electroindustry

NEMA Strategic Initiatives
Looking to the Future

2017 Hermes
Award Winner

2017 Azbee Award

2016 MarCom
Award Winner

NEMA

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WITH LIGHTING'S **LIMITLESS POSSIBILITIES**

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There's a new light on the horizon. It's digital, efficient, and electric. It is the dawning of the third century in the electrification of our country—for the world, in fact. Truly, it is an exciting time to be an electrical manufacturer.

Thomas Edison, George Westinghouse, and Nikola Tesla brought electricity to cities in the late 19th century, marking the first century of electrification. Rural and expanded industrial electrification marked the second. Now that the grid has expanded to cover nearly every corner of the United States, we can look to a third century that will be more efficient, digitally enabled, and connected in new and imaginative ways.

The elements of society and the economy are becoming increasingly electrified. Consequently, the value of electricity is intensifying. NEMA is committed to and leading in electrifying our connected world safely, reliably, and efficiently.

As the association of electrical manufacturers, we advocate for the use of more electricity. Imagine the impact of expanded growth in the transportation sector alone. Beyond that, we could electrify and simplify heating, cooking, shipping, and other aspects of our industrial, commercial, and residential infrastructure. Marvelously, we can do this with sources that limit pollution and protect the environment.

Closely related to electrification is the second facet of this new day—digitization. Many of our Members are increasingly focused on the value they can add to their hardware and systems through software and connectivity. This is not without inherent cybersecurity risks. According to some estimates, annual global cybercrime damage costs will be measured in the trillions of dollars within a few years. The promise of an increasingly digitized electrical world is well worth the inherent risks.

A modern electrical grid will hasten the third century of electrification. Although the grid is arguably the greatest engineering achievement in 20th-century America, it can be improved upon. Beyond our borders, we know that there are more than a billion people who do not have access to electricity, and another billion and a half don't have reliable electricity. The world can and should do better.

Modern grid technologies can facilitate this transition to this more electrified future. The average age of an installed large power transformer—the kind used in the transmission system—is 38 to 40 years; 70 percent of them are 25 years or older. While that's a testament to NEMA Members' quality products, it also means that existing grid technologies are not taking advantage of modern innovations in efficiency and control. Lawmakers and regulators can speed the adoption of new technologies through informed policies and appropriations.

In this issue of *electroindustry*, we are embracing the third electrical century with our Strategic Initiatives. Recently approved by the NEMA Board of Governors, the suite of initiatives falls into four general categories: the Internet of Things, Smart Cities, Medical Imaging, and Workforce Development. These initiatives apply broadly across all NEMA sectors.

I encourage you to explore these initiatives in more depth, beginning on page 8. More importantly, please contact NEMA to participate and add your personal and company value to them on behalf of our industry.

The future is bright. Working together, we can recognize the promise of the third electrical century. ⊕

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Kyle Seymour
President and CEO,
S&C Electric Company

Taking Connected Technologies to Maturity

Mr. Seymour chairs the NEMA Board of Governors Strategic Initiatives and Councils Committee.

Our industry is evolving rapidly and is feeling the resulting growing pains. Connected technologies are collecting, analyzing, and reporting vast amounts of data, enabling manufacturers to offer new functionality and services to their customers. However, this exciting opportunity poses some formidable challenges: processing information raises cybersecurity, privacy, and data ownership questions; changing manufacturing practices require a new, properly trained workforce; and new technologies are often undervalued until their worth is sufficiently proven.

I am pleased to announce that in 2018, NEMA will address many of these problems through its Strategic Initiatives program. Each year, NEMA asks its Members to identify the biggest issues facing their companies in an attempt to help electrical and medical imaging manufacturers seize emerging market opportunities and solve imminent challenges. Many proposals were received, and a theme quickly emerged: how to take connected technologies from infancy to maturity.

Four categories of Strategic Initiatives were approved by the NEMA Board of Governors during its July meeting: Internet of Things, Smart Cities, Medical Imaging, and Workforce Development. Each of these broad categories has discrete underlying initiatives that are designed to support electrical and medical imaging manufacturers in the transition from an analog to a digital industry. Each of these is described in more detail on page 8.

There will be winners and losers in the transition to a digital, connected future. Manufacturers that do not adapt to the new technologies risk falling behind, while startups and innovative incumbents seize the future. The NEMA Strategic Initiatives program is designed to help provide NEMA Members with the tools and information they need to ensure future success.

I encourage you to visit www.nema.org/si to find out more about the program and to get involved. ⊕

Export Webinars Open to NEMA BIC Members

The NEMA Business Innovation Council (BIC) will host two webinars in September to help Members take advantage of export finance programs at the U.S. Small Business Administration (SBA) and U.S. Export-Import Bank (ExIm).

Both organizations offer several programs to meet financial needs of U.S. exporters such as working capital and loan underwriting, with competitive terms that often beat market rates from traditional lenders. SBA also offers a grants program in conjunction with state export centers in almost every state to help small businesses with foreign market penetration activities.

These programs often are underutilized by small businesses because of lack of awareness or understanding. BIC Members will have an opportunity to learn more in the following two webinars:

- Bill Houck, Regional Manager, Office of International Trade, SBA
  Thursday, September 14, 3 p.m. (EDT)

- Elizabeth Thomas, Business Development Specialist, ExIm
  Tuesday, September 26, 2 p.m. (EDT)

To register, or for more information, contact Jonathan Stewart (jonathan.stewart@nema.org). ⊕

Tax Reform: Unleash Innovation and Economic Growth

As chairman of the House Ways and Means Committee, the chief tax-writing committee in Congress, I'm focused on working with my colleagues in Congress and President Trump to deliver comprehensive tax reform this year. We know that American families, workers, and job creators are eager for a simpler, fairer tax code that is built for innovation and economic growth.

I recently joined with other leaders from the House, Senate, and Trump Administration to release a statement defining our shared principles. It states, in part, "We are all united in the belief that the single most important action we can take to grow our economy and help the middle class get ahead is to fix our broken tax code for families, small business, and American job creators competing at home and around the globe."

Throughout the last month—and the Ways and Means Committee's work on tax reform over the past several years—we heard from many Americans that successful tax reform must contain several key elements.

First, it must be bold. If we want to re-establish America as a global magnet for research and development, job creation, investment, and innovation, we cannot settle for temporary cuts or timid solutions. Loopholes must be closed for special interests, and tax rates must be lowered for American job creators of all sizes—corporations as well as pass-through businesses. No longer can we allow our companies to bear the burden of the modern world's highest corporate tax rate. At the same time, Main Street small businesses should not be forced to accept an unfair system where their business income is taxed at individual rates as high as 44.6 percent.

We're dedicated to bringing rates down as low as possible for all American businesses. But lower rates alone will not unshackle the growth of jobs, paychecks, and the economy. We must move the United States to a modern, "territorial" international tax system that does not discourage multinational businesses from bringing home foreign profits to invest in communities here. We should also provide American innovators with unprecedented capital expensing, offering larger write-offs for businesses when they purchase the equipment, machinery, software, or buildings needed to produce and compete at a higher level.

Congressman Kevin Brady represents the Eighth District of Texas and chairs the House Ways and Means Committee.

For tax reform to have a lasting positive impact, businesses and families need certainty to plan and invest for the long term. That's why tax reform must be permanent. It is essential that our bold solutions do not expire five or 10 years down the road.

Finally, it is critical that tax reform happen now—in 2017—when we have this rare opportunity. Families and businesses are eager for a fairer, simpler tax code that rewards hard work and encourages economic growth. Delays will only induce greater uncertainty, and only prolong the harmful impacts of today's broken system.

In June, the Ways and Means Committee welcomed David Farr, CEO of NEMA Member company Emerson Electric, to testify on tax reform. Mr. Farr made clear the real costs of inaction. "The cost of delay means a lack of innovation, less new products, and less jobs," he said. "It is that simple."

For the first time in 31 years, we have a President, a House, and a Senate who are dedicated to making pro-growth tax reform a reality. But we cannot do this alone. We need active participation from the nation's manufacturing companies and workers. Your feedback and support is essential to helping us go bold and get the details right.

This is our opportunity to deliver a 21st-century tax system that unleashes American innovation and economic growth. Working together, I am confident we can get it done. ⊕

We Are NEMA

Luiza Kowalczyk and Walter Zoller Named IEC Young Professionals

Luiza Kowalczyk, senior manager at the Medical Imaging and Technology Alliance (MITA), a division of NEMA, has been selected as a 2017 International Electrotechnical Commission (IEC) Young Professional. She will attend the 81st IEC General Meeting in Vladivostok, Russia, in October.

Ms. Kowalczyk is one of three winners selected to represent the United States. The competition was held by the U.S. National Committee of the IEC, which received a record number of submissions this year.

According to MITA Executive Director Patrick Hope, Ms. Kowalczyk is a contributor, leader, and problem solver.

"This award appropriately recognizes Luiza for her hard work, dedication, and commitment to standards development," he said. "I look forward to continuing to watch her grow in her career and am confident that she will be a leader in shaping standardization and conformance in the future."

Ms. Kowalczyk joined MITA in 2014 and quickly gained significant operational experience by serving as the secretary for multiple working groups and standards committees within the Digital Imaging and Communications in Medicine (DICOM), the international, multi-stakeholder organization for the standardization of the handling, storing,

printing, and transmitting of information in medical imaging. NEMA/MITA serves as the secretariat for DICOM.

In addition to overseeing day-to-day operations of DICOM committees, Ms. Kowalczyk organized two educational conferences promoting DICOM and the standard in China and Korea. As a result, Korean PACS Standards Committee and Chinese Center for Medical Device Standardization Administration joined as members of the DICOM Standards Committee.

Walter Zoller, Global Product Standards and Regulation, Rockwell Automation, a NEMA Member company, was also named as a Young Professional, as was Eric Franta, who works at the FDA Center for Devices and Radiological Health.

The IEC Young Professionals Program was developed as a way for the IEC and its national committees to identify the younger generation of experts, managers, and leaders and encourage their long-term participation in standardization and conformity assessment activities. This enables the commission to maintain its focus on responding to market needs on a long-term basis. Participants are generally engineers or managers in their 20s to mid-30s, working in an industry or business relevant to the IEC, and with experience in standards development or conformity assessment. ⊕

NEMA Among ANSI and IEC Award Winners

The American National Standards Institute (ANSI) announced the recipients of its 2017 Leadership and Service Awards.

Andrew Northup, director, global affairs, MITA, will receive a Next Generation Award, which honors "those who have been engaged in standardization or conformity assessment activities for less than eight years and who have, during this time, demonstrated vision, leadership, dedication, and significant contributions."
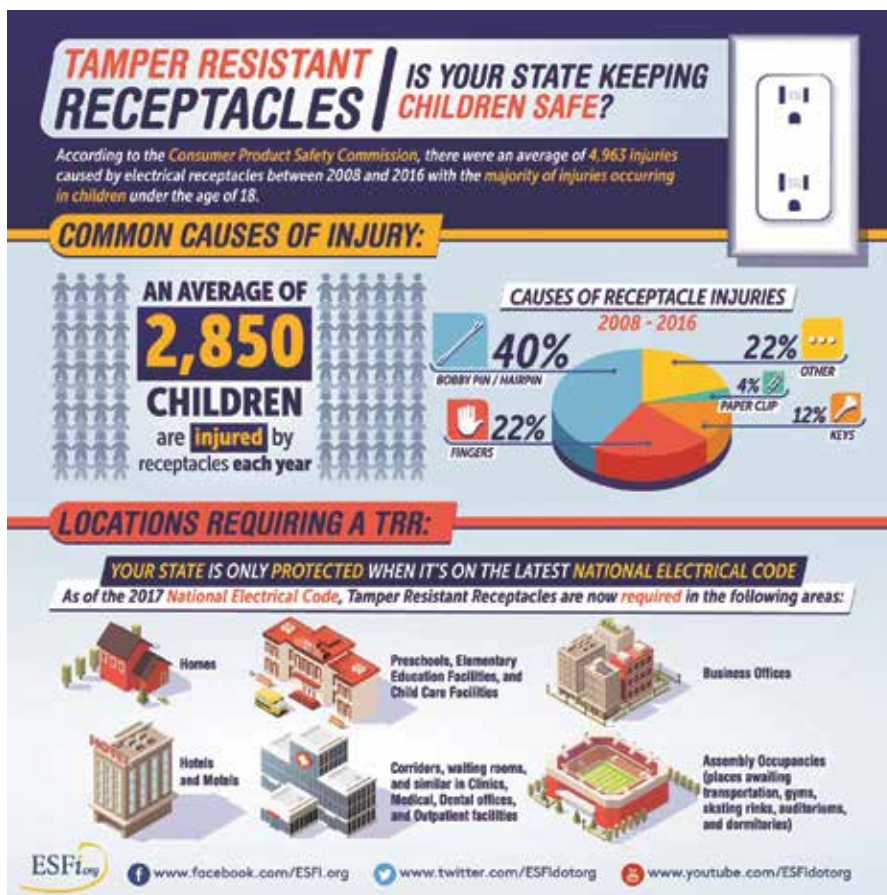
Kevin Lippert, manager of codes and standards at Eaton Corporation, and Clark Silcox, NEMA general counsel, will receive Meritorious Service Awards in recognition of "outstanding contributions to the U.S. voluntary standardization system."

The International Electrotechnical Commission (IEC) announced the recipients of this year's 1906 Award, which commemorates the IEC's year of foundation and recognizes technical experts whose exceptional involvement in IEC activities has brought about significant advancements in standardization.

Among the U.S. National Committee members who will receive the prestigious award are representatives of NEMA Member companies: Jason MacDowell, GE Energy Management; Marcio Magalhães de Oliveira, ABB; Gerard Conway, GE Energy Power Conversion UK Ltd; Tim Schumann, SEW-Eurodrive; Christopher Johnson, Siemens Industry Inc.; Alan Prest, Philips Lighting; Paolo Cardano, GE Grid Solutions; Keith Herrington, ABB; Laurent Guise, Schneider Electric; Raoul Bastiaens, Philips Healthcare; Claus-Peter Hoeppner, Siemens Healthineers; Herbert Barthel, Siemens; Dieter Werner Röder, Siemens; Per Eriksson, Schneider Electric; Phil Beauchamp, General Electric; Iain Lindsay, Rockwell Automation; Alberto Siani, Schneider Electric; and Antonio Fidigatti, ABB SACE. ⊕

ESFI President Brett Brenner accepted a generous donation of $12,000 from NEMA Chairman Michael Pessina on behalf of the Electrical Manufacturers Club at the Board of Governors' July meeting. Photo by Tracy Cullen

TAMPER RESISTANT RECEPTACLES | IS YOUR STATE KEEPING CHILDREN SAFE?

According to the Consumer Product Safety Commission, there were an average of 4,963 injuries caused by electrical receptacles between 2008 and 2016 with the majority of injuries occurring in children under the age of 18.

COMMON CAUSES OF INJURY:

AN AVERAGE OF 2,850 CHILDREN are injured by receptacles each year

CAUSES OF RECEPTACLE INJURIES 2008 - 2016

40% BOBBY PIN / HAIRPIN
22% FINGERS
22% OTHER
4% PAPER CLIP
12% KEYS

LOCATIONS REQUIRING A TRR:

YOUR STATE IS ONLY PROTECTED WHEN IT'S ON THE LATEST NATIONAL ELECTRICAL CODE

As of the 2017 National Electrical Code, Tamper Resistant Receptacles are now required in the following areas:

Homes
Preschools, Elementary Education Facilities, and Child Care Facilities
Business Offices
Hotels and Motels
Corridors, waiting rooms, and similar in Clinics, Medical, Dental offices, and Outpatient facilities
Assembly Occupancies (places awaiting transportation, gyms, skating rinks, auditoriums, and dormitories)

ESFI.org
www.facebook.com/ESFI.org
www.twitter.com/ESFIdotorg
www.youtube.com/ESFIdotorg

The Next Big Idea:

NEMA Announces 2018 Strategic Initiatives

Patrick Hughes, Senior Director, Government Relations and Strategic Initiatives, NEMA

Before joining NEMA, Patrick advocated for energy efficiency and high-voltage transmission policies at the United Nations Foundation and received a master's degree in energy policy and climate science from Johns Hopkins University.

Keeping up with our rapidly changing industry requires a nimble approach. Each year, NEMA asks its Members to let us know what emerging opportunities and impending challenges they are facing, and the Board of Governors approves a suite of short-term Strategic Initiatives to explore these big ideas.

The recent trend toward increased connectivity is echoed throughout the 2018 Strategic Initiatives. From developing the workforce of the future to promoting cybersecurity, 2018 will be about harnessing the value and mitigating the risks of connected devices and systems.

The following list of initiatives is a summary. To learn more, visit www.nema.org/si or contact Patrick Hughes at patrick.hughes@nema.org.

Internet of Things (IoT)

$123 billion

What the global industrial Internet of Things market is expected to exceed by 2021.
—IndustryARC, 2016[1]

CYBERSECURITY

This initiative will help prepare NEMA Members and their customers to withstand increasingly numerous and sophisticated cyberattacks by developing cybersecurity best practices and standards and will involve advocating for reasonable and flexible government policies and regulations.

$6 trillion

The annual cost of global cybercrime damage by 2021.
—Cybersecurity Ventures[2]

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1 industryarc.com/Report/7385/industrialinternet-of-things-(IIoT)-market-report.html
2 cybersecurityventures.com/hackerpocalypsecybercrime-report-2016

DATA PRIVACY AND OWNERSHIP

As manufacturers grapple with how to put to use the troves of data generated or collected by electrical and medical imaging technologies, this initiative will help NEMA Members better understand the legal requirements for accessing and utilizing data.

SMART MANUFACTURING / INDUSTRIAL IoT

With the IoT extending into manufacturing and other industrial processes, this initiative will promote smart manufacturing and industrial IoT by advocating for NEMA-supported standards and government policies.

WEBINAR SERIES ON IoT TRENDS

With so many IoT buzzwords out there, this initiative will cut through the hype to provide NEMA Members with the information they need to incorporate artificial intelligence, machine learning, data analytics, augmented reality, blockchain, and other IoT elements into their operations, products, and service offerings.

Smart Cities

GRID MODERNIZATION ANALYSIS

Innovative grid technologies have the potential to improve grid reliability and flexibility, but only if they are adopted by utilities and approved by regulators. This initiative will quantify the costs and benefits of modern grid technologies, and the results will be published to justify grid upgrades to utilities and their regulators.

3 https://staysafeonline.org/about-us/news/nationalcyber-security-alliance-encourages-digital-citizens-tobetter-understand-how-to-manage-their-privacy

77%

Americans who feel it is "extremely" or "very important" that companies have easy-to-understand information about what data is collected about them, how it is used, and with whom it is shared.

—National Cyber Security Alliance[3]

"Grid modernization is an essential tool for utilities to achieve the decarbonization goals that policymakers are setting out for them related to distributed energy resources, and taking full advantage of renewable generation."

—Chris King, Chief Policy Officer, Digital Grid, Siemens

Protecting Data: Policy and Practice

As the electric grid gets smarter, more and more devices are deployed that collect, use, and store data. Device data is often shared with S&C by its customers in our day-to-day support of our products. This data is not only critical to help our customers apply our products but also necessary to improve our products in the future.

We take the handling of this customer data very seriously. We owe it to our customers to treat that data as confidential, store it securely in the United States, and limit access to the data to select S&C team members who support the customer and improve the product.

Documenting, training, and auditing help ensure S&C is protecting our customers' data.

—Mike Kilpatrick, Vice President, U.S. Power Systems Solutions, S&C Electric Company

ENERGY-EFFICIENCY MODELING OF INDUSTRIAL AND BUILDING SYSTEMS

While NEMA and its Members understand that you can save more energy by focusing on the whole system, rather than just the individual components, computer models do not accurately account for these system benefits. To make customers and regulators more comfortable with the idea of a system-based approach to energy conservation, this initiative will focus on improving and testing energy models for specific applications.

In 1994, just 11.9% of the U.S. workforce was on the verge of retirement (age 55 or older); in 2024, that number is projected to reach 24.8%.

—U.S. Bureau of Labor Statistics[5]

Cancer Screening

The Centers for Disease Control and Prevention (CDC) report that many adults in the United States are not getting the recommended screening tests for cervical, breast, and colorectal cancers. According to a report published in CDC's Morbidity and Mortality Weekly Report, screening use overall did not reach the 2013 targets established as part of the Healthy People 2020 initiative.[4]

Medical Imaging

LUNG, BREAST, AND COLORECTAL CANCER SCREENING

Catching cancer early can reduce the need for costly and invasive treatment later on. This initiative will seek to prove that screening for lung, breast, and colorectal cancer can achieve early detection and reduce mortality.

Workforce Development

EDUCATING THE ELECTRICAL WORKFORCE

To promote the electroindustry as a dynamic, high-skill, high-tech sector with many available career options, and to ensure that students have access to the appropriate curricula and training opportunities, NEMA is continuing and expanding its workforce development initiative. ⓔⓘ

4   https://www.hayesinc.com/hayes/resource-center/news-service/HNS-20150412-43
5   https://blog.dol.gov/2016/11/18/why-more-people-ages-55-areworking

Solar Decathlon Demonstrates Innovation

Photo courtesy of the U.S. Department of Energy Solar Decathlon

The U.S. Department of Energy Solar Decathlon, a public–private partnership, is a collegiate competition that challenges student teams to design and build full-size, solar-powered houses. This international competition has been a driving force in raising awareness about clean energy since 2002. Technologies and solutions used in solar decathlon homes have advanced the residential building industry in the United States and abroad.

The event challenges and inspires students to become the next green energy industry leaders, helping them gain invaluable hands-on experience with appealing designs, sustainable materials, and cutting-edge technologies. The 12 collegiate teams competing in 2017 will focus on innovation; water use and reuse strategies; smart energy use; market potential; cost-effective architectural and engineering design; energy-efficient heating and cooling systems, appliances, and electronics; occupant health and comfort; and communications.

The 2017 event in Denver, Colorado, will be open to the public October 5 through October 15. For more information, visit www.solardecathlon.gov.

Brian Marchionini, PMP, Senior Program Manager, NEMA

Simple and scalable
lighting control

vive

Wireless sensors

Clear Connect Wireless

Vive wireless hub

Load controllers
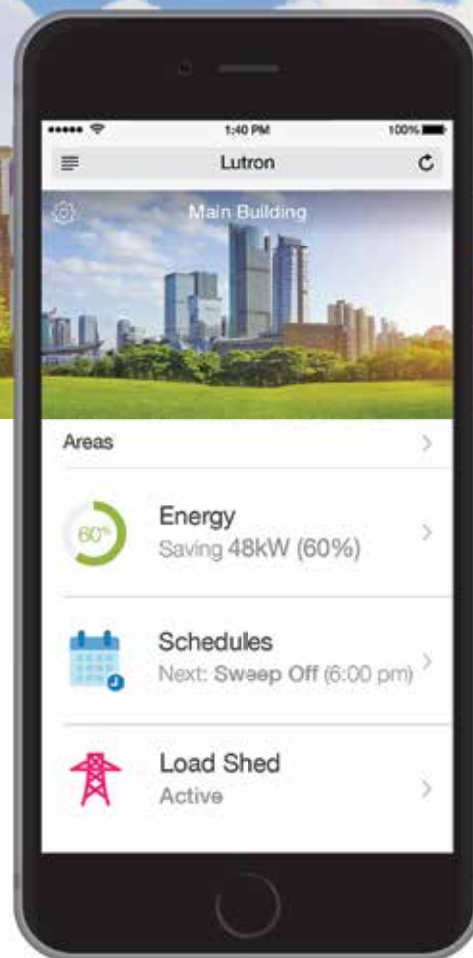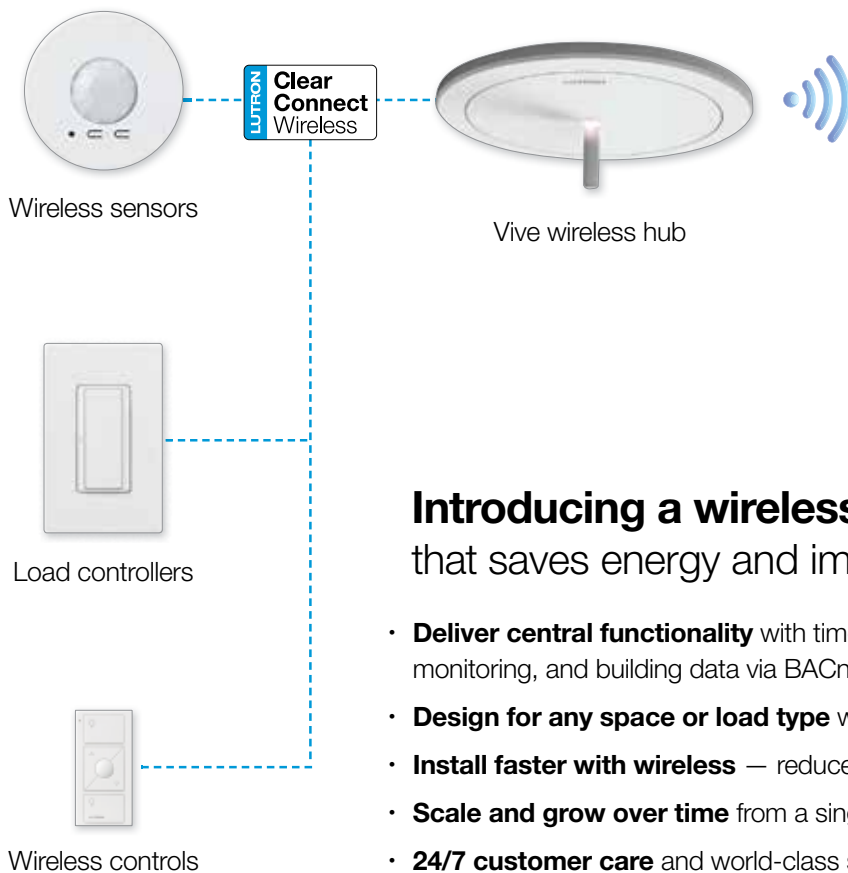
Wireless controls

Introducing a wireless lighting control system
that saves energy and improves occupant comfort

- **Deliver central functionality** with time clock, demand response, energy monitoring, and building data via BACnet
- **Design for any space or load type** with a full suite of wireless controls
- **Install faster with wireless** — reduce labor time by up to 70%
- **Scale and grow over time** from a single room to a whole building
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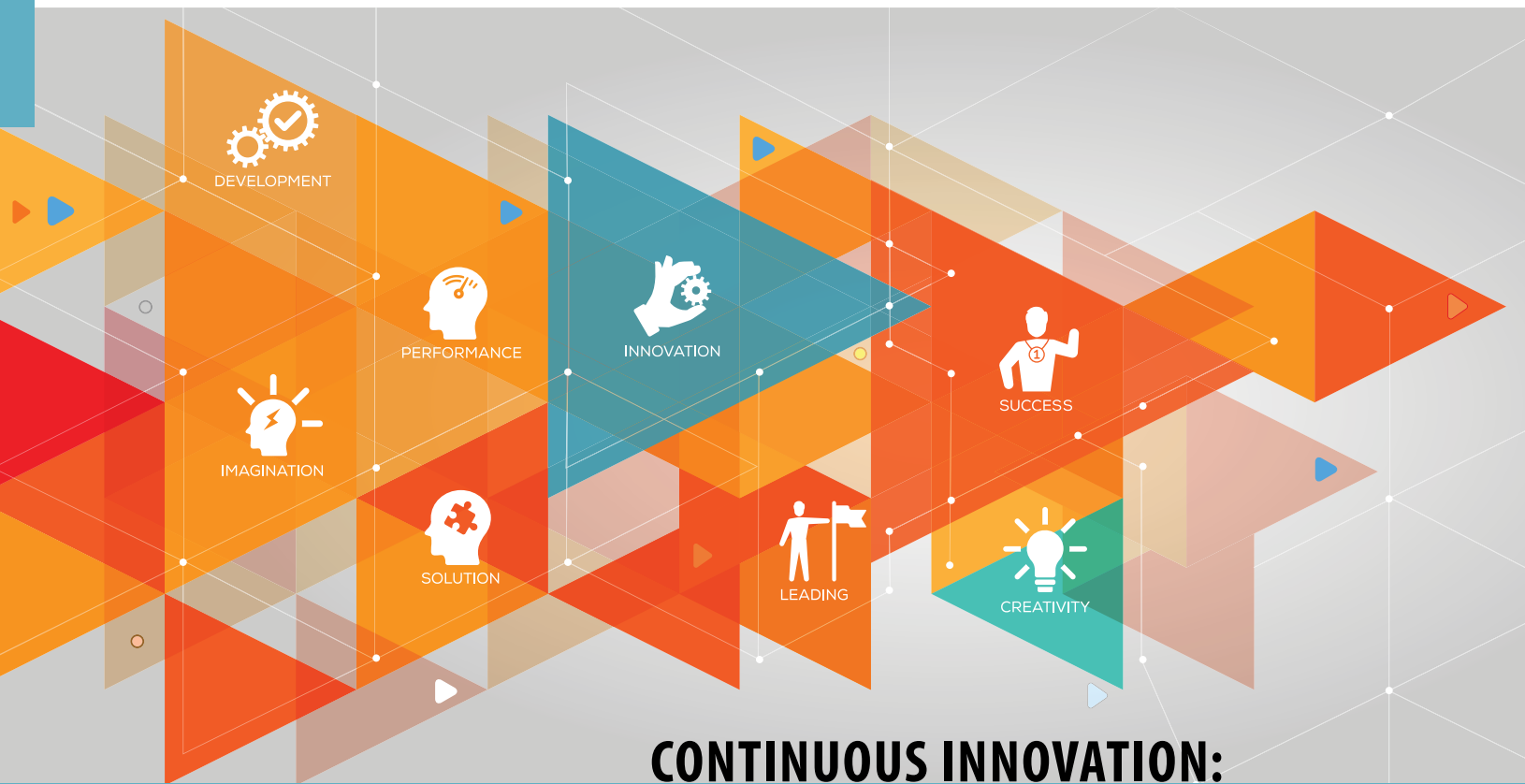
CONTINUOUS INNOVATION:

Disrupt or Be Disrupted

Mike Grandinetti, Global Professor of Innovation, Entrepreneurship, and Digital Marketing, Hult International Business School

Mr. Grandinetti is the chief marketing and corporate strategy officer at Reduxio.

Business disruption is not new. With the introduction of electricity in the 1880s, society moved from steam and mechanically powered systems to electrical power. Manufacturers were forced to face an industrial revolution. Despite clearly superior benefits, including 20 to 60 percent savings on coal, debate still raged among experts until the end of the 1920s as to whether it was prudent to convert.

Human nature resists change, and the leaders of the foremost industrial trusts were fully human. Key reasons for their resistance included complacency, the costs involved, and the lack of specialized knowledge.

Those who delayed or resisted the adoption of superior new technologies were disrupted. In fact, of the thousands of industrial trusts that were formed between 1888 and 1901, more than 40 percent failed outright, and another 10 percent were badly wounded, effectively wiping out half of the industry. The 40 most dominant businesses of that era saw market share declines on the average of 33 percent.

With the introduction of the personal computer and the client server era pioneered by Steve Jobs and Bill Gates and the rapid global adoption of mobile phones and the interactive digital and social web, the current digitally based industrial revolution has been even more disruptive than that of the shift from mechanical to electrical power.

"Economic progress, in a capitalist society, means turmoil."—Joseph Schumpeter, economist who coined the term Creative Destruction.

Digital technologies have removed countless inconveniences in our daily lives, such as memorizing phone numbers, getting lost, going to the supermarket for groceries, and waiting forever in the rain for a taxi. As consumers, we have the benefit of far more satisfying and pleasant experiences in our lives as a result of the ubiquitous use of well-designed technology-based solutions.

Accelerated Disruption

The Era of Accelerated Disruption, beginning in 2005, represents a major economic inflection point. The introduction of the iPhone—the most successful product in history, with 1.3 billion sold globally in 10 years—along with its high-definition camera and video capabilities ushered in planet-scale platforms such as Facebook, Twitter, and Instagram. The same period also saw highly destructive platforms such as the short-lived but brutally disruptive Napster, the ugly but equally effective Craigslist, and Netflix, Amazon, and others. As a result, we have witnessed the decimation of the newspaper, magazine, brick and mortar retail, music, video rental, and film industries, as their revenues declined 50 to 80 percent or more in a very compressed time span.

> "Companies rarely die from moving too fast, and they frequently die from moving too slowly."—Netflix Co-Founder & CEO Reed Hastings

Similar to the transition to electrical power in the 19th century, we have seen more than 50 percent of the Fortune 500 and Global 1000 decline or simply disappear between 2000 and 2015. One major difference is that each successive era is compressed. For example, the glory days of the manufacturing era, driven by electrical power, lasted for more than 60 years, while the glory days of the PC lasted for roughly 20 years.

Since we entered the Era of Accelerated Disruption, executives understand just how powerful and relentless this trend has become. With the introduction of social coding platform GitHub and big data platforms Palantir and Hadoop, we reached an inflection point within a two-year period, driving an accelerated rate of change. Each of these technologies has had massive disruptive power. As a result, countless B2B companies will appear in the financial obituaries. It's the issue that keeps executives awake at night.

Today, we stand at the precipice of the next major industrial revolution, Industry 4.0, an even more significant inflection point. Additive manufacturing, robotics, virtual and augmented reality, drones, and driverless vehicles capture the public imagination, but their disruptive power is poorly understood. As the fourth industrial revolution spreads globally, we'll see business disruption accelerate faster than can be imagined. Reliant on cloud computing, it is certain to be the most disruptive period in the history of business.

Spectrum and the IoT

With millions of connected devices and high-bandwidth wireless data traffic, some are wondering if there will be sufficient spectrum—that is, the frequencies used for wireless communication spanning from 3 kHz (long distance, low bandwidth) to 300 GHz (short distance, high bandwidth)—to facilitate the unimpeded use of these new devices. Creative solutions are emerging that will help ameliorate this problem.

The United States began regulating spectrum 90 years ago with the Radio Act of 1927 because AM radio broadcasters were overcrowding frequencies and causing interference. Through government regulation, spectrum interference is limited and usable spectrum is maximized.

In the U.S., the Federal Communications Commission is responsible for allocating spectrum for nongovernmental uses, while the National Telecommunications and Information Administration is responsible for government use of spectrum. The International Telecommunication Union (part of the United Nations) manages use of spectrum between countries.

Many Internet of Things (IoT) devices use short-range, unlicensed spectrum (e.g., Wi-Fi, Zigbee, Bluetooth), but some electrical products use longer-range, licensed spectrum (e.g., smart meters use 3G mobile spectrum). Proponents of licensed spectrum over unlicensed spectrum tout reduced interference over wide areas and claim that unlicensed spectrum is best suited for short-distance applications.

Some licensed spectrum bands are unused or underutilized. This presents an opportunity to alleviate some of the spectrum limitation concerns raised by the proliferation of IoT devices. Regulators can allow limited access to these spectrum bands if safeguards against interference are put in place. This concept is gaining traction in the U.S. thanks to a 2012 report by the President's Council of Advisors on Science and Technology and a corresponding presidential memorandum issued on June 14, 2013. Freeing up unused spectrum (white space) and underused spectrum (gray space) is an efficient way to meet growing needs.

The emergence of shared spectrum seems to have at least partially eased constraints on spectrum access for IoT devices. However, since there is a finite amount of spectrum available, licensed spectrum is going to become increasingly expensive as demand grows. Connected products—including many electrical products—will need to become more spectrum efficient. For products operating in unlicensed bands, more crowded frequencies will necessitate the development of products that can clearly send and receive wireless signals in a noisy environment.

While spectrum allocation and the efficient use of finite frequencies merit monitoring, creative sharing, spectrum-use regulations, and technological innovations are taking some of the pressure off what would otherwise be a major barrier to the widespread deployment of connected technologies. ◆

**Patrick Hughes, Senior Director,
Government Relations and Strategic Initiatives, NEMA**

Can Video Games Improve Code Enforcement?

At the video gaming world's premier show, E3 (Electronic Entertainment Expo), 50,000 industry insiders flocked to see and try the latest games, consoles, and mixed reality platforms. More than 125 vendors showcased mixed reality systems (i.e., virtual reality and augmented reality), double the number from 2016.

The rapid improvement of this new type of gaming hardware has implications for non-gaming applications, such as building code enforcement. Augmented reality (where virtual images are superimposed on the real world) and virtual reality (where a user is fully immersed in a digital world) will both play a role in training new employees, troubleshooting malfunctioning systems, providing users with vast databases of information at a moment's notice via a heads-up display, and much more.

For example, augmented reality technologies could be leveraged to enhance the productivity and performance of code officials who are sometimes required to enforce up to a dozen different building codes that are regularly updated. Giving code enforcers the latest information in a heads-up display would allow them to quickly reference specific elements of the latest codes to ensure a facility is in compliance.

Taking it one step further, certain technologies, such as the Structure Sensor / Occipital Bridge, can create a 3-D map of a room and the objects in it using an attachment for an iPhone. This technology could scan a room, identify the different elements, and flag potential code violations. For example, if the sensor detects an outlet near a sink, it could let the code enforcer know that the outlet should be a ground-fault circuit interrupter.

Thanks to the video game industry, which created the initial demand for virtual and augmented reality hardware, we can now begin to use these technologies in our own industry for a variety of new and exciting purposes. ⊕

Patrick Hughes, Senior Director, Government Relations and Strategic Initiatives, NEMA

Disrupt or Be Disrupted

Business leaders must take a comprehensive, adaptive, and courageous approach in order to thrive in the Industry 4.0 era, especially when it comes to harnessing the pervasive presence and power of the cloud and the escalating challenges and threats around cybersecurity. They must realize that:

- The cloud connects everything, from traditional devices such as phones, tablets, and servers to sensors, robots, and smart cars.
- The intelligence of hyper-connected devices has driven a shift from programmable computers to cognitive, connected devices.
- The value of this hyper-connected cloud grows at a rate proportional to the square of the number of connected devices, dramatically amplifying the power of each connected device individually and the entire cloud collectively.
- Business models that leverage the flow of real-time intelligence through the cloud will dominate. Similar to the war on terror, the cyberwar to control the cloud will be ongoing. It's the cost of living in a hyper-connected, always-on world.

> According to Darwin's Origin of Species, it is not the most intellectual of the species that survives; it is not the strongest that survives; but the species that survives is the one that is able best to adapt and adjust to the changing environment in which it finds itself.—Leon C. Megginson, Professor of Management and Marketing, Louisiana State University

Industry 4.0 relies on machine learning and data mining. According to Amazon Founder and CEO Jeff Bezos, a great deal of machine learning is hidden from view. "Machine learning drives our algorithms for demand forecasting, product search ranking, product and deals recommendations, merchandising placements, fraud detection, translations, and much more," he said.

Disrupt or be disrupted. ⊕

IoT

Get IoT Guidance Online

As part of NEMA's Internet of Things (IoT) Strategic Initiative and under the guidance of the association's IoT Council, NEMA has released an IoT handbook (www.iothandbook.org). This tool was featured during a NEMA presentation at the annual conference of the National Fire Protection Association.

Steve Griffith, PMP, Industry Director, NEMA

The interactive website provides users with actionable information related to the use of specific IoT protocols, communication technologies, and standards within the vertical markets of industrial, commercial, and residential buildings as well as medical imaging. As more IoT devices enter the market, achieving a common understanding of applicable business cases through economic analysis and education becomes more necessary.

INDUSTRIAL

The industrial market vertical is categorized by discrete, continuous, and hybrid applications. Discrete applications are individual pieces that are often manufactured in machines that form, mold, or package raw materials into usable parts, including 3-D printing, injection molding, and bottling. Continuous applications convert raw materials into usable product in a continuous process, often through chemical transformations. Examples include cement kilning, chemical manufacturing, and iron making.

Batch processing is a good example of a hybrid process. In it, discrete amounts of materials are combined or mixed with a catalyst to generate a chemical reaction that results in a usable or sellable product. Hybrid applications are often combined with discrete applications to create products such as bottled or canned beverages, food products, pharmaceuticals, and similar packaged goods.

The industrial market is characterized by a wide range of communication protocols, many of which are standardized in IEC 61158 *Industrial communication networks—Fieldbus specifications* and IEC 61784 *Industrial communication networks—Profiles*. Significant protocols that are explained in the guide include CC-Link, ControlNet, EtherCAT, Modbus TCP/IP, and PROFINET.

COMMERCIAL AND INTELLIGENT BUILDINGS

The commercial and intelligent building systems market vertical includes office, retail, educational, healthcare, and hospitality ranging in size from small shops to high-rise towers. Services may include lighting; heating, ventilation, and air conditioning (HVAC); access control; security; video surveillance; fire alarm and sprinklers; elevator control; audio; and others.

The predominant communication technologies fall into three categories: wired, wireless, and optical. Relevant protocols include BACnet, digital addressable lighting interface (DALI), EnOcean, Bluetooth and BLE, and SNMP.

RESIDENTIAL

The residential market vertical spans multiple types of dwellings, categorized by varying footprints and ownership structures (single family, multifamily, detached, condominium, etc.). Although the level of IoT penetration and complexity varies by the type of dwelling, the application space targets the same goals: efficiency and convenience. IoT functionality is implemented by combinations of sensing, monitoring, automation (control), and notification.

Predominant communication technologies include personal, mesh, local, and wide area networks, such as Bluetooth, Zigbee, cellular (e.g., 3G, 4G, and 5G), and broadband. In the residential vertical there are also user interface/home automation systems that control IoT devices. There are several vendor-specific and proprietary stand-alone systems, but the major drivers are the integrated systems that manage multiple devices across protocols and systems.

IoT applications in the residential market include appliance controls; entertainment; HVAC and environmental monitoring and conditioning; lighting controls; power delivery, including automotive charging, smart meters, and submeters; and security and access controls.

FEEDBACK

Input and feedback are welcome as we refine the handbook's content. For more information about the website or NEMA's IoT Strategic Initiative, contact Steve Griffith at steve.griffith@nema.org.

Eric Lind
Vice President of Global Specifications, Lutron Electronics Company, Inc.

Getting Smart with Lighting Retrofits

Lighting retrofits have long been associated with code compliance and energy-saving initiatives, but increasingly, smart technologies and wireless lighting control solutions add even greater value by creating more comfortable, productive work environments that take care of a company's greatest asset—its people.

Installing advanced control strategies that take advantage of the ever-expanding Internet of Things (IoT) also makes it easier to maintain and support these benefits over the life of the space.

The American Society of Interior Designers headquarters office incorporates the most innovative health and wellness design features and has sustainability as a central philosophy. Photo courtesy of Lutron

SOFTWARE SIMPLIFIES MANAGEMENT

Building systems have had powerful software capabilities for some time now, and digital lighting control solutions ensure that systems can effectively participate in the IoT to improve building operation and maintenance. Intuitive new apps and graphical user interfaces can turn your smart device into a potent resource to help unlock the system's full potential, whether the project is retrofit or new construction.

Automated control systems can seamlessly integrate and manage lighting and shade control in response to predefined building settings, scenes, timeclocks, or user-defined events. Data collected from smart lighting systems can help a facility's team understand so much more about how buildings are used, what spaces are occupied, and when and where a building is using most of its electricity. System settings can be quickly and easily adjusted to optimize building performance and improve building value.

With the right control system, building managers can be connected to the entire system from anywhere, improving building efficiency and responsiveness to occupant concerns and requests. Digital control can enhance comfort, sustainability, and energy savings and can often help achieve requirements for certifications such as Leadership in Energy and Environmental Design (LEED) and the WELL Building Standard™.

BENEFITS FOR EXISTING BUILDINGS

Especially in retrofits, wireless control systems offer significant advantages, including faster installation compared with wired systems, reduced materials cost, and access to data anywhere, at any time—even pre-installation.

New lighting control systems often include occupancy and daylight sensors that automatically adjust electric light in response to daylight. Wireless protocols make it easier to adjust placement and setup of these controls. The importance of this kind of flexibility is often overlooked. Once installed, sensor performance can be affected by bookshelves, shades, partitions, and other variables once the building is fully occupied.

Wireless controls allow sensor installation without rewiring, tearing out walls, or further disrupting the workspace. Another benefit of wireless sensors and controls is their ability to be utilized before system installation to help accurately map how the space is used and even predict the lighting control system's energy performance. The data gained can be used to inform system design, and the right strategies can be effectively specified and installed throughout the project.

SMART SOLUTIONS, BETTER BUILDINGS

Smart lighting control technologies increase system efficiencies and optimize performance without sacrificing personal well-being or productivity. That's positive news for the people who work in these spaces and excellent news for a sustainable future. ⊕

Mike Stone

West Coast Field Representative, NEMA

NEC Adoption Delayed in New Mexico

Activity continues on the West Coast regarding adoption of the *National Electrical Code®* (NEC) and the International Codes (I-Codes), which include building, fire, residential, and energy codes.

Adoption of the 2017 NEC in New Mexico has been delayed. It was scheduled for a final public hearing in June and would have become effective several months after that, but the public hearing was canceled at the request of homebuilders. As a result of legislation that became effective July 1, the New Mexico legislature has the authority to review all code adoptions before they become effective. This gives homebuilder organizations a venue through which they can delay or even prevent code adoption. This is a disturbing trend that has happened in other states. The NEMA Task Force on State Code Adoptions is active at regulatory and legislative levels to keep the timely adoption of codes on track.

Idaho and Washington adopted the 2017 NEC, effective in both states on July 1. Idaho also adopted the 2015 I-Codes for building, fire,

and residential with the same effective date. In Washington, the 2015 I-Codes have been effective since July 1, 2016.

Oregon completed its review and adoption of the 2017 NEC and the 2015 International Residential Code. Both become effective October 1.

Discussions are underway in Montana and Southern Nevada to move forward with 2017 NEC and 2015 I-Code adoptions.

In California, the 2014 NEC and the 2015 I-Codes became effective on January 1. The next editions of the codes are not scheduled to be effective until January 1, 2020. Because of the need for safety codes and standards governing the installation of energy storage systems, California is adopting the 2017 NEC Article 706 for Energy Storage Systems during its intervening code cycle. Article 706 will become effective statewide on July 1, 2018. ◐
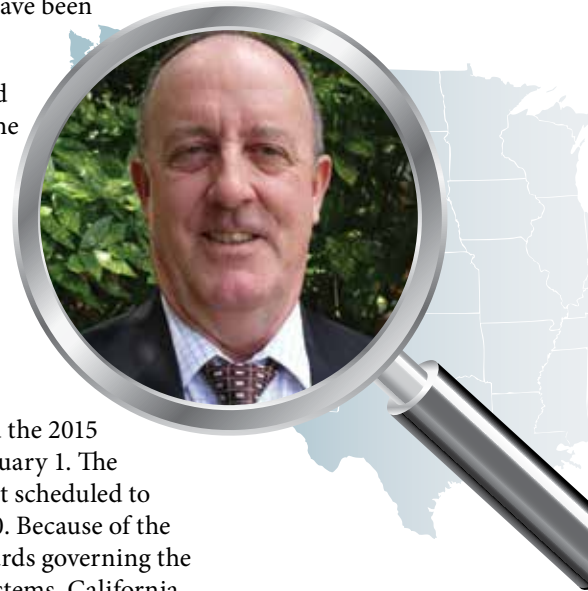
Ann Brandstadter

Manager, Standards Publications and Marketing, NEMA

Connector Standard Meets Utility Requirements

ANSI C119.1-2016 *American National Standard for Electric Connectors—Sealed Insulated Underground Connector Systems Rated 600 Volts* covers sealed insulated underground connector systems rated at 600 volts for utility applications and establishes electrical, mechanical, and sealing requirements for these systems.

"This edition of C119.1 has the common tests of the C119 family removed and replaced by a reference to ANSI C119.0-2015," said Michael Dyer, executive engineer, Salt River Project, and chair of the Sealed Insulated Underground Connector Systems Subcommittee.

In September only, receive a 25 percent discount on **ANSI C119.1-2016**. It can be purchased for $87 in hard copy or as an electronic download on the NEMA website. The regular price is $116.

OTHER RECENTLY PUBLISHED STANDARDS

- **ANSI C78.377-2017** *American National Standard for Electric Lamps—Specifications for the Chromaticity of Solid-State Lighting Products* can be purchased for $102 in hard copy or as an electronic download on the NEMA website.

- **NEMA AB 4-2017** *Guidelines for Inspection and Preventive Maintenance of Molded Case Circuit Breakers Used in Commercial and Industrial Applications* is available for $103 in hard copy and as an electronic download at no cost on the NEMA website.

- **NEMA MS 8-2016** *Characterization of the Specific Absorption Rate (SAR) for Magnetic Resonance Imaging Systems* is available in hard copy for $87 and as an electronic download at no cost on the NEMA website. ◐

Patrick Hughes

Senior Director, Government Relations and Strategic Initiatives, NEMA

Expo Encourages Lawmakers to Modernize the Grid

▲ Hosting the first Grid Innovation Expo on Capitol Hill in conjunction with the U.S. House Grid Innovation Caucus, were EEI President Tom Kuhn, Rep. Bob Latta, GridWise Alliance CEO Steve Hauser, and NEMA President and CEO Kevin Cosgriff. Photos by Pat Walsh

▲ Congressman McNerney (right) discussed solar technology with Mike Connolly and Betty Watson of Tesla.

▲ Siemens Industry partnered with Rappahannock Electric Cooperative to increase grid reliability. At the Siemens booth were NEMA President & CEO Kevin Cosgriff, Jason Satterwhite of Rappahannock Electric Cooperative, Farel Becker of Siemens, Congressman Paul Tonko (D-NY), and Samuel Wilson of Rappahannock Electric Cooperative.

The Edison Electric Institute (EEI), GridWise Alliance, and NEMA hosted the first Grid Innovation Expo on Capitol Hill on July 25 in conjunction with the U.S. House Grid Innovation Caucus, co-chaired by Rep. Bob Latta (R-OH) and Rep. Jerry McNerney (D-CA).

"As our nation's energy infrastructure continues to age, it's imperative that we commit to a serious discussion about how to improve grid resiliency and stability and bring our system into the 21st century," said Congressman McNerney during his remarks.

Congressman Latta agreed. "We want a future where energy is delivered in a more reliable, efficient, and secure way to households and businesses across the country. In order to make this a reality, it's critical that we embrace cutting-edge technology," he said.

According to NEMA President and CEO Kevin Cosgriff, recent advancements by electrical manufacturers have the potential to significantly improve the efficiency, reliability, and security of electricity delivery.

"Policymakers and grid regulators should embrace these modern grid technologies to upgrade and better protect our critical infrastructure," he said.

In his remarks, GridWise Alliance CEO Steve Hauser praised the modernization technologies that "save money for businesses and consumers by reducing or avoiding power outages, empower consumers to better manage their electricity usage, and ensure the reliable and secure integration of resources, such as storage, microgrids, and electric vehicles."

"The electric power industry is leading a profound transformation, and electric companies' continued focus on innovation is essential to developing smarter energy infrastructure that benefits our customers," said EEI President Tom Kuhn.

Companies at the expo showcased energy storage, distributed energy management, advanced metering, and storm hardening. Exhibitors included ABB, American Electric Power, CenterPoint Energy, Florida Power & Light Company, G&W Electric Company, General Electric, Innovari, Itron, Pacific Gas and Electric Company, Rappahannock Electric Cooperative, S&C Electric Company, Siemens, Southern California Edison, Tesla, Vermont Electric Power Company, Xcel Energy, and others. ⊕

▲ Kate Cummings of G&W and NEMA Vice President of Government Relations Kyle Pitsor posed at the G&W exhibit.

▶ Tom Martin of PG&E (center) explained distributed automation to Tony Markel, who works in the office of Senator Cory Gardner (R-CO), and others. Photo by Patrick Hughes

▲ Gary Wetzel of S&C Electric Company (left), Brian Marchionini of NEMA, and William Monzon of Florida Power & Light discussed building a stronger and smarter electric grid.

▲ NEMA Senior Director of Government Relations and Strategic Initiatives Patrick Hughes (left) met with Timothy Raines of CenterPoint Energy, Dan Pfeiffer of Itron, Annelise Rickert of the U.S. House of Representatives Energy and Commerce Committee, and Asaf Nagler of ABB.

NAFTA Talks Begin in Washington

Craig Updyke
Director, Trade and Commercial Affairs, NEMA

Negotiations to modernize the North American Free Trade Agreement (NAFTA) among Canada, Mexico, and the United States launched in Washington, D.C., on August 16 with NEMA as one of the U.S. government's cleared advisers.

In an opening statement, U.S. Trade Representative Robert Lighthizer indicated his priorities for NAFTA modernization: more restrictive rules of origin; equal access and reciprocity in government procurement; new safeguards for labor rights; and provisions against currency manipulation and "market-distorting practices of other countries, including third-party dumping and state-owned enterprises."

According to a joint statement issued when talks concluded on August 20, more than two dozen topics were discussed over the five days.

"While a great deal of effort and negotiation will be required in the coming months, Canada, Mexico and the United States are committed to an accelerated and comprehensive negotiation process that will upgrade our agreement and establish 21st-century standards to the benefit of our citizens," the statement read in part.

The three governments agreed to a speedy pace for the talks. In the near term, negotiators will reconvene in Mexico September 1–5 and in Canada later this month.

While there is no formal deadline for completing the negotiations, Mexico has voiced strong interest in concluding the talks before its presidential election campaign begins in 2018. The NAFTA negotiations with the two largest export markets for the U.S. electroindustry present a unique opportunity for NEMA Members who are engaged in or interested in trade with Canada and Mexico. For more information, contact Craig Updyke (craig.updyke@nema.org). ◉

Khaled Masri
Program Manager, NEMA

Harmonization Committee Seeks Participants for UPS Standards

The CANENA technical harmonization committee (THC) 22H seeks involvement by stakeholder groups that will be affected by new standards for uninterruptible power systems (UPS).

UL 1778 *Uninterruptible Power Systems* requires UPS to comply with CAN/CSA-C22.2 No. 60950-1/UL 60950-1, Second Edition, *Information Technology Equipment—Safety—Part 1: General Requirements*, as applicable for the country where the product will be used. The UL 1778 (fifth edition) UPS standard will be withdrawn in 2019 and replaced with UL/IEC 62368-1 *Audio/video, information and communication technology equipment—Part 1: Safety requirements*.

This change will create a void in the UPS industry since 62368-1 does not address UPS products. In response, NEMA's Power Electronics Section is developing new harmonized standards for UPS in North America. The proposed standards will be based on UL 62477-1 *Safety requirements for power electronic converter systems and equipment—Part 1: General* and UL 62040-1 *Uninterruptible power systems (UPS)—Part 1: Safety requirements*.

In May 2017, a THC was formed under CANENA to work on the proposed standards with national differences. The scope of the new harmonized 62477-1 standards will cover UPS equipment and inverters but will exclude power drive systems. UL has already published standards covering inverters and power conversion equipment.

Since IEC 62477-1 excludes drives, power conversion equipment not used for motor control should be added to the scope of its adoption, as this type of equipment is explicitly excluded from the scope of UL 61800-5-1. The new scope of harmonization and adoption of UL 62477-1 should be limited to the UL 1778 UPS standard and power conversion equipment not used for motor control.

Manufacturers of power converters, inverters, and power systems would likely be affected and should participate in the standards being developed by THC 22H. If you have any questions or would like to take part, contact Khaled Masri at 703-841-3278 or khaled.masri@nema.org. ◉

Steve Wilcox

Director, Market Research, NEMA

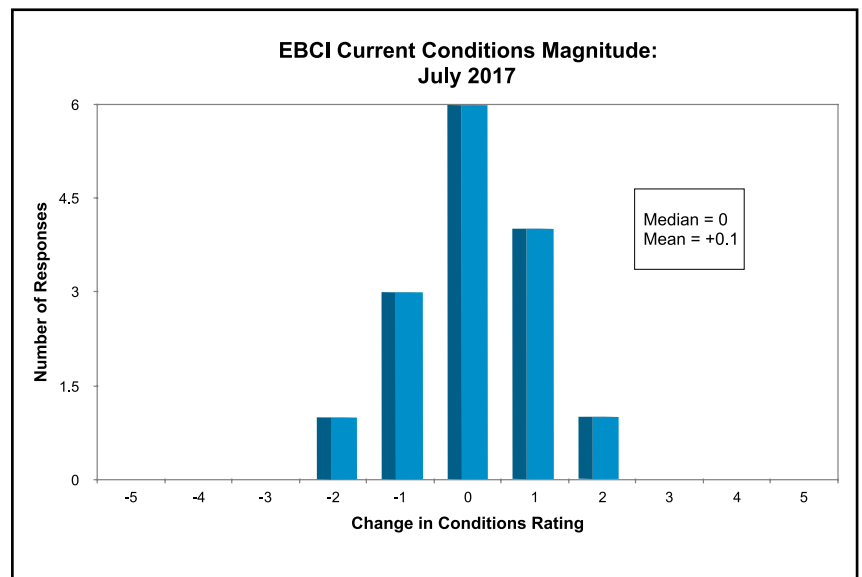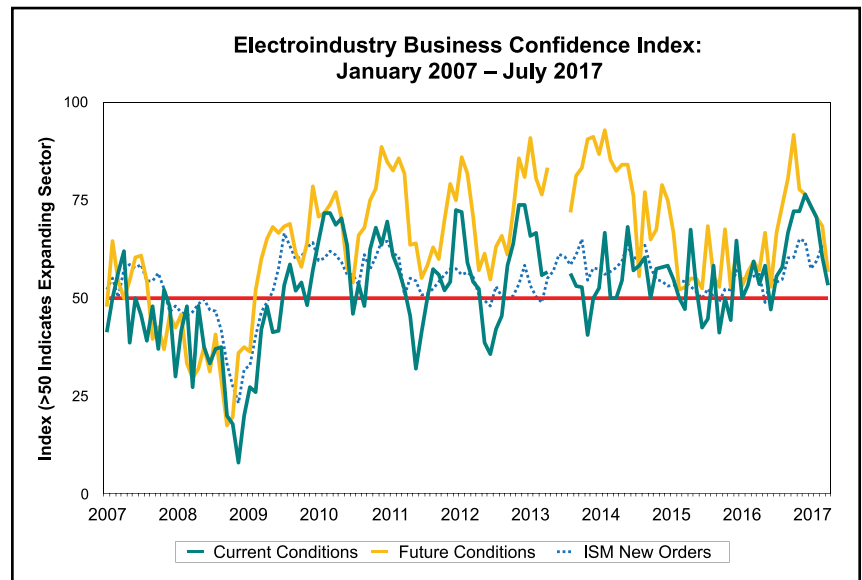# Confidence Indexes Decline Sharply, Remain Above 50

The current Electroindustry Business Conditions Index (EBCI) slid by more than 20 points from the near-term high of 76.5 reached in March of this year. As recently as June, the current conditions index topped 60 but fell 7.2 points to reach July's value of 53.3. Most of the change came from a larger share of respondents—67 percent in July versus 58 percent the previous month—who reported unchanged conditions. The share of those who noted that conditions are worse increased by only two points to 13 percent in July. Some respondents mentioned sluggishness in key markets, while others noted improving economic conditions overall and the seasonal boost typical of summertime.

The reported intensity of change in electroindustry business conditions continued to erode in July. The median value of this measure remained at 0 for the second consecutive month. The mean value, which is a more volatile measure, declined from 0.3 in June to 0.1 in July. Panelists are asked to report intensity of change on a scale ranging from -5 (deteriorated significantly) through 0 (unchanged) to +5 (improved significantly).

The future conditions index fell even more dramatically than the current index. In January 2017, the six-month ahead index stood at 91.7 but dropped 35 percentage points since that zenith. July's reading clocked in at 56.7 points, down from 68.4 the previous month. Unlike the current index composition changes, most of the decline in the future index could be attributed to the 27 percent share of July's panelists who expected worse conditions in six months, which was an 11-point increase from June. The share of those expecting unchanged conditions edged up only slightly from 32 percent in June to 33 percent in July.

Visit www.nema.org/ebci for the complete July 2017 report. 🔚

	Current Conditions (Compared to Previous Month)		Conditions Six Months from Now (Compared to Current Conditions)	
EBCI	53.3	▽	56.7	▽
% Better	20%	▽	40%	▽
% Worse	13%	▲	27%	▲
% Unchanged	67%	▲	33%	▽

Electroindustry Business Confidence Index: January 2007 – July 2017

Index (>50 Indicates Expanding Sector)

— Current Conditions — Future Conditions ⋯ ISM New Orders

EBCI Current Conditions Magnitude: July 2017

Number of Responses

Change in Conditions Rating

Median = 0
Mean = +0.1

2017 Annual Meeting

Future Supply Chain Risks and Opportunities

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