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## Strategic Initiatives

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## FROM THE **PRESIDENT**

**D**ean Kamen, whose inventions range from drug infusion pumps to the Segway, is credited with saying, "Every once in a while a new technology, an old problem, and a big idea turn into an innovation."

That trifecta is not too far different from the purpose of NEMA Strategic Initiatives: To seek out promising opportunities or emerging challenges, thoroughly research them, and report to Members so individual companies can make business decisions armed with more complete information.

NEMA Members have been redrawing for years the innovation curve that drives solutions with products and systems across the breadth of the electrical and medical imaging scopes. Since 2007, companies have annually submitted ideas regarding the near-term future (3-5 years) to determine what technologies or obstacles are coming into view. From an assortment of proposals, staff and Members collaborate to fine-tune a set of study topics ideally to the benefit of multiple NEMA Divisions and Sections. These initiatives have clear and achievable goals and produce materials to help NEMA Members approach their future as much as possible on their own terms.

After receiving the approval of the NEMA Board of Governors at its July meeting, the Strategic Initiatives are announced in September in the Big Ideas issue of *electroindustry* magazine. I invite you to look at our feature article on the 2019 Strategic Initiatives, beginning on page 8.

This year, the approved projects fall into the general categories of Digitalization / Internet of Things, Smart Cities / Electrification, Value of Medical Imaging, and Workforce Development. These themes are not random. Rather, they encompass a review of the environments in which our companies do business and cover technological topics such as data analysis and artificial intelligence, new opportunities such as increased use of electricity in agriculture, and the shared challenge of finding work-ready employment candidates.

Much of what is learned via Strategic Initiatives gets translated into new and improved products and systems. In turn, NEMA will need to develop corresponding performance Standards and other value-added technical documents that keep pace with emerging technologies. Occasionally, entirely new Sections get created as our industries evolve with the times.

I encourage all our Members to become familiar with Strategic Initiatives and, more importantly, become involved in the process that develops and oversees them. 🍌



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**October 5, 2018**

## Difficult Congressional Agenda Looms



Joseph Eaves

While people on the street may focus on daily political news cycles, NEMA stays above the fray, planning instead for a new Congress and mapping the policy areas that are most likely to affect NEMA Members.

Regardless of which party controls the 116th Congress, it will face several major matters beyond the annual appropriations process. NEMA is focusing on four categories, based on conversations with congressional staff, analyses of bills we expect to be left over from this Congress, and major problems facing the nation.

Although this agenda could change once the elections are decided and unforeseen world events unfold, we want NEMA Members to start thinking about the policy challenges and opportunities that await us in 2019.

Our four categories of advocacy are data and privacy, infrastructure, healthcare, and cybersecurity and Internet of Things (IoT).

- **Data and Privacy:** With the new European Union data privacy law now in effect and many global companies having changed their data policies as a result, we expect a push of similar laws and regulations to be debated in the U.S. Already, California entered the debate with a law that was passed in June 2018 but does not go into effect for a couple of years. Given the impact social media has on society and with monthly announcements of consumer data being hacked, Congress is considering this issue as well.

NEMA has been working with several stakeholder groups to ensure that we are part of the solution. Much like other regulations, NEMA prefers a nationwide versus a state-by-state approach.

- **Infrastructure:** This is an issue we have been hearing about since the 2016 campaign. However, with tax reform passed, political agreement, a long list of incomplete bills from this Congress, and a President wanting to claim another campaign achievement, we believe early congressional action is possible. The biggest hurdle on this issue is the cost and how to pay for it, but the November elections will help answer those questions.

NEMA staff and Members have been working on a formal infrastructure policy statement that will be submitted to the Board of Governors for approval at the November Annual Meeting.

- **Healthcare:** With the ongoing debate about the Affordable Care Act and expected increases in healthcare costs, policymakers will continue to seek ways to reduce those burdens on their constituents. While Congress already passed legislation on the opioid epidemic, it may be pressed to take further action. Because of the impact of addiction on Members' communities and workforce, NEMA will look for ways to address these concerns.

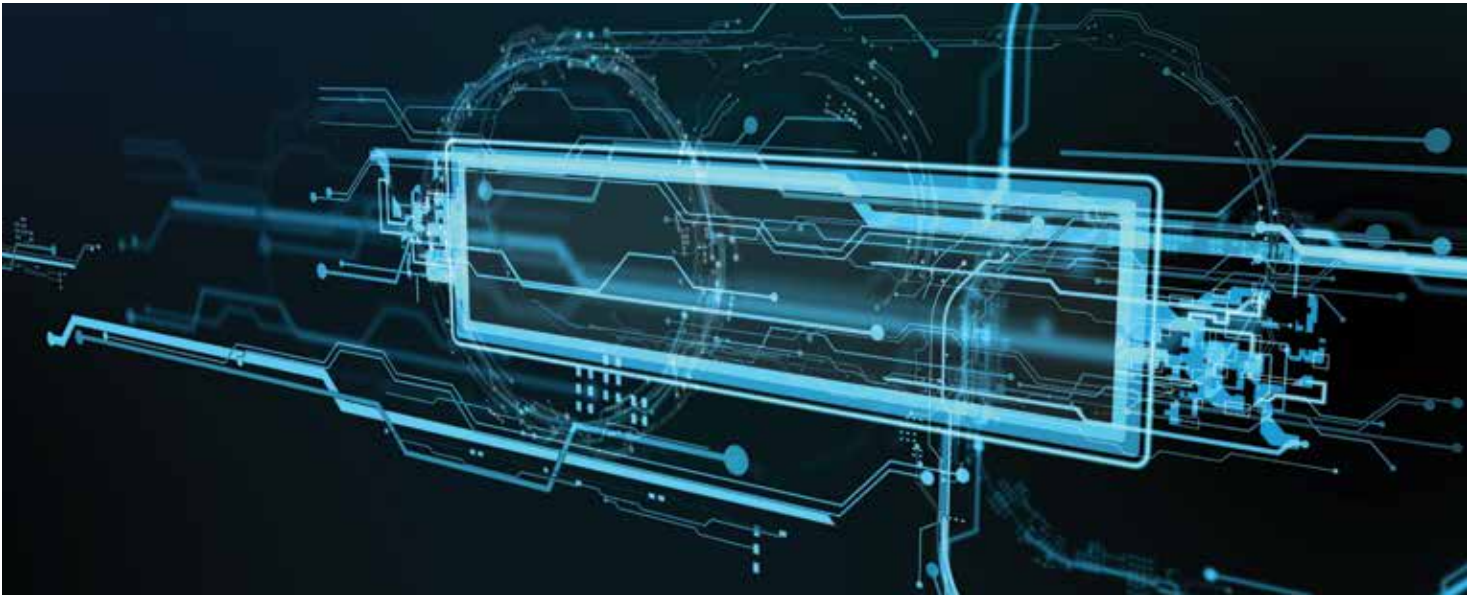
MITA will continue to seek to permanently remove the burden of the device tax following success in 2018 in getting the tax delayed for another two years.

- **Cybersecurity and the IoT:** In our ever connected world, threats of cyberattacks continue to grow. They now go far beyond such major systems as the electrical grid, extending into our homes and other personal properties. While the IoT gives consumers more control and helps them save energy, smart devices are now on the front lines of attacks and provide another internet gateway that must be protected. Much like data privacy issues, states are moving first on this front and are considering security regulations and laws on connected devices. Along with security are concerns about the energy consumed by all these devices.

NEMA expects some of this state work to make its way to Congress. While some in the industry hope to prevent a state-by-state tactic, others see a nationwide approach as a means to increase the impact of the new regulations. NEMA has begun working with like-minded stakeholders and will continue to do so.

Although Congress is a reactive body, it can be shaped by unforeseen events. NEMA and its Members need to be in the forefront so that once the political leadership is in place, solutions will be based on NEMA positions and not those of other stakeholders. ☎

## New BMS Section to Employ Integrated Approach



**T**he new Building Management Systems (BMS) Section, approved by the NEMA Board of Governors at its July meeting, will integrate building management applications related to energy efficiency and power reliability with devices that measure and report energy use.

A BMS is an integrated system of hardware, software, and interfacing communications that automatically monitor and control building subsystems like HVAC, lighting, power, fire, access control, and security in order to optimize building occupants' comfort, energy performance, safety, and security.

A BMS typically includes systems that

- connect a building's mechanical, electrical, power, communications, and lighting using devices such as sensors, monitors, actuators, controllers, and communication technology;
- provide control outputs to optimize the building occupants' comfort, energy performance, safety, and security;
- include interfaces for configuration, initialization, system maintenance, fault detection, diagnostics, predictive maintenance, and continuous improvement; and
- include dashboards to provide building performance information to facility operators.

This integrated approach expands the traditional NEMA focus of device-level collaboration

to a systems focus that enables coordinated identification of broad customer concerns to facilitate wider adoption. For example, by fusing systems together, data can be leveraged to provide descriptive, predictive, and prescriptive analytical tools and ultimately serve as the building's digital twin. It can also facilitate building interactions with external systems (e.g., electric utility demand response signals, time-of-use electricity prices, and first responder/firefighter guidance).

The BMS Section will maintain an intersection with traditional energy distribution and distributed energy resources (DER), focusing on applications related to energy efficiency and power reliability. This could include integration with end-device power measurement and reporting, demand response, time of use, electric vehicle charging, renewable energy production, operational technology, information technology, and other emerging technologies. It will also work with mechanical, electrical, and plumbing firms to develop guidelines and Standards that promote their integration.

Although the BMS Section will coordinate with NEMA's High Performance Buildings Council and related Sections, it will focus on such technical issues as developing guidelines and Standards for integrating devices and systems into a BMS.

For more information, contact Suzanne Alfano ([suzanne.alfano@nema.org](mailto:suzanne.alfano@nema.org)). ☎

**Suzanne Alfano, MBA,  
CET, Industry Director,  
Building Systems  
Division, NEMA**



## NEMA Webinars Empower Remote Learning



### BATTERY-POWERED TECHNOLOGY IN THE IOT

September 17, 2018

1–2 pm, EDT

Presented by Christian Olivier, President,  
Sigfox USA



Christian Olivier

The Internet of Things has been dubbed the Fourth Industrial Revolution and for good reason—it brings productive and cost-efficient technology to companies, putting data at the forefront of business decision making. Imagine increasing productivity and streamlining operations through simple wireless technology that gives consumers the insight to know a point of inventory loss or the status of remote assets.

In this webinar we'll explore various IoT use cases and the technology empowering the revolution—from chips and devices to connectivity and platforms—and examples of how manufacturers can implement this technology now.

Register at [www.IoTNOWwebinars.org](http://www.IoTNOWwebinars.org).

NEMA Members: No charge

Nonmembers: \$49 per webinar, discounts available for bulk registration

### UPCOMING IOT WEBINARS

Oct. 12, 2018 1–2 pm EST	Transportation Transformation: What's Driving the Future?
Nov. 19, 2018 1–2 pm EST	5G Communications: Better, Stronger, Faster
Dec. 17, 2018 1–2 pm EST	The Security of Things: Privacy, Protection, & Proprietorship

### WEBINAR SERIES TO FOCUS ON BATTERY TECHNOLOGY

The first in a series of battery technology webinars will be held in November.

This introductory webinar is a high-level overview of portable cells and batteries that will focus on emerging trends in standardization, particularly:

- Standards for batteries and how they promote new technologies and innovations
- How Standards may be used to develop a regulatory framework and establish rules and procedures where relevant legislation has not been established
- Relevant stakeholders
- Anodes, cathodes, and separators
- Chemistry
- Transportation
- Recycling



For more information, contact Khaled Masri ([khaled.masri@nema.org](mailto:khaled.masri@nema.org)).

### LISTEN UP!

In a podcast on NEMA TS 8-2018 *Cyber and Physical Security for Intelligent Transportation Systems*, NEMA Industry Director Steve Griffith discusses the implementation of cyber and physical security in transportation systems—legacy, new, and those with revisions planned for the future.

Listen at <https://podcast.nema.org/securing-transformative-transportation-systems>.

In a podcast on protecting electrical conductors and wiring systems with steel conduit, NEMA Industry Director Daniel Abbate, discusses the Steel Conduit and Electrical Metallic Tubing Section and its activities. He explains the different types of steel conduit as well as safety benefits of installing this material.

Listen at <https://podcast.nema.org/protect-electrical-conductors-and-wiring-systems-with-steel-conduit> and learn more at the Steel Conduit and Electrical Metallic Tubing Toolkit. 📱

Mariela Echeverria, Communication Services  
Manager, NEMA



## Tariff Initiatives Continue to Impact Electroindustry

On August 21, NEMA testified before an interagency committee chaired by the Office of the U.S. Trade Representative (USTR) regarding Administration proposals to place tariffs on a third list of products made in the People's Republic of China. The third list was developed by the agencies in reaction to Beijing's imposition of retaliatory tariffs on U.S. products and refusal to assuage U.S. complaints about intellectual property and industrial policies.

"If tariffs are still judged by the Administration to be an effective, attention-getting tool in bringing about changes to support U.S. companies trying to do business in China, we urge the use of tariffs to be much narrower than proposed and very short-lived," said NEMA President and CEO Kevin Cosgriff. "Specifically, if the tariffs are intended to bring China to negotiations, when can industry expect those negotiations to begin in earnest?"

The first round of 25 percent increases in U.S. tariffs on certain Chinese goods took effect on July 6, including approximately 100 types of electroindustry products, which together accounted for \$8 billion in imports from China in 2017. A second tranche of tariff increases entered into force on August 23, targeting \$2 billion of electroindustry imports from China. A third round, aimed at \$18 billion of electroindustry products as part of an overall \$200 billion target list, could go into effect this month.

On August 3, China's Ministry of Commerce announced a plan to place tariffs of 5, 10, 20, or 25 percent on many goods imported from the U.S., including 150 types of electroindustry products, if Washington implements more tariffs. To date, China has imposed 25 percent tariffs on a total of \$50 billion in U.S. shipments already, including medical resonance imaging and x-ray units as well as agricultural products.

In the past six months, U.S. and Chinese tariffs on manufacturing inputs and components as well as finished goods have dramatically expanded the electroindustry's tariff profile, building on the Administration's tariffs on steel and aluminum imports that took effect in March and June.

Member companies are using new NEMA tools to assess and communicate with federal, state, and local officials about the impact of the tariffs on their businesses and, where possible, seek relief. ☎

Craig Updyke, Director, Trade and Commercial Affairs, NEMA

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# 2019 Strategic Initiatives to Explore Emerging Opportunities— Digitalization, Electrification, Future of Standards, Workforce Development

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

Each year, NEMA asks its Members to submit ideas for seizing emerging opportunities and overcoming challenges facing the electroindustry. The NEMA Board of Governors recently approved the 2019 Strategic Initiatives, which collectively explore the themes of digitalization, electrification, the future of Standards, workforce development, and more.

## Digitalization and the IoT

### • Blockchain Guidance

Going beyond the hype of blockchain, this initiative will develop technical industry guidance detailing use cases (e.g., reliability, resilience, distributed energy resources, and transportation) as well as best practices for the use of blockchain in electrical products and systems within the Internet of Things (IoT).

### • Augmented Reality for Codes and Standards

Hands-free technologies like augmented reality could help improve code compliance and offer ways to provide guidance to installers and end users of electrical products. This initiative will publish an electroindustry-tailored white paper of use cases, opportunities, and shortcomings of augmented reality as well as demonstration apps showing how functionality could be used to improve compliance with Standards and building codes.



## Making Sense of Blockchain

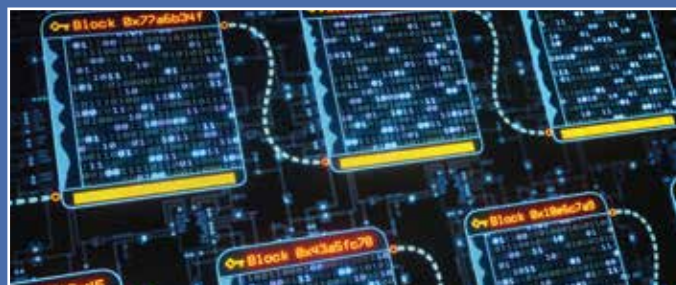
The early internet dealt with intangibles. You sent or received emails, corresponded on forums, and read and distributed articles.

The modern internet deals with assets, the most valuable immediate items that you can touch and want to protect. These assets are stored in encoded form on a network-to-network chain called the blockchain or ledger, where each participant sees whom you do business with. This not only protects your business dealings and prevents theft but also simplifies your affairs, quickens the process, reduces errors, and saves you from hiring a third party.

This decentralized blockchain system is going to change your life, from the way you transact business or manage assets to the way you use your machines, vote, rent a car, and even prove who you are.

Blockchain is already evident in a number of applications:

- financial services (asset management and insurance claims processing);
- smart properties (cars, phones, and appliances);



- smart contracts, which are digital contracts embedded with intelligence that provide self-execution (personal healthcare records and voting systems); and
- identity protection (digital passports; birth, wedding, and death certificates).

Blockchain technology has the potential to disrupt distributed cloud storage by decentralizing current cloud storage services, which will improve security and decrease dependency.

The NEMA 2019 Strategic Initiative on blockchain will develop technical industry guidance detailing use cases and best practices that are applicable and relevant to NEMA Members. 

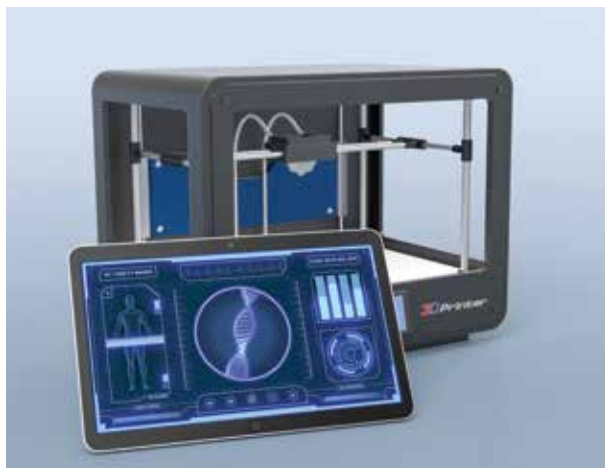
Steve Griffith, PMP, Industry Director, NEMA



As the industrial Internet of Things expands, this initiative (which is being continued from 2018) will fund Standards and Advocacy efforts to include NEMA priorities on smart manufacturing in Standards and government policies.



To give NEMA and MITA Members the information they need to prepare for the widespread use of additive manufacturing / 3D printing, NEMA will develop a report and host a Members workshop on use cases, safety and counterfeiting concerns, standardization gaps, and other barriers and opportunities surrounding the widespread adoption of 3D printing. NEMA will also advocate for appropriate safety certification of 3D printing materials.



This initiative will develop technical guidance that enables construction projects to leverage the benefits of BIM, which uses digital models of products to optimize building performance. Using BIM in construction projects will increase efficiency through the entire project lifecycle (i.e., concept, design, build, operate, and demolish).

*Continued on page 10*

Under this Strategic Initiative, NEMA will contract with an independent consultant to

- The analysis will include identification of the requirements of an ideal system efficiency model for a variety of applications (e.g., total building, HVACR, lighting, industrial facility) and rate the attributes of each model against an ideal.

**Suzanne Alfano, MBA, CET, Industry Director,  
Building Systems Division, NEMA**

Continued from page 9

## Smart Cities

- **Building Rating and Labeling**

In order to promote above-code building performance, this initiative will determine the feasibility of establishing one or multiple commercial or residential building rating and labeling programs for energy-efficient, safe, reliable, and sustainable electrical products. The concept is similar to, but not intended to compete with, rating and labeling systems like LEED (Leadership in Energy and Environmental Design) and ENERGY STAR®.



- **Circular Economy and Materials in Buildings**

As governments and consumers focus more on the materials used in products, this initiative will help Members assess the end-of-life impact of their products, investigate ecologically friendly

materials that can be recycled at end of life, and investigate successful state recycling programs and their adoption levels. This initiative would also fund engagement in European materials regulatory efforts, which tend to be the basis upon which other markets build their materials regulations.

## Market Development

- **Future of Standards**

Rapidly iterating technologies require equally nimble technical guidance, yet the process for developing industry consensus Standards remains slow. Standards play an important role in ensuring product safety and performance, but improperly developed Standards can result in product commoditization and can limit innovation. This initiative will focus on developing an updated approach to standards development, requiring new expertise and redoubled engagement in outside groups' digital standardization efforts.

## Circular Economy and Materials in Buildings

The notion of a circular economy (CE) is emerging as a dominant template for crafting environmental policy in key global markets. Restorative and regenerative by design, it seeks to move beyond the traditional “take, make, dispose” approach that characterizes most economic systems. Instead, the aim becomes buying less and reusing more by keeping products, components, and materials at their highest utility and value at all times.

The European Union was an early and earnest promoter of the CE concept, adopting an ambitious Circular Economy Package in December 2015 that included legislative proposals on waste and an action plan to support circular processes in each step of the value chain. The CE movement in the United States—although not established in federal law—has been spurred by influential support from the business community. In Canada, it is advancing through public-private partnerships as well as policies adopted at the provincial level.<sup>1,2</sup>

This Strategic Initiative will examine the implications of the CE concept for electrical products and systems, with particular focus on the selection of materials and product recyclability. It is intended to build on the work of a prior NEMA SI on Environmental and Health Product Declarations (EPD/HPD), which addressed the use of lifecycle analysis and hazard assessment to enhance the transparency of building products.



Drawing on the expertise within Member companies as well as outside consultants, this SI will produce a materials use and end-of-life management report to help Members assess the impact of their products and investigate ecologically friendly materials. The work will include a review of U.S. recycling laws and programs as well as European CE regulations. **ei**

**Mark Kohorst, Senior Manager, Environment, Health & Safety, NEMA**

1 <https://www.uschamberfoundation.org/event/2017-sustainability-and-circular-economy-summit>

2 *Strategy for a Waste-Free Ontario: Building the Circular Economy*, <https://www.ontario.ca/page/strategy-waste-free-ontario-building-circular-economy>



## Expediting Standards Development to Match Innovation

Because Standards serve as the backbone of industry self-regulation, it is important to get them right. Industry consensus Standards help reduce costs and expand markets through the promotion of interoperability, safety, and quality.

As the electrotechnical industry changes and as the pace of innovation quickens, NEMA must keep up. One of the association's primary activities is the production of technical intellectual property. Given that standards development traditionally spans multiple years, the process needs to be expedited to match the rate of technological change. Significant reforms will be necessary for NEMA to remain relevant and continue to provide value to its Members.

This will require improvements to the standards development process itself, NEMA's ability to execute it, and the ends toward which it is directed. The point is to deliver technically sound IP that has the consensus of NEMA Members. Rethinking the main criteria of technical soundness and Member consensus may involve issuing beta versions or iterating Standards quickly over a period of weeks or months instead of years or more.

NEMA will need to hold itself to high performance standards, driving progress through the process and delivering technical IP on time to retain maximum relevance. It will also need to undertake high-value projects that will achieve Members' objectives.

All of this work should be directed toward the association's mission statement, which is to "expand markets and reduce costs for electrical and medical imaging technologies and services," in order to contribute to Member profitability. Staff, Divisions, and Sections will establish high-value objectives to ensure that the IP being developed supports achievement of these objectives. ©

**Peter Weems, Senior Director, Strategic Operations & Policy, MITA**

### • Seismic Activity Standards

No industry Standard currently exists to provide guidelines for testing the impact of seismic events on electrical equipment. This initiative will develop an industry Standard to define product-specific guidelines for seismic qualification of electrical equipment to comply with commercial building codes.

*Continued on page 12*

## Creating a Consensus Seismic Conformity Standard

Imagine rewinding history to the early 20th century and removing conformity Standards and third-party certification for the electrical industry. With no industry consensus Standard, each item of electrical equipment would have to satisfy the conformity policies of each inspection jurisdiction on a building-by-building basis. Chaos would rule.

For more than 100 years, however, our electrical safety system has allowed our industry to innovate, grow, and thrive because of conformity. The premise of the above thought experiment is difficult to imagine.

Yet there are the disrupters—in this case, earthquakes. Electrical equipment must be designed to withstand seismic loads.

The International Code Council introduced a prescriptive seismic qualification requirement for electrical equipment in the 2000 International Building Code® (IBC). The seismic code disruption was elevated to a critical electrical industry issue in 2008 when California changed the basis of the enforceable California Building Code (CBC) from the 1997 Uniform Building Code (with no equipment qualification requirements) to the 2006 IBC (with equipment seismic qualification requirements).

The first California Authority Having Jurisdiction (AHJ) to feel the impact of full compliance with the electrical equipment qualification requirements of the IBC was the statewide jurisdiction responsible for licensing healthcare, OSHPD. Lacking electrical industry Standards on which to base seismic conformity to the CBC, OSHPD was forced to adopt internally derived policies.

Today, seismic conformity in our industry is challenged with a reality very similar to the imagination experiment above. Stakeholders face the daunting task of satisfying conformity policies of each inspection jurisdiction on a building-by-building basis. That reality grows in complexity as each AHJ with moderate to high seismic risk moves incrementally toward full IBC compliance.

With a decade of lessons learned from full enforcement based on conformity policies created outside of our industry, we are in an excellent position to create a consensus seismic conformity Standard. Endorsed by all stakeholders, it would greatly simplify the IBC certification process while bringing it into the mainstream of safety. ©

**Philip Caldwell, Edison Expert, External Affairs, Schneider Electric**

## Growing Crops with Big Data

There is nothing more important than ensuring a plentiful food supply. From Florida oranges to Idaho potatoes, farmers are faced with abundant challenges from seed to harvest. Big data is changing that. As farming transforms to a more data-driven industry, sensor technology is becoming as important a tool to farmers as the tractor.

Sensors in the fields are providing farmers with real-time data on seed placement, soil composition, weather, water availability, and even pest invasion. Data analytics may help the farmer predict what areas of the field will yield the greatest harvest and reduce spoilage. Drones flying above the fields help monitor crops and alert farmers to problems. Big data will help automate labor-intensive processes like seed planting and chemical application and even allow farmers to plant different hybrids of seed in certain areas of the field, all based on the data collected.

The emerging counterpoint and companion discipline to traditional outdoor agriculture is that of indoor agriculture. Modern automated indoor agricultural ventures are being built in major urban areas where sufficient unused warehouse space, local demand for produce, and available distribution paths are available. Leafy greens are the forerunner of urban agriculture, since freshness in storage is a challenge and demand for them is high.

A Spread Co. indoor lettuce production facility near Kyoto<sup>1</sup> yields 21,000 heads of lettuce per day, and thanks to better automation and improvements in harvesting, they expect their next improved facility to double that capacity with a 900-square-meter vertical facility. That sounds like a lot of lettuce until considering that the Ministry of Internal Affairs and Communications notes that vertical farming is responsible for just 0.15 percent of Japan's vegetable market.

A pessimist might say that this is less than a drop in the bucket and not worth doing, but the optimist would look at the same figures and see a gigantic opportunity. Indoor farming enthusiasts agree heartily with the latter opinion.

As arable land becomes maximized and concerns of water and pesticide use grow, the ability to transform empty urban warehouses into sources of locally produced food and jobs is an attractive option.

The technology revolution in farming will ultimately make planning easier and fields more sustainable. Sensors and big data in agriculture help farms be more efficient, increase production, cut costs, and become more profitable. 📡

Fred Ashton, Economic Analyst, NEMA, and Alex Boesenberg,  
Senior Manager, Government Relations, NEMA



*Continued from page 11*

### • Electrified Agriculture

From horticultural lighting and water-efficient pumps to advanced humidity and temperature controls, agricultural productivity can be enhanced through the use of electricity. This initiative will promote the safe and efficient use of electricity in modern agricultural practices by developing and promoting best practice guides for farmers and electric utilities.

## Workforce Development

Continuing our 2018 efforts on workforce development, in 2019 NEMA will work with Members to help implement a digital toolkit promoting the benefits of a career in electromanufacturing to middle and high school students. Work will also continue to roll out a pre-apprenticeship program whereby NEMA Members can collaborate with their local school districts to establish combined in-class and on-the-job training programs for high school students. 📡

**To get involved** in or find out more  
about the NEMA Strategic Initiatives,  
visit [www.nema.org/si](http://www.nema.org/si) or  
email [si@nema.org](mailto:si@nema.org).

<sup>1</sup> <https://spectrum.ieee.org/energy/environment/the-green-promise-of-vertical-farms>





## Workforce Development Tools to Debut at November Meeting

In 2018, NEMA set out to tackle the workforce development gap through three projects under the Workforce Development Strategic Initiative. They involved a curriculum sharing feasibility study, an industry promotion digital toolkit, and an industrial maintenance technician youth apprenticeship.


The digital toolkit and apprenticeship program will be rolled out at the Workforce Development Seminar on Wednesday, November 14, which will be held in conjunction with the NEMA Annual Meeting. For more information, visit [www.nema.org/workforce-development-seminar](http://www.nema.org/workforce-development-seminar).

In a study conducted by Tooling U-SME, the feasibility of curriculum sharing was determined to be constrained because of challenges related to recruiting and training instructors, capital investment to procure requisite training equipment, and non-alignment of curriculum standards from state to state.

To create an industry promotion digital toolkit, NEMA retained Edge Factor, a communications firm that specializes in promoting the manufacturing sector. It created a series of videos and other digital tools to raise awareness of the electroindustry and demonstrate

its viability as a safe, innovative, and dynamic career pathway for middle and high school students. The firm developed a Netflix-style dissemination platform that NEMA Members can use to run the videos and activities while tracking post-event hits and other metrics.

NEMA also retained Tooling U-SME to develop an apprenticeship program for high school students to gain hands-on experience as industrial maintenance technicians. Tooling U-SME worked closely with a group of NEMA Member representatives from human resources and technical backgrounds to develop the program. The apprenticeship will have five domains, each with a respective curriculum and on-the-job training component: safety, electrical knowledge, mechanical repair, production equipment, and manufacturing aptitude.

Once developed, NEMA Members will be able to adopt and adapt the program to meet their local needs as well as their level of resources. Tooling U-SME will develop the curriculum, an on-the-job training guide, and a “train the trainers” handbook. 

**Jonathan Stewart, Industry Director, Utility Products and Systems Division, NEMA**

# Big Happenings in Medical Imaging Suggest Better Treatment Options

Patrick A. Hope,  
Executive Director,  
MITA

**W**ith new developments continuing to push the boundaries for medical imaging and related devices, technological innovation has completely changed the healthcare landscape. Below are a few of the many developments that are helping doctors and patients.

## Software-Aided Diagnosis

Patient privacy is a huge focus for equipment manufacturers and hospitals, so technologies that make it easier to protect data and securely exchange information are making waves.

Cybersecurity startup MedCrypt, for example, developed software that will protect the security of all medical devices. Researchers from Vanderbilt University are investigating the possibilities of using blockchain technology to safeguard patient data and hospital communications.

Protecting patient data isn't the only benefit provided by new technologies, as artificial intelligence (AI) and machine learning are making it possible for computer-aided diagnosis (CADx). A handful of CADx programs have been FDA approved, with applications ranging from coronary computed tomography (CT) analysis to stroke detection.

As new data becomes available, and AI becomes more powerful, a host of technologies will emerge to assist doctors in recognizing and treating any number of patient conditions.

## Imaging Innovation

Advancement in imaging technology is pushing the bounds of current modalities. Development of a new ultrasound device that substitutes optical probes for the traditional electronic ones means that the device can be used in tandem with magnetic resonance imaging (MRI), a feature that eludes current models because of the effect of the magnetic field on electronic systems.

Another multimodal system that has recently been unveiled is a coronary CT angiography / cardiac single-photon emission CT (SPECT) perfusion combinational approach that provides doctors with vital information on blood flow to and from the heart tissue.



Ultrasound, typically thought of as an imaging method, can also be used in the treatment of a variety of conditions. By utilizing high-intensity focused ultrasound, doctors can destroy problematic tissues in an accurate and entirely non-invasive manner. As doctors and researchers continue to investigate the power of this technique, we will likely see additional treatment applications emerge.

## PET Imaging

Similar to the use of ultrasound technology for both imaging and treatment, new developments in the field of nuclear medicine combine the therapeutic and diagnostic capabilities of the radiopharmaceuticals in a model known as theranostics.

A powerful example has been the diagnosis and treatment of neuroendocrine cancer. Positron emission tomography (PET) can also act as an early detection method for Alzheimer's disease (AD) because the buildup of specific peptides and proteins in the brain that is linked to AD can be directly imaged using different tracer drugs. The importance of early AD diagnosis cannot be understated. As medical technology advances, we hope to find a cure for this disease. 🍷





# High-Tech Li-Fi Based on Age-Old Technologies

**V**isible light communication (VLC) sounds like a newfangled notion, but it's not.

The ancient Greeks shined light across the sky to communicate quick and urgent messages; in Boston, Paul Revere famously signaled “one if by land, two if by sea” using lantern-based semaphores; and Alexander Graham Bell developed his photophone to transmit speech on a beam of light in 1880.

Today, VLC refers to using the visible part of the optical spectrum to communicate data. With the invention of energy-efficient light-emitting diodes (LEDs) and laser diodes (LDs), it is possible to encode data into the visible spectrum to achieve very high rates, comparable to Wi-Fi. Where Wi-Fi uses radio waves for transmission, Li-Fi (short for light fidelity) uses light. Li-Fi is often used to describe high-speed VLC in scenarios where Wi-Fi might also be used.

Emerging Standards for VLC include such camera-based techniques as CamCom (IEEE 802.15.7m), a proposed vehicular assistant technology that uses image sensor communication in intelligent transportation systems, and Li-Fi (IEEE 802.11lc and IEEE 803.15.13), which promote interoperability among solid state light sources. These standardization efforts emerge from different technology standpoints, targeting a range of use cases.

A critical factor for these new technologies is the ability to exploit the visible spectrum. This has advantages and disadvantages. A big plus is the ability to piggyback on lighting functions so that wherever there is lighting, there can be data communications. This use is opportunistic, exploiting the “free” spectrum that is not otherwise used for communications. Light is also highly directional, and this property can be exploited to improve data security and to realize many private data links in close proximity.

On the negative side, VLC must conform to human factors, including freedom from flicker and glare, and must meet color rendering index (CRI) and light distribution goals.

VLC technologies have the potential to provide access to unused spectrum that will ensure growth in wireless capacity beyond the crowded radio frequency bands. VLC also promises to do this using deployed lighting, offering the potential to both use existing infrastructure and leverage the other features offered when lighting is computer controlled. ☼

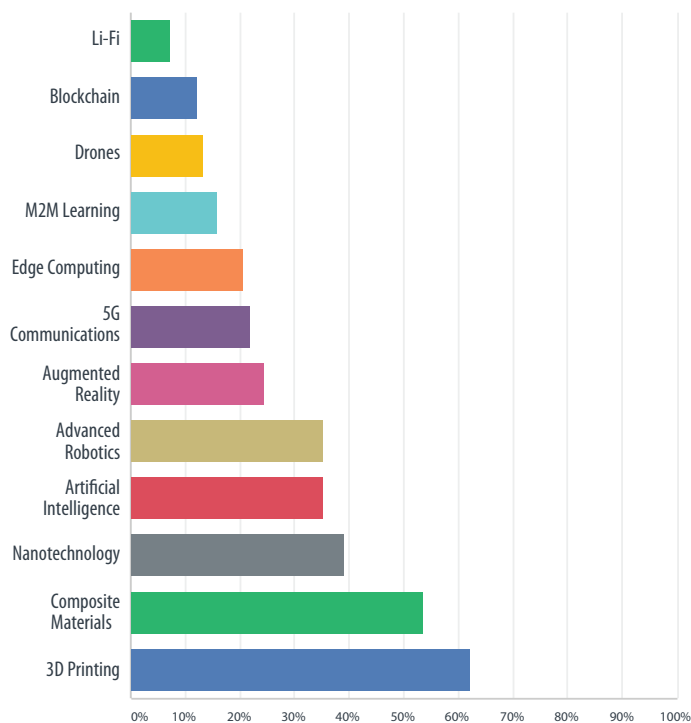
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director at the  
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Research Center  
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Applications  
(LESA)

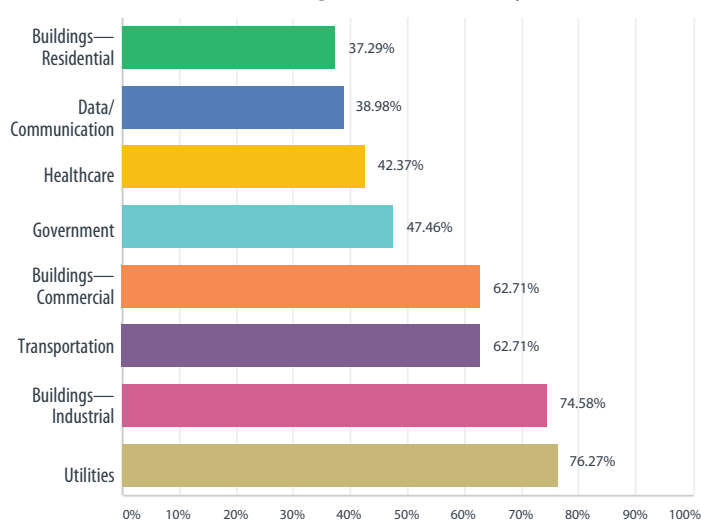
## TECHNOLOGY SURVEY RESULTS

We asked *electroindustry* readers to help us develop relevant content by telling us what new technologies are important to them. In an online survey conducted during July and August, readers identified top innovative technologies, as summarized below.

Which of the following topics are relevant to your industry?



Which of the following end-markets do you serve?



Several of these technologies (e.g., 3D printing, augmented reality, blockchain, and drones) are addressed in the 2019 Strategic Initiatives laid out on pages 8 through 13. Others (e.g., Li-Fi and 5G communications) are pertinent to individual Divisions and Sections that will be covered in future issues. **ci**

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## Code Adoption in the West

California is currently in the process of adopting the 2019 edition of Title 24 of the California Code of Regulations, known as the California Building Standards Code. Title 24 will be based on the 2018 International Code Council codes (I-Codes) and the 2017 *National Electrical Code*® (NEC) as well as California's own Energy and Green Building Standards Codes. Code Advisory Committee (CAC) meetings were held in July and August, and the CAC recommendations from these meetings will be voted on by the Building Standards Commission in December 2018/January 2019. The new codes will be effective on January 1, 2020. NEMA staff and Members have been actively engaged throughout this process.

Since Nevada is a home-rule state, each municipality/county adopts its own construction codes. However, there is statewide collaboration with building officials and other industry stakeholders to develop a consistent set of code adoption recommendations that can be used as a model ordinance by any city or county. Many city councils and county boards throughout Nevada are voting on these recommendations this fall with effective dates for the adopted codes in 2019.

Hawaii and Montana are considering adoption of the 2018 I-Codes and 2017 NEC, although neither state has scheduled hearings. Montana held informal listening sessions earlier this year to collect input from stakeholders. Agency staff in both states anticipate moving to the current codes in early to mid-2019. ☎

## Two New Standards Available for LEDs



Now available are two new Standards for LED lighting, **ANSI C78.62612-2018** *American National Standard for Electric Lamps—Self-Ballasted LED Lamps—Performance Specifications*, which features the performance requirements for LED lamps for stable operation,

and **ANSI C78.62717-2018** *American National Standard for Electric Lamps—LED Modules for General Lighting—Performance Requirements*, which contains the performance requirements for LED modules. Both are intended for domestic and general lighting purposes.

They are available for \$50 each in hard copy and electronic download.

The following have been reissued:

- **ANSI C78.260-2002 (S2018)** *American National Standard for Tubular Tungsten Halogen (TH) Lamps—Physical Characteristics* is available for \$119 in hard copy and electronic download.
- **ANSI C78.23-1995 (S2018)** *American National Standard for Incandescent Lamps—Miscellaneous Types* is available for \$78 in hard copy and electronic download.
- **ANSI C78.22-1995 (S2018)** *American National Standard for Incandescent Lamps—A, G, PS and Similar Shapes with E39 Mogul Screw Bases* is available for \$78 in hard copy and electronic download. ☎

## NEMA Folks Recognized by IEC

The 1906 Award commemorates the foundation of the International Electrotechnical Commission (IEC) and honors technical experts around the world whose work is fundamental to it. The award also recognizes exceptional achievement related to the activities of the IEC that advances the work of the Commission.

Among the IEC Technical Committee (TC) experts recognized this year are the following NEMA Member representatives and NEMA staff:

Donald Barta, Rea Magnet Wire Company, Inc., TC 55; Kenneth Gettman, NEMA, TC 121; Keith Goshia, VERTIV, TC 22; Robert Kretschmann, Rockwell Automation, TC 66; Robert Smith, Connector Mfg. Co. (subsidiary of BURNDY LLC), TC 110; and David Stone, Eaton's Power Systems, TC 17. ☎

## I Am the Electroindustry



Philip Caldwell, Edison Expert,  
External Affairs, Schneider Electric

Earthquakes nearly ran me over in 1998. That was when Square D Company / Schneider Electric asked me to review seismic qualifications for building code applications. My initial goal was to get a colleague to take the lead. Despite our best efforts, however, we kept getting hit by a very big bus driven by earthquake provisions in building codes.

In the 1970s, advances in earthquake engineering practice were developed to meet the needs of the commercial nuclear power industry. In the latter part of the 20<sup>th</sup> century, however, earthquakes in urban areas around the world emphasized the need to improve seismic design provisions of building codes. These were necessary to save lives and to improve the chances of post-event functionality of the critical facilities.

By the time the 2000 *International Building Code* (IBC) was published, I had learned to ride the bus. My ticket was to form relationships with key people in the global earthquake engineering community.

I am a member of the Earthquake Engineering Research Institute, the Seismological Society of America, the Applied Technology Council, the National Science Foundation–sponsored George E. Brown Jr. Network for Earthquake Engineering Simulation, and the National Earthquake Hazards Reduction Program. I am also a committee member of IEEE P693, ASCE 7, and ISO/TC 98/SC 3.

Currently, as an Edison Expert with Schneider Electric, I serve as the company's codes and standards representative for numerous committees and activities related to earthquake mitigation of nonstructural components. I am the electroindustry because I look at seismic activity from the electroindustry's perspective. 🇺🇸

## BUSINESS ANALYTICS

### Is Second Quarter Economic Growth Sustainable?

Don Leavens, PhD

Vice President and Chief Economist,  
NEMA

According to the Bureau of Economic Analysis second-quarter GDP advance estimate released July 27, 2018, economic output grew at a 4.1 percent annual rate from the previous quarter.

Positive consumer spending, net exports, nonresidential fixed investment, and government spending offset a drag from imports, a contraction in residential investment, and an inventory drawdown. Compared to the same quarter last year, GDP was 2.8 percent higher in the second quarter.

A near doubling in the economic growth pace is partly attributable to factors that are expected to fade over time.

While second-quarter growth was the strongest since the third quarter of 2014 during the height of the oil extraction boom, it is likely not a sustainable pace.

Given continued weakness in labor force productivity and growth, output growth at four percent would eventually precipitate a bout of accelerating inflation. To guard against such an outcome, the Federal Reserve has set course to raise rates gradually to transition monetary policy from being unusually accommodative (easy) to being neutral.

Compounding matters, recent U.S. trade policy maneuvers are raising uncertainty for businesses contemplating investment decisions as the viability of global supply chains is threatened. Rising interest rates and uncertainty suggest slower growth ahead. Although a recession is inevitable at some point, the expansion could continue well into 2019 given its current momentum.

Although the overall economic growth rate is likely headed lower in 2019, the \$19 trillion U.S. economy affords plenty of opportunity for regions and industries to experience widely differing growth rates. 🇺🇸



## Little Change in Expansionary Conditions Suggested

The current conditions component of the Electroindustry Business Confidence Index (EBCI) pulled back sharply in July but remained above the level indicative of conditions conducive to growth at 53.8. The 15.4 point fall from June was the steepest such decline since December 2015 but was less a sign of deteriorating conditions than of hitting a plateau as all of the change was attributable to a substantially greater share of respondents noting that conditions were unchanged.

The reported intensity of change in electroindustry business conditions flattened compared to June. The mean value declined to 0.0 after reaching 0.6 that month. July's median value also slid to 0 following a one-month stint at 1. Panelists are asked to report intensity of change on a scale ranging from -5 (deteriorated significantly) through 0 (unchanged) to +5 (improved significantly).

Although the future conditions component also declined this month, its change was much less pronounced than was the case for current conditions. Edging down 3.9 points to 53.8, the outlook for six months ahead remains expansionary. The share of panelists expecting better conditions decreased in July, as did the number indicating worse conditions ahead. The only category to see an increase this month was in those expecting unchanged conditions. One commenter suggested some trepidation regarding international trade, but the general quiescence in the commentary section suggests a wait-and-see attitude prevails for now.

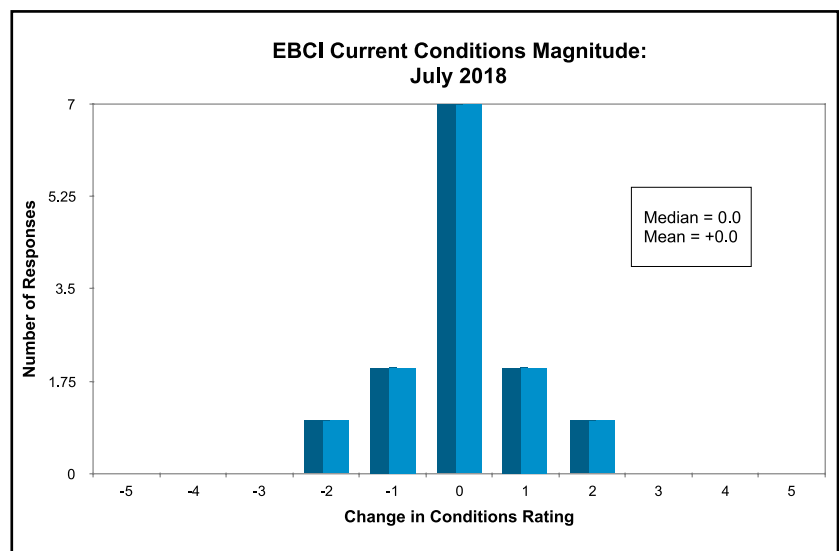
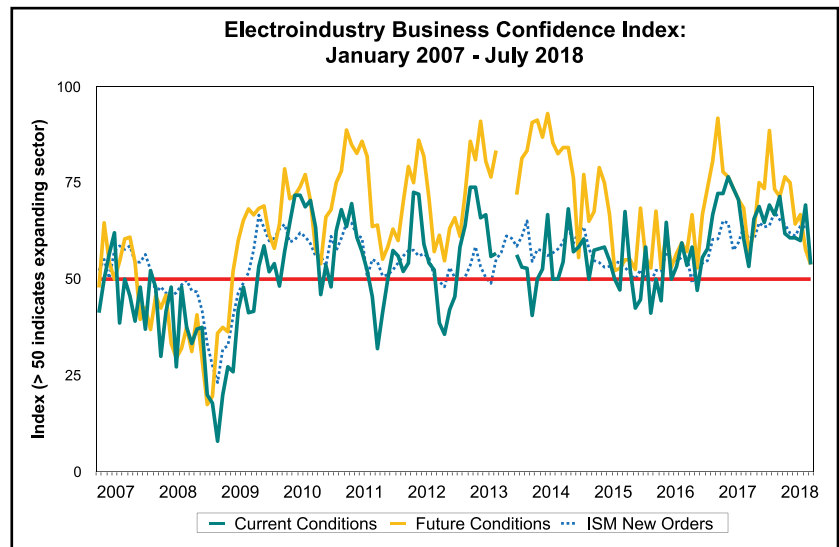
Visit [www.nema.org/ebci](http://www.nema.org/ebci) for the complete July 2018 report. ©

	Current Conditions (Compared to Previous Month)	Conditions Six Months from Now (Compared to Current Conditions)
EBCI	53.8 ▼	53.8 ▼
% Better	23% ▼	31% ▼
% Worse	15% ▲	23% ▼
% Unchanged	62% ▲	46% ▲

Number of Respondents: 13

Values reflect the percentage of respondents expecting "Better" conditions, plus one-half of the percentage of respondents expecting "Unchanged" conditions.

A score of 50 or higher suggests conditions appropriate to an expanding economy.



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**Thank you, NEMA, and congratulations to our fellow winners.**

Read more about the **Illuminations Awards** at [championfiberglass.com/illuminations](http://championfiberglass.com/illuminations).



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