adding benefits related to health, productivity, and learning; enabling more efficient indoor plant growth; improving safety; and protecting the night sky and minimizing the environmental impacts of outdoor light at night. However, while we know these benefits are possible, our understanding of how to achieve them remains dim. We have a lot to learn before we can use LED lighting to its full potential.

For general illumination, LED performance has been steadily improving while prices have declined. LED lighting products are now competitive for nearly every application and can outperform their conventional

counterparts in most aspects of lighting performance, including color quality, lifetime, beam control, and cost of ownership. LED products can also offer new lighting features, such as dynamic color control, including dim-to-warm color temperature, and even dynamic beam control. And even with these improvements, there is still considerable room for improvement in LED technology, which will enable even more efficient products with better performance and additional features.

Redefining Lighting

One feature of LED lighting is improved optical control. LEDs deliver light with more precision than ever before and direct light where it's needed to effectively illuminate objects or tasks in a space, reducing wasted light. Similarly, LED technology enables precise control of lighting intensity over large areas, bringing the opportunity to get light intensity “just right” for the application—not overlighting and wasting energy when unnecessary, yet not underlighting, which could reduce the effectiveness of activity in a space or cause safety or health concerns.

These advantages are amplified by integration with connected technologies and compatibility with controls (see “Lighting Control for Lighting Quality” on page 8).

Another feature of LED lighting is control over color quality and spectrum. Unlike conventional lighting, which has limited color options, LED technology delivers any combination of colors, opening a whole new dimension for lighting. The exact best color of light can match the activities taking place in the lighted space. LED lighting offers color-rendering features such as high color fidelity and gamut, and the spectrum can be dynamically engineered to optimize human health and productivity as well as safety.

With LED outdoor lighting, these advantages can be combined to reduce light pollution and sky glow (a brightening of the night sky due to terrestrial light sources). The 2017 U.S. Department of Energy (DOE) study *An Investigation of LED Street Lighting’s Impact on Sky Glow* found that a light source’s contribution to sky glow typically includes, in order of importance:

- uplight from the source (LEDs eliminate this)
- luminaire output (LEDs minimize this, while still meeting illumination requirements)

- spectral content (shorter-wavelength “blue” light scatters in the Earth’s atmosphere more readily than longer-wavelength light, but manufacturers can easily engineer spectral content of LEDs)

Making Tradeoffs

As LED lighting provides new capabilities and we learn how to apply these capabilities in lighting applications, we learn more about some of the necessary tradeoffs with the technology in specific applications. For example, with roadway lighting, reducing the blue content of the light may decrease sky glow (although less effectively than dimming and eliminating uplight), but early studies indicate that increased blue content also improves visibility and thus driving safety. However, we don’t yet know what the optimal lighting is for roadway safety. Roadway lighting is one example of where ongoing research enables better-informed decisions and optimizes technology for safety and ecological considerations.

The spectral content of indoor lighting has also been receiving a lot of attention, thanks to LEDs. Physiological studies confirm that nonvisual receptors in the eye linked to melatonin secretion are more responsive to blue light and that higher intensity and



Tunable LED lighting in a classroom in the Carrollton-Farmers Branch Independent School District in Carrollton, Texas. The four spectral power distribution settings are shown in clockwise order, beginning with the upper left photo: 3000 K (Reading), 3500 K (Testing), 4200 K (General), and 5000 K (Energy). All luminaires were on at full light output when the photographs were taken.

Photos courtesy of
Acuity Brands Lighting

blue content in lighting promote alertness. But again, the scientific understanding of these physiological responses to light remains at a relatively early stage. Researchers are working on a variety of fronts to increase the scientific understanding of the nonvisual effects of light on human physiology and the related energy impacts. As we learn more, it is likely that lighting designers will need to consider both occupant visual needs and occupant health when designing lighting systems.

Adding to Our Understanding

Two current DOE-funded research projects will increase our understanding of the physiological effects of light. The Virginia Tech Transportation Institute's study¹ measures the impact of different types of roadway lighting on levels of melatonin in drivers, pedestrians, and nearby sleepers. And researchers at the University of California San Diego are studying the circadian health effects of light on night workers in a hospital setting. DOE also funds GATEWAY studies that assess the performance of lighting systems designed to engage physiological responses in a variety of real-world settings—in senior care, classroom, and healthcare facilities—where, in addition to the energy savings, the potential nonenergy benefits are of considerable interest.

LED lighting also attracts interest in horticulture. Energy savings are a big part of the lure, but so is the benefit of tailoring the spectrum and intensity to specific crops to increase yield and control such parameters as growth, color, and nutritional content. But once again, scientific knowledge of the exact relationship of those parameters to plant growth is still in its relative infancy.

There is no doubt that LEDs are the future. DOE forecasts that by 2035, LED lamps and luminaires will be in most lighting installations and will result in annual energy savings of an astounding 5.1 quads in the U.S.—representing a 75% reduction in lighting energy consumption, compared to a scenario without LED lighting.² While LED lighting products can exhibit very good efficacy, energy savings, and lighting performance, there are still large variations in product performance, which is typical with a young technology. And LED technology is still changing—ongoing research will change and further improve LED efficacy and performance. LED technology still has a long way to go to fulfill its energy-saving potential and is only at the halfway point.

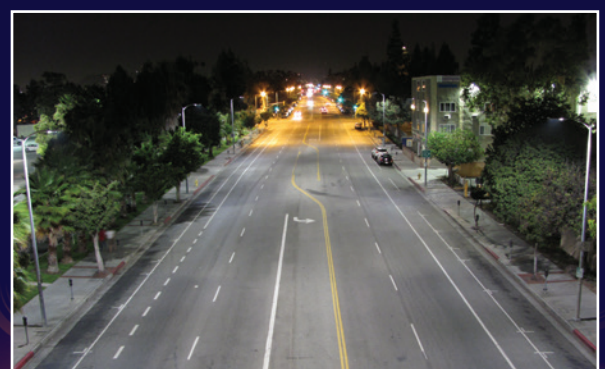
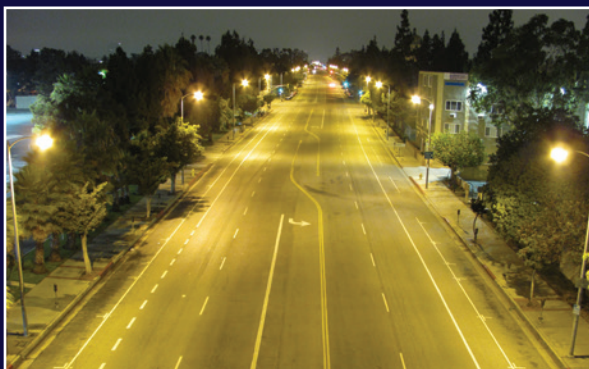
Beyond improvements to lighting technology, research to better understand the requirements of lighting applications can enable further energy savings, better lighting performance, and new value. LEDs offer precise control of the color quality, intensity, and optical distribution of the light. We need to connect the new capabilities of lighting technology with what is best for the application, and this requires new research in all aspects of lighting science—including human physiological responses to light, roadway safety, vision and visibility, horticultural lighting, and even old lighting science topics such as glare and flicker. LED lighting can give us the light we need—once we know what we need. In the meantime, there are very good, efficient products out there, but choose well. Get help if necessary. Not all LED lighting products are created equal. ☺

¹ *Investigating the Health Impacts of Outdoor Lighting*, Virginia Tech Transportation Institute and Thomas Jefferson University, https://www.energy.gov/sites/prod/files/2018/02/f48/gibbons_impacts_nashville18.pdf

² *SSL Forecast Report*, Office of Energy Efficiency & Renewable Energy, <https://www.energy.gov/eere/ssl/ssl-forecast-report>

Left: Visible non-uniformities characterize illumination from high-pressure sodium and other bulb-based products.

Right: The capability for improved optical control and more uniform distribution is visible after conversion to LED. Notice how the LED lights on the right do not emit light upward or directly into the camera. Photos courtesy of the Los Angeles Bureau of Street Lighting



Think Beyond Smart to Provide a More Human-Centric Experience



Pekka Hakkarainen:
Vice President,
Government and
Industry Relations,
Lutron Electronics
Company, Inc.

Building systems are designed to be smarter, more efficient, and more agile than ever before. With the rapid evolution of smart lighting control, automated shading, and daylighting solutions, the conversation among owners, facility managers, and end users is changing to focus on the total building experience and how it affects productivity, well-being, and long-term property value.

System providers are increasingly expected to help deliver dynamic spaces that better reflect the needs of the people in indoor spaces, outdoor spaces, and everywhere in between. And, because lighting is essential in every space, lighting control strategies will have to implement best practices that create greater value for building owners and tenants and deliver a more human-centric experience to the people in the space. People are generally acknowledged to be an organization's most valuable asset. Creating a more human-centric environment can improve the overall building experience to deliver higher return on that critical investment.

Consider these five ways smart solution providers can help create the right environment.

1. Capitalize on available building information.

To help deliver a high-performance environment, smart-building solutions must effectively collect and aggregate system data in three performance categories:

- Energy use by fixture and area—this information enables facilities managers to decrease energy consumption without sacrificing control or occupant comfort.
- Advanced analysis of space utilization over time—once facility managers understand how a building is being used, they can take advantage of enterprise software tools to quickly and seamlessly adjust to changing occupant needs.
- Lighting, HVAC, and automatic shading as they pertain to occupant comfort and preference—a human-centric environment integrates all this data to deliver a more consistent, pleasant, and productive work environment.

Gary Bouthillette of IA Interior Architects in Los Angeles emphasized the critical link between data and the human experience in a recent Lutron-hosted Human Centric Lighting Roundtable: “They want to give their employees more control over their environments, but they’re also interested in the data that’s being generated by smart building systems.” Building system data can help owners answer key questions about real estate use, individual space use, and how to make the most of their investments. Owners understand the power of being able to adjust the work environment, and they are willing to pay for this capability.

2. Simplify future expansion.

Identifying the right building system solution can be daunting—even more so over multiple buildings, let alone multiple geographies. The ideal solution will support actionable data with a simple-to-use, intuitive graphical user interface to monitor, manage, and adjust system settings from anywhere in the space—or even off-site—from a tablet or other smart device.

Facility managers will select systems for their ability to provide information that is easy to view, easy to compare across systems, simple to share with other building systems, and easily scalable as their business and responsibility expands. Communication and reliable integration can make or break system utility and efficiency.

3. Align features with the facilities team and business mission.

The best solutions will help facilities teams improve the work environment. For example, occupancy data can identify where conference rooms are frequently overbooked, where office space is underutilized, and where additional capacity is needed. Once the need is apparent, it should be easy to reassign lighting areas or reconfigure spaces from intuitive software, anywhere in the world. The right user interface can be the key to satisfied employees and high-value buildings.

4. Access reports to optimize space utilization.

Lighting data can facilitate informed decisions about adding, expanding, and repurposing real estate. It can also help improve staff efficiency by highlighting periods of low occupancy and identifying situations where the occupancy pattern has changed—permanently or temporarily.

Make sure information is easily accessible via the building’s system software—single-screen access, the ability to quickly see the percentage of occupied versus unoccupied areas, reports on occupancy history

presented as charts and bar graphs, and the ability to create historical occupancy reports for selected areas. Information is only as good as the individual’s ability to use it to access and adjust system settings across the enterprise, ultimately improving planning and workflow.

5. Improve the occupant experience.

Natural light has been cited as one of the most popular office perks. In a study cited by *Business Insider*, a recent survey of 1,614 North American employees found that “access to natural light and views of the outdoors” was the most popular perk of all, beating out other things like cafeterias, gyms, and on-site childcare.”

Vivian Loftness, internationally renowned researcher, author, and professor at Carnegie Mellon University, talked about the importance of control as part of the same Human Centric Lighting Roundtable. “There’s a critical need to rethink how our lighting is much more conducive to the test at hand, which often means we have to let humans back into the loop and let them control the light levels,” she said. “We have to carefully consider how people interact with and relate to the environment in a way that is most comfortable, most productive, and least restrictive.”

Integrated daylighting and digital lighting control strategies can provide that valuable connection to the outdoors while ensuring that glare and heat gain don’t offset the positive effects.

Human-Centric Solutions Enable the Right Environment

Building owners will continue to invest in spaces that improve comfort and productivity, enhance recruiting efforts, and improve retention, while smart building solutions will continue to be instrumental in a real estate strategy that emphasizes the total user experience.

System providers are key to the advancement of smart, integrated control. Beyond product solutions, they can further enhance value with training, consulting services, resources to simplify installation and setup, and 24/7 support to ensure their systems meet expectations for the life of the building.

Data management is changing the way we interface with the world around us, and helping to enhance the spaces where we live, work, and relax. Designing for the human experience means we will increasingly rely on systems and providers that embrace interconnectivity, offering solutions that make people’s lives easier and their buildings more productive. ☯

BACnet Secure Connect:

An IT-Friendly Twist on an Established Standard

Networked lighting systems in commercial and industrial applications are quickly becoming the industry's new normal. These systems often integrate with a building management system and regularly use a building's IT infrastructure in which sensitive corporate information flows. That naturally begets questions about security risks and IT compatibility.

Purpose-built protocols such as BACnet® and the introduction of the new BACnet Secure Connect (BACnet/SC) have been designed to improve security.

BACnet continues to be a network-based architecture based on the IT model. However, BACnet is a purpose-built protocol adapted to the unique communication needs of relatively lightweight controllers and other resource-limited devices that, when tweaked, doesn't allow the use of some common IT protocols. This limitation pushes IT departments to adapt how they implement BACnet on an IT infrastructure, rather than fitting it into the current IT framework.

For example, while the BACnet Standard SSPC 135 features Clause 24, a very secure security solution when fully adopted, it is not a common IT cybersecurity Standard. As a result, officials have not widely adopted it.

Enter BACnet/SC. BACnet Secure Connect is a misnomer because it is not another BACnet security Standard. BACnet/SC implements the entire BACnet system architecture as an application. That means the common TCP/IP 5-layer model, also known as

the “internet model” (Figure 1), does not touch the physical, datalink, network, or transport layer, leaving the building IT network to be installed and managed using any configuration set by IT.

Explaining BACnet/SC

BACnet/SC is a new datalink layer that leaves the BACnet network layer (NPDU) and BACnet application layer (APDU) intact in a new three-layer bundle. That entire BACnet stack becomes an application and is linked to HTTPS in the application layer with “web sockets” (Figure 2). The new Standard requires the use of common Transport Layer Security (TLS) version 1.2. This requirement grants the new BACnet label “secure connect.” Perhaps more importantly, it moves BACnet into a realm that should seem familiar to IT professionals and remedies any previous concerns about being “IT-friendly.”

While BACnet/SC is not yet available, the addenda from the SSPC 135 BACnet Committee has completed a second public review and should have a third sometime this spring, with a goal to publish in 2019.

The BMS community is abuzz with excitement for this new IT-friendly twist on an already solid and established Standard. Given the continued growth trend of connected lighting systems, the lighting industry should be just as excited.

Want to follow the progress? Visit www.BACnet.org and look for the “secure connect addendum.”

Scott Ziegenfus,
Manager of
Government
and Industry
Relations,
Hubbell
Lighting

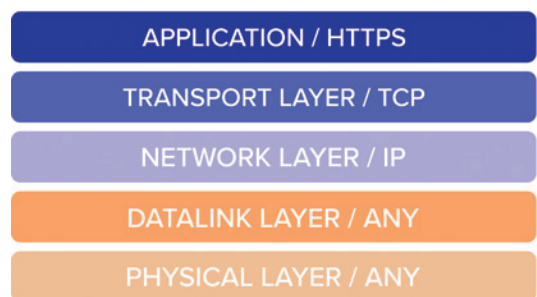


Figure 1

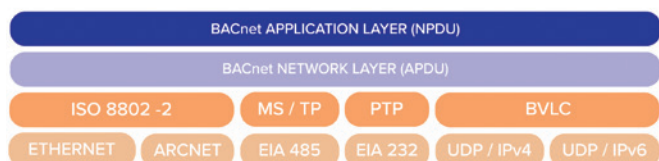
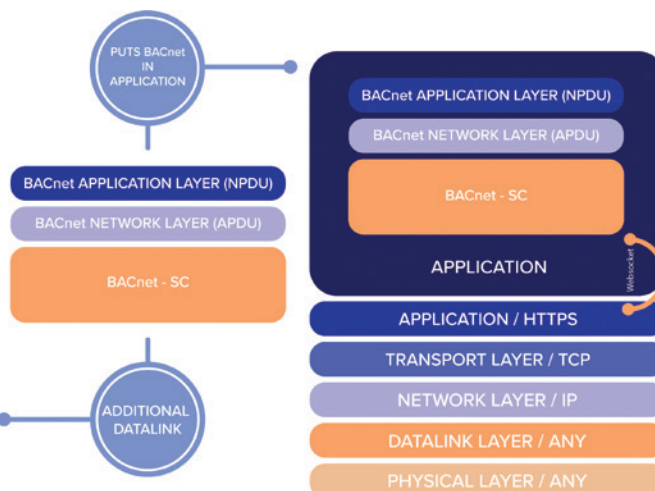


Figure 2



Integrated Lighting Control and Shade Solution Maximizes Employee Comfort and Productivity

The new Zurich North America headquarters in Schaumburg, Ill., was designed to be a creative and collaborative work environment as well as set a standard for future Zurich offices. A new integrated lighting and shading control solution automatically monitors and adjusts daylight and electric light to help maximize the comfort and productivity of its employees throughout the corporate campus.



Photo courtesy of
James Steinkamp
Photography

Challenge

As part of the planning process, Zurich management surveyed employees, who expressed a significant preference for an environment filled with natural light. The Chicago-based architecture firm Goettsch Partners designed the curtain wall system in the predominantly glass structure to deliver the desired productive, bright, open atmosphere. The architects also knew that unchecked daylight could create glare and heat gain, mitigating the advantages of the sunlight.

Solution

Goettsch Partners chose an integrated lighting control and shade solution to automatically monitor and adjust the total light environment. Solar-adaptive shading software ensures that the low-voltage motorized shades quietly and unobtrusively respond to the changing

position of the sun, maximizing natural daylight, improving occupant comfort, preserving views, and eliminating disruptive glare.

The system incorporates a broad range of additional control strategies, including daylighting, occupancy sensing, simple integration with time clocks and the HVAC system, and personal control to accommodate personal light preferences. To achieve Zurich's goal of maximizing the view through closed shades, Goettsch selected a dark solar-screen fabric with a low openness factor to reduce diffuse light while preserving the view to the outside.

The low-voltage shading and light management solution simplifies design, installation, setup, and system integration, says Randall Chapple, Associate Principal at Goettsch Partners.

"Because the shades and the controls feature low-voltage wiring, installation was easier and more cost-effective than other options," he said. "Our ability to minimize wiring material cost, as well as reduce time and labor costs, was a major consideration in our choice. These were critical to meeting project timelines."

Results

Zurich's new automated shading solutions help regulate building temperature, lower energy use, reduce heat gain, reduce glare, and provide a consistent look from outside and inside the building.

The comfortable, flexible environment contributes to a campus that enhances communication and collaboration. The roller shades with Hyperion software were a contributing factor in achieving credits toward LEED Platinum Core and Shell certification in the following categories:

- EAp2: Minimum Energy Performance
- EAcl: Optimize Energy Performance (21 points achieved)
- IEQc8.1: Daylight and Views, Daylight 75% of Spaces (1 point achieved) 

Mighty Lights Bookend Memphis Riverfront

Mighty Lights, a privately funded dynamic LED installation on Big River Crossing (launched in 2016), has dramatically expanded Memphis' downtown revitalization by adding a connected LED lighting system on the iconic Hernando de Soto Bridge. The installation, which debuted on October 27, 2018, features a cloud-based architectural lighting system. This is the first connected LED lighting system of its kind that can remotely monitor both the Big River Crossing and Hernando de Soto Bridge from a single dashboard and remotely manage content, creating a citywide immersive experience for onlookers.

The Mighty Lights installation on the Hernando de Soto Bridge includes nearly 10,000 individually controllable light points.

These durable architectural lighting fixtures are specifically designed to withstand harsh weather, excess vibration due to automobiles, and extreme heat. The cutting-edge LED technology featured in the Mighty Lights installation can produce more than one billion intensely saturated colors in a variety of beam

angles, ensuring that every truss and cable on both bridges is defined and vibrant. The LEDs can also create hundreds of possible light distribution patterns and configurations to create static displays or fluid and animated color shows that commence every hour on the hour after sundown on Big River Crossing and the Hernando de Soto Bridge.

"The Mighty Lights is reinvigorating one of the region's most vital centers of activity and contributing directly to the social and economic prosperity of the community," said Roger Karner, U.S. President of Signify. "By integrating the Big River Crossing and Hernando De Soto Bridge, Mighty Lights reimagines how residents and visitors will experience the iconic Memphis riverfront while also capturing the attention and imagination of millions of people and thousands of cities around the world."

Revitalizing Memphis

The Mighty Lights on the Hernando de Soto Bridge radically transform and enhance the Memphis waterfront by illuminating more than four miles of



riverside parklands. There are expansive viewpoints ranging from Harbor Town and Greenbelt Park in the north to Tom Lee Park and Big River Trail through the Arkansas floodplains in the south.

Photos courtesy of Signify

"The Mighty Lights have helped to increase tourism, economic development, and community engagement in downtown Memphis," said Todd Richardson, President of Memphis Bridge Lighting, Inc., the nonprofit orchestrating the Mighty Lights. "The glow and hourly light shows are a unique and fun experience for Memphians and visitors that will capture imaginations and bring a broad range of people together in times of celebration and commemoration."

Quantifying Impact and ROI

Using the Social Impact Analysis app, a software service within the Interact Landmark platform designed to help the City of Memphis and Memphis Bridge Lighting Inc., designers selected Memphis as a pilot market to collect accurate feedback on the social and media impact of the Mighty Lights. Along with the Big River Crossing's eco-counter, information from the app will help the city to facilitate better engagement with citizens, improve strategies to boost tourism, and enhance value for the local economy. 🌐

Lighting Feeds Thousands in Texas

LED solutions are saving businesses big energy costs and helping cities grow smarter, but light fixtures can also help feed entire communities, according to Big Tex Urban Farms.

Farming at the Fair

Located at the State Fair of Texas, Big Tex Urban Farms is part innovation lab, part production facility and on a mission to grow fresh produce for communities that lack easy access to grocery stores, farmers markets, and other healthy eating options.

Initially, the farm on concrete started with 100 raised garden boxes but quickly grew to over 500 boxes able to produce 2,700 pounds of food—or about 21,000 servings annually. Still, Big Tex had bigger goals.



Photo courtesy of Current, powered by GE

Big Tex counts on Hort Americas, a commercial greenhouse and hydroponics supplier, to deliver innovative and economically viable solutions that will result in even greater food yields. Along with the brand-new grow bed, Hort Americas brought the urban farm another bright idea—an LED system that provides the most suitable spectrum of light for indoor farming.

Up and Growing with LED

The LED lighting system provides optimal light spectrums for plant growth. On one spectrum, higher red content promotes flowering and fruit generation while, on another, higher blue content helps produce thick, healthy leaves. A third spectrum, balanced red-to-blue, encourages overall growth.

Past experiences had taught the Big Tex team that LED lamps offer longer life, energy savings, lower maintenance, and less heat as compared to traditional horticulture lighting options like fluorescent tubes and high-pressure sodium fixtures, making the decision to add the system to its newest deep-water bed an easy one.

An Even Healthier Outlook

Over the past year, Big Tex has converted its greenhouse from a sometimes storage space to a full production facility that never takes a day off. As the farm expands, and as Hort Americas continues to lend its expertise to the budding operation, Jason Hays, creative director of Big Tex Urban Farms, can see a setup that can one day produce a million servings of food a year. In the meantime, 100 percent of the fresh greens grown by the farm are donated to Dallas-area organizations that distribute the food to various communities.

“Our role is to continue to innovate in urban agriculture and to be an open resource for anyone who wants to replicate what we’re doing,” he says. ☎

Outlook for the 116th Congress: Back to Business

The 116th Congress convened on Thursday, January 3, 2019, with a bit of a hangover. Since December 22, 2018, certain portions of the federal government had been conducting only essential services because their authorized funding had run out. Of course, the political maneuvering continued through the holiday season.

The partial shutdown affecting employees of the Agriculture, Commerce, Homeland Security, Housing and Urban Development, Interior, Justice, State, Transportation, and Treasury departments has largely been resolved. And so the business of the nation, at least in those areas where NEMA Members are most interested, such as trade, infrastructure, and energy policy, has more normal levels of activity.

CLIMATE CHANGE

One of the more visible changes in the 116th Congress was the establishment of a Select Committee on the Climate Crisis in the House of Representatives. Climate change is one of the most unifying issues among Democrats, which is why it has received so much attention so early. No matter how one interprets the often conflicting and incomplete scientific data, there is no denying that the issue galvanizes the Democratic Party faithful who will be a major source of energy in Congress and in the 2020 elections.

However, even before the committee was even established, its ability to effect policy change was muted in two important ways. First, important committee chairs whose jurisdiction currently includes climate change successfully demanded that the committee not have the ability to move legislation. This was an important concession from House Speaker Nancy Pelosi that matches a similar decision from 2007 when a similar committee was established. Second, the committee will not have subpoena power, which would have been a powerful tool to compel administration officials to testify.

GOALS ALIGNED

Much of the NEMA legislative agenda focuses on urging Congress to implement policies that encourage the use of modern and efficient electrical products. Our goals should align with many of those in the new House majority advancing a clean energy future. We will deepen existing relationships and build new ones so that American consumers can enjoy the benefits of the products that NEMA Members manufacture. Stay tuned for more political analysis on these and other issues facing our industry and the nation. 🇺🇸

Book-a-Speaker



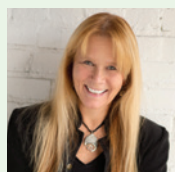
Muhammad Ali

Muhammad Ali, AStd Program Manager, will speak at the USNC TAG Leadership Workshop at Rockwell Automation in Milwaukee, April 30. Learn more at <http://bit.ly/USNCTAGWorkshop>.



Kirk Anderson

Kirk Anderson, NEMA Industry Director, Industrial Systems Division, will participate in a panel discussion in Hong Kong on aligning conformity assessment efforts for energy efficiency regulations of motors from March 18 to 21.



Lisa Spellman

Lisa Spellman, MBA, General Secretary, DICOM, will moderate a webinar, "Managing User Adoption in Informatics Projects," on April 25 at the Society for Imaging Informatics in Medicine. Check out https://siim.org/page/19w_managing_user for more information.



Jonathan Stewart

Jonathan Stewart, NEMA Industry Director, Utility Products and Systems Division, will speak about NEMA's 2016 study on regulatory barriers and opportunities for U.S. microgrid deployment at the Microgrid Global Innovation Forum—North America 2019, March 18-20, in Washington, D.C. Learn more at www.microgridinnovation.com.

NEMA electroindustry experts are available to speak at your event. Need a speaker? Book a speaker at www.nema.org/book-a-speaker. 🇺🇸

What's in the New NAFTA for the U.S. Electroindustry?

This spring, Congress is preparing to consider legislation to implement a new trade agreement between the U.S., Mexico, and Canada intended to replace the 1993 North American Free Trade Agreement (NAFTA). NEMA is working with interested Member companies and alongside other business groups to advocate for approval of the U.S.–Mexico–Canada Agreement (USMCA) as soon as possible. NEMA's support is grounded not only in the great importance of trade, investment, and supply chain relationships in North America but also in a series of cost-reducing provisions embedded in the agreement, including:



- Maintain tariff-free market access for products that originate in the region
- Provide greater flexibility for traders to use common and electronic business documents instead of laboring with duplicative paper government forms
- Deepen cooperation between customs authorities to interdict imports of counterfeit or otherwise non-compliant products
- Authorize trade in remanufactured equipment
- Require each country to adopt and implement open, transparent, impartial, and consensus processes for international Standards, a requirement that should create a level playing field for all relevant Standards that meet the criteria
- Authorize regulators to consider North American Standards if an international Standard does not exist and to reference multiple Standards that help satisfy their objectives

- Require equal treatment for North American conformity assessment bodies (CABs), even if the CAB does not have physical presence in the country for which they wish to test and certify products
- Require each country to allow persons from the other two nations to participate in development of technical regulations, Standards, and conformity assessment procedures on the same terms as local persons
- Specify comment periods for technical regulations of at least 60 days, six-month delays between adoption of a technical regulation and its effective date, and a reasonable period of time for companies to demonstrate conformity by the date of entry into force
- Direct the countries to work on developing common Standards and conformity assessment procedures in sectors of mutual interest and to encourage cooperation between their respective organizations responsible for Standards, conformity assessment, accreditation, and metrology, whether public or private
- Require countries to work together over time to harmonize upward their national mandatory energy-efficiency Standards and test procedures
- Commit national medical device regulators to improve alignment of regulations and regulatory activities, improve cooperation on inspections of manufacturers' quality management systems (QMS), and to recognize QMS audits that are in accordance with Medical Device Single Audit Program requirements
- Prohibit governments from requiring companies to share source code or locate data storage within the customer country as a condition for conducting business there

If you have questions about USMCA or would like to get involved in advocacy on trade, contact Craig Updyke of NEMA Government Relations at craig.updyke@nema.org. ☎

Codes Spotlight Value of Industry Standardization

The proper installation of lighting systems in buildings, in public transportation systems, and for outdoor spaces and events is critical to the health, safety, and general welfare of the public. Various nationally recognized installation codes ensure lighting systems function and perform as intended by the manufacturer and applicable product safety Standards. Here are the primary installation codes that contain provisions for lighting systems:

NATIONAL ELECTRICAL CODE

The *National Electrical Code*® (NEC) includes rules to safeguard people and property from hazards associated with using electricity for lighting systems. The NEC also mandates that illumination be provided for certain electrical equipment to enhance user safety. Additionally, the code outlines the locations in buildings where lighting outlets are required, the required calculations for lighting loads, and other requirements for lighting systems in special occupancies, for special equipment, and for special conditions. Article 410 is the primary location in the code for installation rules about luminaires, lampholders, and lamps.

BUILDING AND FIRE CODES

There are several nationally recognized building and fire codes that contain rules and requirements for lighting systems, including the *International Building Code*®, *International Fire Code*®, NFPA 1 *Fire Code*, and NFPA 101 *Life Safety Code*. These installation codes provide a safe and healthy environment for building occupants and allow for their safe evacuation during an emergency. These codes also detail nighttime lighting system requirements for outdoor spaces and events.

ENERGY CODES

The two most popular energy codes adopted and enforced in the United States are the *International Energy Conservation Code*® and ASHRAE Standard 90.1 *Energy Standard for Buildings Except Low-Rise Residential Buildings*. Both of these codes contain prescriptive installation requirements and operational performance criteria for lighting systems and lighting control. These codes offer rules and requirements covering energy conservation methods, materials, and systems to optimize the efficiency of energy use within a building. 

Sign up for Code Alerts

To receive notification of code adoption activity at the state and local levels, subscribe to the NEMA Code Alerts email service at www.nema.org/Technical/Code-Alerts. You can also view the most current NEC and Energy Code adoption maps, along with detailed informational reports, at www.nema.org/Technical/FieldReps. 

Ann Brandstadter

Manager, Standards Publications
and Marketing, NEMA

2019 Electrical Standards & Products Guide Now Available

The NEMA 2019 *Electrical Standards & Products Guide* (ESPG)—a comprehensive guide of NEMA Standards and white papers, product categories, and the Member manufacturers of those products—is now available.

View the 2019 ESPG at www.nema.org/Communications/Documents/NEMA-ESPG.pdf

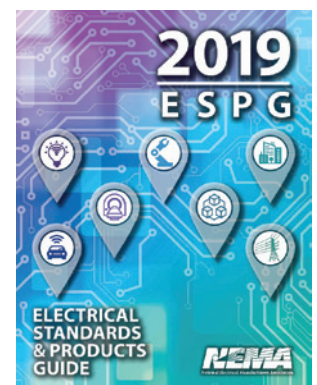
Recently published Standards:

NEMA WC 76-2018 *Standard for Controlled Impedance Shielded Twisted Pairs in Internal Electrical Cable* is available in hard copy and as an electronic download for \$79.

NEMA/MITA RMD P1-2019 *Considerations for Remanufacturing of Medical Imaging Devices* is available as an electronic download at no cost.

NEMA XR 25-2019 *Computed Tomography Dose Check* is available for \$69 in hard copy and as an electronic download at no cost.

NEMA ERCS P1-2018 *NEMA's Electric Resistance Heating Technical Committee Primer on Codes and Standards* is available as an electronic download at no cost. 



ANSLG Committees Advance Lighting Safety

NEMA is the Secretariat for the American National Standards Lighting Group (ANSLG), composed of three Accredited Standards Committees (ASC): ASC C78 Electric Lamps; ASC C81 Bases, Lampholders, and Gauges; and ASC C82 Electric Ballasts and Drivers. These three ASCs cover lighting technology from incandescent to solid state.

The ANSLG had a dynamic year in 2018. ASC C78 published 13 Standards—a mix of two new Standards, two revisions, and nine reaffirmations. The committee has already published 11 reaffirmations and plans to publish two new Standards in 2019: ANSI C78.53 *Performance Specifications for LED Direct Replacement Lamps* and ANSI C78.54 *Specification Sheets for Tubular Fluorescent Replacement and Retrofit LED Lamps*.

ASC C81 spent 2018 drafting revisions to ANSI C81.61-2017 and ANSI C81.62-2017, which cover lamp bases and holders, respectively. These two revisions, to be published in the first half of 2019,

will add new base and holder systems for tubular LED (TLED) lamps, including variants for non-grounded and low-voltage TLEDs.

In 2018, ASC C82 began tackling test methods for standby power and dimming energy efficiency for LED drivers. Dimming LED drivers are a critical energy-saving strategy and driver designers, testing houses, and regulators were lacking a measurement technique for energy estimation. The C82 committee has also been drafting a suite of Standards, the C82.77-X series, which covers electromagnetic compatibility (EMC). EMC is becoming much more relevant as the number of connected devices increases exponentially and the potential for electromagnetic interference increases along with it.

The ASCs will continue to be busy and publish more in 2019, including a mix of reaffirmations and revisions, as well as some new Standards, such as a proposed ANSI C82.15, which deals with LED driver robustness. ☎

Eye on the International Energy Conservation Code

Andrei Moldoveanu

Technical Director, NEMA

The International Energy Conservation Code has entered into a three-year review cycle. All proposals submitted by an early January deadline will be processed this year. The process involves three stages. In the first stage, the proposals are published to prepare for a public hearing. The weeklong public hearing, which consists of all-day sessions, allows supporters and opponents of each proposal to state their cases in front of a committee that votes after the hearing ends. To complete the process, a second public hearing is held and all International Code Council members cast a final vote.

NEMA's High Performance Buildings Council's Codes and Standards Review Committee (CSRC) started preparations for this cycle early in 2018. NEMA Sections were informed about the opportunity and the process, and the CSRC started preparing proposals that may fall outside a specific NEMA Section's scope but affect a number of them.

The submitted proposals come from a variety of sources:

- Outlet and Switch Box Section—5OS—1
- Electric Resistance Heating Section—3DCRH—4
- CSRC—26

The large majority of the CSRC proposals are related to lighting applications (warehouse control, light reduction controls, general lighting, parking garages, antimicrobial lighting, etc.). The rest involve energy monitoring (Electrical Submeter Section—5ESM), auto-receptacle control (Wiring Device Section—5WD), Grid-Interactive Electric Thermal Storage (Energy Storage Systems Section—8ES), and more.

Next, CSRC Members will prepare a public hearing. The Members, along with NEMA field reps and staff, will then review all submitted proposals and devise strategies to support those of interest to NEMA Members but also oppose the ones that may be detrimental to their businesses. ☎

Campaign Keeps Wall Dimmers Out of Scope—For Now

This past December, the Engineering Planning and Standards (EPS) branch office of the Canadian ministry for Innovation, Science and Economic Development (ISED) published the fifth revision to its Standard for radiated and conducted emissions for lighting products, ICES-005. This publication capped a year of staunch advocacy and technical work.

A small change to wording in the scope section of the draft for comment document caused significant concern for NEMA Members, especially the Lighting Controls Section. The words “ex. wall dimmers” were added to that section of the draft, ostensibly tagged as a clarification. If allowed to proceed unchallenged, these words would have brought all wall box dimmers under the scope of the Standard, causing millions of dollars in redesign and testing, gaps in product availability to consumers, and a clear fracture of the North American market for these products. Impacts to price and product availability would have been unpreventable.

FCC, INDUSTRY CITE INSUFFICIENT PROOF

To date, lighting dimmers in North America have been classified as incidental radiators for purposes of electromagnetic interference (EMI), meaning they are not required to be tested and certified to existing harmonized North American EMI Standards. However, the EPS branch insisted that the potential, but rarely observed, EMI from these products in application necessitated harsh action to correct it.

Interestingly, the U.S. Federal Communications Commission (FCC) and industry experiences did not mirror these conclusions. Furthermore, after testing in their own labs, the FCC concluded that there is insufficient proof to warrant changes to regulations or certification requirements (for example, rare instances of interference are best addressed in the field). Even though the FCC shared these conclusions, ISED insisted on proceeding.

NEMA WORKS TO CHANGE PROCESS

When the EPS branch office publishes a new ICES-005 EMI Standard, the regulation then changes. There is no formal requirement that public engagement take place, and drafts can be made without industry participation or input before they

are put out for cursory comment as near-complete versions. NEMA is now working to change this formally, rather than rely on interpersonal relationships to yield fair treatment.

Throughout the past year’s discussions, ISED insisted the changes to ICES-005 were necessary, despite the lack of documented evidence of widespread problems and the clear indication that the change in scope would fracture the market. NEMA and the Electro Federation Canada (EFC) engaged deeply to submit technical and procedural arguments against the scope change, submitting several sets of comments and technical papers. Additionally, the staffs of our two organizations met several times with government personnel from the EPS branch office as well as with public servants at the ministry’s main office.

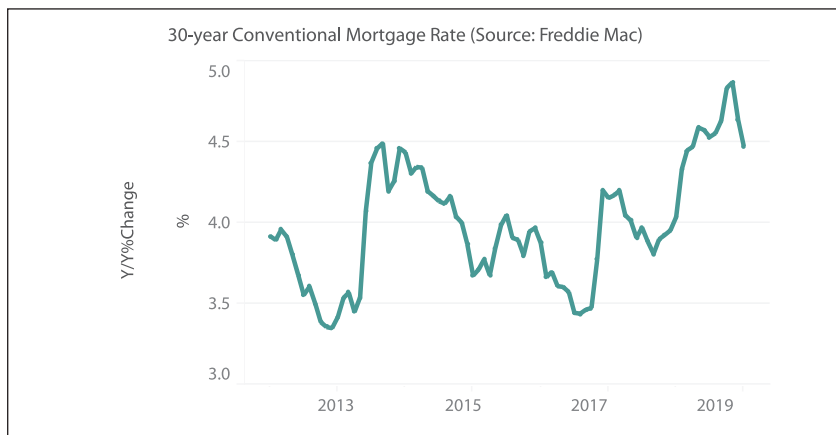
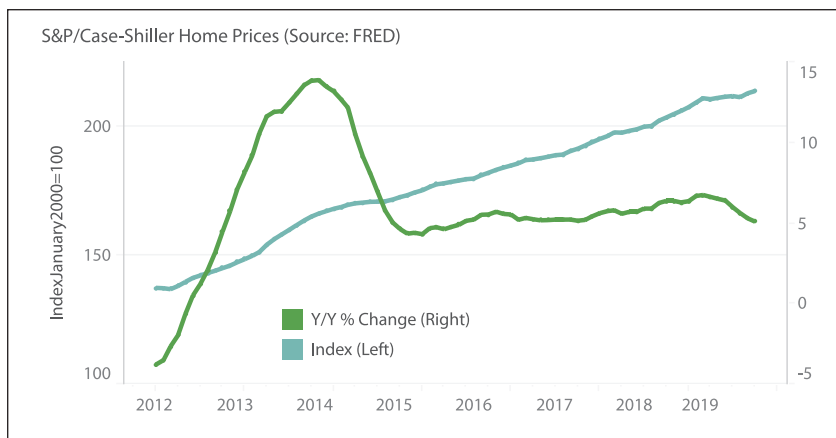
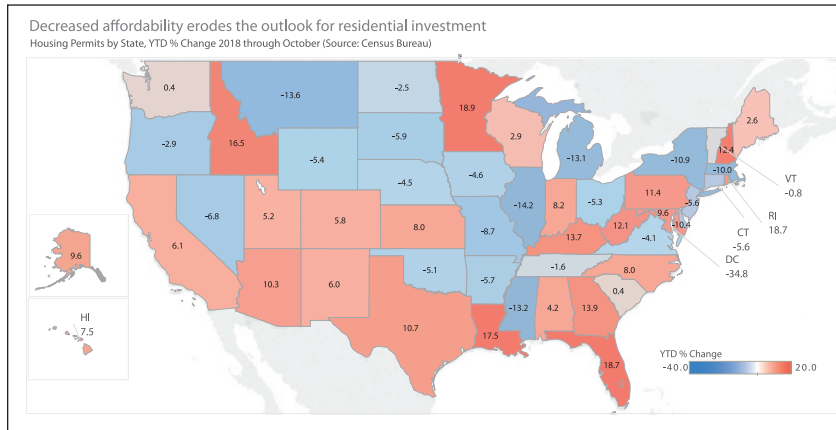
NEMA engaged contacts in the Office of Management and Budget of the Executive Branch to formally request this topic become a work project for the Regulatory Cooperation Council (RCC), the harmonization body reaffirmed in USMCA.

ISSUE MAY RESURFACE LATER

In the end, all of this attention, along with significant public advocacy, swayed the EPS office to agree to keep wall dimmers out of scope and aligned with the FCC’s treatment for the fifth revision of the Standard. However, the EPS indicates they intend to address this again in the future alongside their repeated calls to adopt international EMI Standards from CISPR in Canada, which NEMA and EFC also have opposed. Our work will continue as U.S. and Canadian industries push for harmonized Standards and to bring ICES-005 into a more public, transparent, and formal review process. ☎



Housing Starts Headed for Modest Improvement



Before the recession, housing starts averaged 1.57 million units per year. Since the end of the financial crisis in 2009, the recovery in residential construction has lagged overall growth. Housing starts have averaged just 1.24 million units since 2017. Housing affordability challenges have contributed to weak residential construction markets.

National Association of Realtors data suggest home affordability dropped in 2Q 2018 to its lowest level in 10 years. Government data showed the median price of a new home rose 52 percent since 2010, but average weekly earnings increased just 21 percent.

After hitting a multi-year high of 4.87 percent in November 2018, the conventional 30-year mortgage rate moderated, averaging 4.47 percent in January 2019. The rate is 50 basis points higher than a year-ago rate and more than a full percentage point higher than in December 2012.

Given these headwinds, how has the housing market been performing?

The nearby map shows the year-to-date percent change in housing permits by state. Housing permits are an indicator of future housing construction. Most of the 4.7 percent year-to-date increase in October 2018 occurred in the South, while parts of the Midwest and Northeast have underperformed.

So, what does the future look like for housing?

The outlook calls for modest improvement. Housing starts are expected to increase, reaching 1.38 million units in 2020.

Home price appreciation is expected to slow in 2019. Meanwhile, a more dovish Fed may ease upward pressure on mortgage rates. Relatively low mortgage rates and rising wages in a strong labor market will mitigate affordability barriers.

Visit www.nema.org/ebci for complete monthly analytics reports. ☺

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ENDNOTES FROM THE **PRESIDENT**

NEMA Illuminates Lighting Industry

Lighting systems are everywhere—and they are an important focus area of NEMA. Besides improving lamps using the latest technologies, lighting manufacturers have been hard at work to give us illumination and lighting controls that impact our everyday lives and make our society more healthful and productive.

This issue of *electroindustry* explores several aspects of lighting—controls, the LED revolution, and human-centric experiences.

Lighting controls are integral to building design and function. Networked lighting systems work within Internet of Things and building management systems concepts to increase value and productivity within building envelopes. From simple steps such as mitigating glare to minimizing over lighting and its inefficiencies, lighting controls are the brains behind these changes. Plus solid state lighting can contribute to maintenance notifications, monitoring occupancy and predicting and delivering user preferred lighting.

LED lamps and luminaires are the future of lighting, which is individual choice and control in illumination. This technology, which seems to get better every day, is driving cutting-edge research to help actualize its full potential. “We need to connect the new capabilities of lighting technology with what is best for the application,” says Morgan Pattison, the principal for Solid State Lighting Services (SSLS), Inc., a consulting company.

Many talented and inquisitive minds went into the first light bulb, not the least Thomas Edison’s, but they had in common the notion that people craved artificial light beyond that provided daily by the sun. That same human desire only increases as we expand the uses for illumination in new and specific ways. Inside or out, lighting is an inherent part of how we live, work, and relax. Providing it efficiently and affordably is what NEMA lighting and controls companies are doing every day for all of our benefits. ☺

Kevin J. Cosgriff
NEMA President and CEO

2019 Editorial Calendar

March/April

Lighting Systems

Quality of Light = Quality of Life—Managing lighting systems

May/June

Transportation Systems

Electrifying transportation—
Not just for cars anymore

July/August

Building Systems

Systems efficiency modeling

September/October

Industrial Products & Systems

Smart manufacturing

November/December

Building Infrastructure

The connected customer—Creating dynamic systems with passive devices

November/December

Medical Imaging

NEMA welcomes the following new members:

Cerveau Technologies, Inc.
CERVEAU
technologies

Imalogix
IMALOGIX

RTI Group AB
RTI

eV Products, Inc. a Kromek company
kromex

Integrated Engineering Software
(Associate Member)
INTEGRATED
ENGINEERING SOFTWARE

Samsung Healthcare (HME)
SAMSUNG
Healthcare

The Gund Company
TGC

Preformed Line Products
Resideo
resideo

Wolong Electric America
WOLONG

Quiet Ceilings That Inspire

Low-profile downlights without the compromise...

As the trend toward shallow plenum recessed downlights becomes more prevalent, ceilings are getting brighter. But with Low Profile Precision Recessed Adjustables from Aculux®, you get the flexibility that shallow plenum luminaires afford, without sacrificing ceiling brightness, source concealment, and beam control. Architectural recessed luminaires from Aculux maintain quiet ceilings by putting precisely the right amount of light in precisely the right place.

Learn more at www.acuitybrands.com/aculux