

electroindustry

www.nema.org | August 2018 | Vol. 23 No. 8

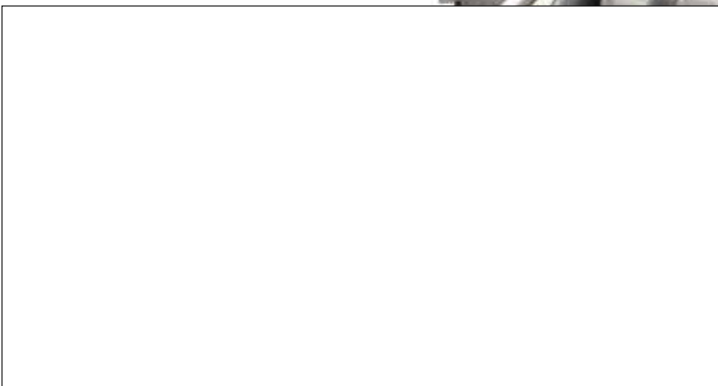
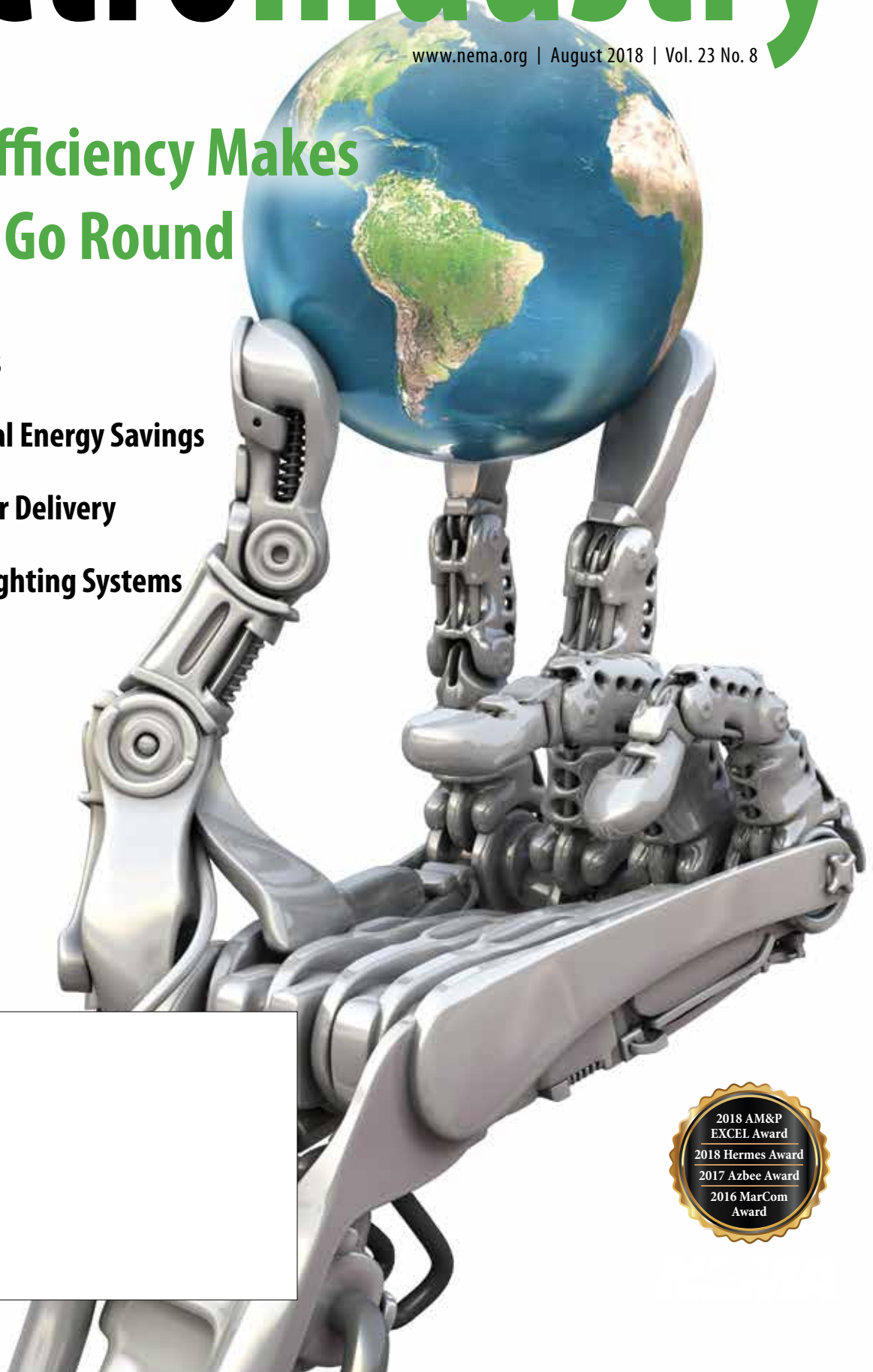
Systems Efficiency Makes the World Go Round

4 | Talking Tariffs

8 | Getting to Real Energy Savings

12 | Reliable Water Delivery

14 | Responsive Lighting Systems





Are you designing intelligent transport systems?

Get the latest standards for controller area networks (CAN), Intelligent Transport Systems (ITS), and Traffic and Travel Information (TTI)

Visit webstore.ansi.org/transportation



CONTENTS



Manufacturers and suppliers convene at Wire and Cable Forum



Recognizing lifelong contributions by John Williamson



Stephen Tuckwell on the role of laminates

electroindustry

Publisher | Tracy Cullen
Editor in Chief | Pat Walsh
Contributing Editors | Ann Brandstadter, Mariela Echeverria, Andrea Goodwin, William E. Green III
Art Director | Jennifer Tillmann
National Sales Manager | Chris Riordan
 The Townsend Group
 202.367.2462
criordan@townsend-group.com

electroindustry (ei) magazine (ISSN 1066-2464) is published monthly by the National Electrical Manufacturers Association (NEMA), 1300 N. 17th Street, Suite 900, Rosslyn, VA 22209; 703.841.3200. Periodicals postage paid at Rosslyn, Virginia, and additional mailing offices. POSTMASTER: Send address changes to NEMA, 1300 N. 17th Street, Suite 900, Rosslyn, VA 22209. The opinions or views expressed in *ei* do not necessarily reflect the positions of NEMA or any of its subdivisions. The editorial staff reserves the right to edit all submissions but will not alter the author's viewpoint. Every attempt is made to ensure that information is current and accurate.

Subscribe to *ei* at www.nema.org/subscribe2ei.
 Contact us at ei@nema.org.

Follow NEMA:

We thank our advertisers:



8

Motors, Drives, and Systems: Getting to Real Energy Savings

Kirk Anderson, Industry Director, Industrial Products and Systems Division, NEMA

11

HVAC Retrofit Returns 53 Percent in Fan Energy Savings

Paul Wickberg, Executive Vice President of Sales, SMC

12

Water Delivery More Reliable with Systems

Alex Boesenberg, Senior Manager, Government Relations, NEMA

13

City Upgrades Water Meters with Smart Infrastructure Project

Dennis Siegert, Water Director, Johnson Controls

3

Comments from the Chairman

4

Electric News

16

Advocacy

16

Spotlight

17

Codes & Standards

19

International

20

Business Analytics

Managing Supply Chains in Real-time with Smart Sensors
 August 13, 2018
 1:00 - 2:00 pm EDT
[#IoTNOW/webinars](https://www.nema.org/iotnow/webinars)

NEMA 2018 ANNUAL MEETING

La Cantera Resort and Spa
San Antonio, Texas
November 14 and 15

The Alternating Currents of Economics, Politics, and Technology

Early Bird Registration

June 1–August 31

Attendee Fee | \$895

Registration

September 1–November 7

Attendee Fee | \$995

Hotel Reservations

Room Rate | \$249

Sponsorship opportunities still available

For more information, visit www.nema.org/annual-meeting.





officers

Chairman

David G. Nord

Chairman, President & CEO
Hubbell Incorporated

Vice Chairman

Mark Gliebe

Chairman & CEO
Regal Beloit Corporation

Treasurer

Theodore D. Crandall

Senior Vice President
Control Products and Solutions
Rockwell Automation

Immediate Past Chairman

Michael Pessina

Co-CEO & President
Lutron Electronics Co., Inc.

President & CEO

Kevin J. Cosgriff

Secretary

Clark R. Silcox

The NFL season is just around the corner. When I watch the New York Giants play, I appreciate that no matter how good an individual player may be, it is the entire team that wins or loses. A quarterback may have a near-perfect pass rating, but unless his offensive line and receivers are tuned to each other, the team probably loses, and the fans go home frustrated.

The same concept applies to energy efficiency in the electroindustry. NEMA Member companies are renowned for products that are safe, reliable, and efficient. Each of these attributes has different defining characteristics: Safety is based on deep scientific study of electricity and its applications in the real world; reliability results from applied production engineering and quality; and efficiency arises from design excellence and manufacturing expertise.

Even as we manufacture and employ the most effective individual components, each has technical and economic limitations. The sum of their device-level efficiency is not commensurate with system-level efficiency. Attaining that pinnacle involves not only understanding product efficiency, but employing analysis and application expertise.

Whether we're talking about lighting, HVAC, wastewater treatment, microgrids, or medical imaging informatics, a systems approach relies on the interactions of components within and among its individual parts and ultimately drives consumer satisfaction. According to the American Council for an Energy-Efficient Economy, quantifiable non-energy benefits have been estimated to range from 25 to 50 percent of the total benefits of energy efficiency across all sectors.

Government efficiency standards, however, remain focused on the product level alone. Nearly half of the electricity consumed in the manufacturing sector is used for powering motor-driven products, such as fans, pumps, conveyors, and compressors. Improving efficiency of an entire system, rather than just improving the efficiency of individual motors, holds greater potential for energy savings. In fact, according to the U.S. Energy Information Administration, more than 70 percent of the total potential motor system energy savings is estimated to be available through system improvements.

NEMA and others need to show regulators an approach to system analysis that is at least neutral—if not advantageous to—Member companies. The Internet of Things should hasten the trend to systems thinking across virtually all NEMA/ MITA sectors. This will likely introduce a whole new family of Standards and other technical and policy work that NEMA is optimally positioned to deliver.

While politicians and policymakers wrestle with the complex issues of the day, manufacturers are wise to keep their focus on what drives the economy over the longer term. We make things so that they perform precisely as individual components and achieve optimized outcomes within a systems environment.

On our field, customers—our fan base—know they can depend on us to navigate the complexities of the game in ways that will make their lives systematically better. 🏈

David G. Nord
Chairman, NEMA Board of Governors

NEMA Urges Administration to Minimize Collateral Damage from Tariffs

Craig Updyke, Director,
Trade and Commercial
Affairs, NEMA

In formal statements to an interagency committee chaired by the Office of the U.S. Trade Representative (USTR), I called on the Administration to minimize collateral damage on NEMA Members from additional U.S. import tariffs proposed on Chinese-made products.

Although NEMA agrees with the Administration's goals and concerns about China's intellectual property practices and industrial policies, tariffs are a blunt instrument that delivers a tax increase for U.S. manufacturers and their industrial, commercial and residential customers

"NEMA Members have remained competitive in the open global economy of the 21st century in part by investing in extensive international supply chains based on comparative advantages," NEMA President & CEO, Kevin Cosgriff, said in a recent press release. "Broader market access has fostered innovation, productivity, and growth opportunities for manufacturers, enabling them to service a larger, more diverse customer base and tap the highest quality inputs. These developments have benefitted consumers in the United States and around the world."

In comments filed July 23, NEMA reiterated that the benefits of openness in international trade are diminished to the extent that trading partners violate internationally agreed trade rules and norms.

Consequently NEMA will continue to support USTR actions to defend the U.S. market from unfair practices as long as they follow a targeted approach that supports U.S. manufacturing while also bringing about change in Chinese policies and practices.

NEMA suggested that steps taken should minimize collateral damage associated with higher tariffs and be narrowly targeted and time-limited so as to produce negotiated outcomes that restore and, whenever possible, advance openness and fairness. The NEMA statement to USTR posed the following question: If the purpose of these tariffs is to get the other party (i.e., China) to the negotiating table, our industry for one would like to know when those negotiations are to begin?

Read NEMA's full written comments at www.nema.org/ustr-testimony-section-301.

NEMA-SCOPE CHINESE PRODUCTS TARGETED FOR MORE TARIFFS

On June 20, USTR issued a draft list of 284 products from China, representing a value of \$16 billion that could face 25 percent tariffs. Of those products, at least 30 are of direct interest to NEMA Members, including certain electric motors, electronic components, wireless lighting dimmer units, integrated circuits and electricity meters.

Tariffs on these 30 items would amount to \$500 million in import taxes, in addition to the \$2 billion in tariffs on Chinese NEMA-scope products implemented on July 6, NEMA said in formal written comments to USTR.

I testified that NEMA recommends any tariffs be applied for as short a time period as possible, as a precursor to a negotiated outcome that addresses the Chinese practices at a public hearing on July 24. I also said that NEMA urges the Administration to narrow the scope of the proposed tariff list, so it does not do disproportionate harm to NEMA Members' U.S. production.

Specifically, NEMA called for exclusion from the tariff list product inputs for which non-Chinese substitutes are not readily available, that come from wholly owned U.S. facilities within China or that have a high percentage of U.S.-made content.

NEMA is also consulting with Member companies and preparing testimony, and written comments on a third round of tariff proposals from the Administration announced July 10, targeting \$200 billion in Chinese products. A public hearing on the proposals is scheduled for August 20-23; pre-hearing written comments are due to USTR by August 17.

In addition to a wide range of industrial metals and materials, including some rare earth materials and permanent magnets, the list includes NEMA-scope products including single-phase electric motors, aluminum stranded wire, ceramic insulators, carbon electrodes, certain electrical transformers, static converters, plugs and sockets, halogen lamps, lighting ballasts, luminaires, and certain types of primary batteries.

For more information, contact Craig Updyke at craig.updyke@nema.org.

Manufacturers and Suppliers Convene at Wire and Cable Forum

Photos by Pat Walsh

The NEMA Wire and Cable Industry Forum, sponsored by the Copper Development Association (CDA), drew electroindustry executives from leading North American wire and cable manufacturers and material suppliers to Washington, D.C., on June 26. The agenda covered economic trends, international trade developments, and technical advancements shaping today's rapidly changing marketplace. ©



CDA Director of Sustainable Electrical Energy Zolaikha Strong summarized copper's role in the electrification of energy technologies.



Kristen Smith, trade remedies lead at Sandler, Travis & Rosenberg P.A., clarified aspects of U.S. tariff initiatives and the future of international trade in wire and cable.



NEMA Industry Director Suzanne Alfano prepared the podium for Southwire OEM Division President Winn Wise, who discussed emerging trends.



Encore Wire President & CEO Dan Jones presided over the day's events.



Encore Wire Vice President of Sales & Marketing Kevin Kieffer examined issues affecting the wire and cable market.




Assistant U.S. Trade Representative for Intergovernmental Affairs and Public Engagement Gregory M. Walters provided an update on NAFTA negotiations.



NEMA Vice President and Chief Economist Donald R. Leavens, PhD, presented an economic outlook for wire and cable.

NEMA Welcomes New Members

 <p>Imagen Medical Imaging Informatics imagen.ai</p>	 <p>Varex Imaging X-Ray Imaging Products www.vareximaging.com</p>
 <p>LUX Products Corporation Residential & Commercial Controls www.luxproducts.com</p>	 <p>VISUS Health IT GmbH Medical Imaging Informatics www.visus.com</p>
 <p>New England Wire Technologies Corporation Flexible Cords Group High Performance Wire and Cable Magnet Wire www.newenglandwire.com</p>	 <p>Zionexa US Molecular Imaging, PET www.zionexa.com</p>
 <p>PKG Inc. Ultrasound Imaging pkguis.com</p>	 <p>ASSOCIATE MEMBERSHIP MRO Supply Wholesale Trade www.mrosupply.com</p>

The RIGHT Box for the RIGHT Environment

The Scepter® JBox™ with Hinged Cover opens more than 200° for complete and easy access to control devices and instruments. 100% non-metallic, this box is ideally suited for indoor and outdoor industrial, MRO and OEM applications and in wash-down environments. The Scepter JBox with Hinged Cover is suitable to be used as an enclosure per section 18 of UL 508A and is NEMA 12 rated for industrial use providing protection from contact and from harmful effects; dust-tight and drip-tight.

Available on all 8" to 16" Series JBoxes, the Hinged Cover features:

- ✓ A removable cover that opens more than 200°
- ✓ Back panels available for all sizes
- ✓ Standoffs are molded-in to accept back panels as well as DIN rails
- ✓ Hand-close fastener tabs

ipexna.com | 1-800-463-9572



Products manufactured by IPEX Electrical Inc. and distributed in the United States by IPEX USA LLC. Scepter® JBox® is a trademark of IPEX Branding Inc.




BOOK-A-SPEAKER



Kirk Anderson, NEMA industry director of industrial systems, presented “Using NEMA Premium and Similar Programs to Implement Effective Energy Savings Programs” at the Chilean Energy Efficiency Agency’s seminar High Efficiency Motors, June 27, in Santiago, Chile.




Paul Orr, NEMA program manager, will speak on the ANSI standards development process at the Consortium for Universal Healthcare Credentialing Fall Summit in Chicago, October 25 and 26, 2018.

Do you need an electroindustry subject matter expert to speak at your next event? Contact book-a-speaker@nema.org or visit www.nema.org/book-a-speaker. 

Thanking John Williamson



Atkore President and CEO John Williamson (center) was honored for his outstanding service by the NEMA Board of Governors at its July meeting. Mr. Williamson, who will retire this year, served on the Board of Governors, NEMA Section Affairs, and Government Relations and Communications Committees. NEMA President and CEO Kevin J. Cosgriff (left) and Chairman of the Board David G. Nord, Chairman, President, and CEO of Hubbell Incorporated, praised Mr. Williamson for a history of benefitting his company and the industry. Photo by Don Leavens 



RETROFIT AWAY.

*We want to make a confession. We like **EASY.***

Universal's SOLUTIONS put you in CONTROL.

Learn more at <https://unvlt.com/products/led-retrofit-kits-luminaires> or call 615.316.5322.

 **Universal**
Lighting Technologies

A member of the Panasonic Group

Panasonic

Motors, Drives, and Systems: Getting to Real Energy Savings

Kirk Anderson,
Industry Director,
Industrial Products
and Systems
Division, NEMA

Prior to joining
NEMA, Mr.
Anderson served
in roles of
principal engineer
and business
development
manager for motors
and generators at
UL. He was named
the first IEC motor
energy efficiency
expert in 2016.

In the decades since the oil crises of 1973 and 1979, countries around the world have been looking for ways to save energy.

Energy savings often start with motors. They are the invisible force behind the compressors in our HVAC systems, the pumps providing water to our homes, and fans of every sort. They make up a vast majority of electrical energy used for industrial applications, with some estimates as high as 70 percent, and roughly 40 percent for all electricity consumed. Because of this, most of the initial efforts to reduce energy usage were focused on improving the efficiency of the motor.

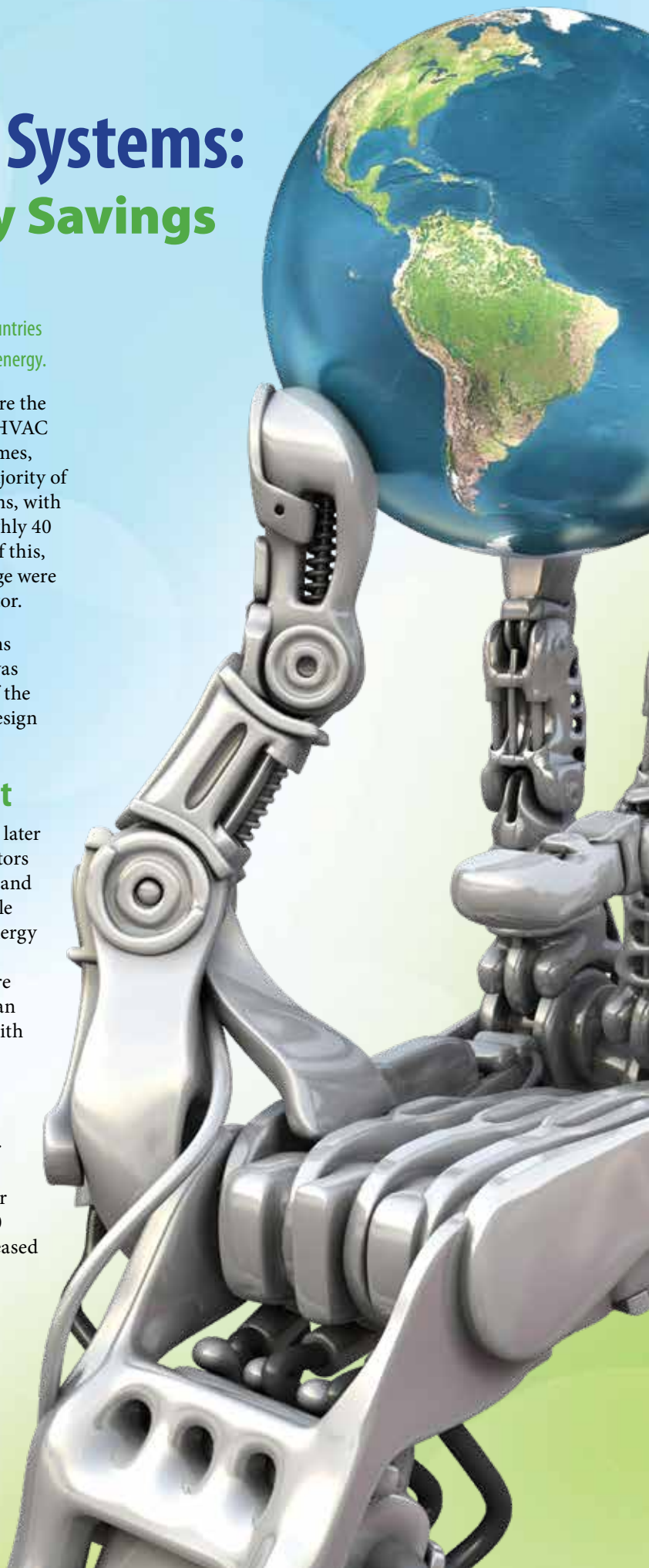
When the original energy-efficiency regulations and standards were developed, the efficiency was measured at a single point. This makes sense if the product is operated continuously at its rated design point (100 percent).

When Efficiency Is Not Efficient

NEMA introduced high efficiency (~1990) and later (2001) NEMA Premium® energy-efficiency motors programs. These are roughly analogous to IE2 and IE3 efficiency classifications, respectively. While this resulted in significant improvements in energy efficiency, the quest to save energy continued. Unfortunately, we have come to the point where simply increasing the efficiency of the motor can significantly increase the cost to build it, but with little real energy savings.

Unless significant redesign takes place in the final application, retrofitting an existing application with a newer high-efficiency motor can result in *no energy savings*. The reason for this is that higher efficiency motors have higher base speeds. If the motor is operated below 100 percent load (which is often the case), the increased rotational speed results in increased energy being consumed.

If simply replacing an old motor with a higher efficiency motor isn't the solution, what is?



To answer this question, we need to look at two characteristics that can result in significant energy savings: shifting the focus to the overall efficiency of the system and use of motors with variable speed capability.

Overall System Efficiency

Take, for example, a 10 hp motor. The efficiency rating of a standard efficiency motor (IE1) is 86 percent; a NEMA Premium efficiency (IE3) motor is just over 90 percent. Gears are commonly used with motors and affect the overall efficiency of the system. A low-cost gear may reduce it in half. Conversely, using the best gear might only affect the system efficiency by a couple points. Knowing this, it's easier to see that looking at the system might result in greater energy savings than simply focusing on the motor.

To better understand this concept, consider if your car's engine only operated at optimum efficiency (e.g., 55 mph). The only way to adjust the overall speed of the car would then be to use the brakes. You can imagine how much energy would be wasted sitting in traffic while the brakes kept the car stationary and the engine continued to work at the same output.

This is how traditional energy efficiency was measured: at a single (fixed) point, without regard to real-world variability.

Obviously that would be a car few people would want to drive. This is where system efficiency helps.

System efficiency takes a broader view and tries to look at the overall installation.

By evaluating the overall system, incorporating the variability of loads, and determining how long the application operates at each point, the designer can incorporate variable speed technology or otherwise optimize the design to maximize energy savings. This benefits the user, since this often translates into real energy savings.

In a system efficiency world, our car would now have an adjustable gas pedal that can vary the speed so that it's only driving the engine as fast as necessary for the speed of traffic, thus saving a lot of brake pads and a ton of gas!


Because most applications operate at a variety of load points, a motor with a drive can yield tremendous energy savings. Combining a motor with a drive in applications with variable loads can effectively increase the energy savings by 20 percent and as much as 60 percent in some applications.

By combining a motor with a drive in applications with variable loads, you can effectively increase the energy savings by 20 percent and as much as 60 percent in some applications.

These two concepts—variable speed capability and system efficiency—are the keys to reducing energy use. Since not every drive and motor combined will result in optimal savings, NEMA Member companies worked closely with the international community to create a Standard that establishes a system efficiency classification, the International Efficiency of Systems (IES). Basically, this helps users select a combination motor-drive system, usually referred to as a power drive system (PDS), or pair a motor with a drive (referred to as a complete drive module), and know how it will perform in an application, across virtually any load point.

This helps system designers and users get to what everyone wants: real energy savings.

NEMA will drive this solution by updating the NEMA Premium program to support system efficiency classifications. Over the next several months, you can expect to see more motors, drives, and PDSs entering the market from the best manufacturers in the business with both a NEMA Premium mark and an IES classification. This will give users and installers the confidence they need that they are actually saving the most energy possible across the entire range of use in the application.

Look for updates by visiting www.nema.org/nema-premium. 

Drive and Motor Technology Proven Effective

Kirk Anderson,
Industry Director,
Industrial Products
and Systems
Division, NEMA

The energy-saving benefits of using drive and motor solutions from a single supplier were noted in a 2015 report by Energimyndigheten, the Swedish Energy Agency.¹

Energimyndigheten investigated efficiency claims by manufacturers of electric motors of various efficiency classes when used in a pump application and supplied with a drive. It was in response to the 2015 European Union Ecodesign directive² requiring that new electric motors 10 hp to 500 hp (7.5 kW to 375 kW) meet minimum EU efficiency requirements.

Electric motor systems are estimated to account for 65 to 70 percent of the total electricity used in industry and almost 40 percent of total electricity use. It is estimated that more efficient electric motors could save around 135 terawatt hours (tWh) of electricity annually in the EU by 2020. Electric motors often run around the clock, throughout the year. They drive fans, pumps, compressors, and power systems such as elevators, escalators, and large air conditioning or refrigeration units.

The agency tested electric motors rated at 20 hp (15 kW), 1,500 rpm. Motors representing different efficiencies (IE0, IE2, IE3, and IE4) and different technologies were compared. IE0-rated motors were included because they represent the vast majority of installed motors in industry.

The investigation analyzed the characteristics of three induction (asynchronous) motors, corresponding to efficiency classes IE0, IE2, and IE3. See Table 1. The study also included two newer technologies, permanent magnet and synchronous reluctance designs, both with an IE4 efficiency class to provide an overview of the energy savings possible with newer technologies.

Choice Affects Function

Test results confirmed fixed speed induction electric motors run at a higher nominal speed as their efficiency increases. This can negatively affect the function of products that the motor is attached to.

For example, if a water pump is installed with a newer more efficient motor, it will pump faster. But because it is pumping faster, it will also use more energy. On the other hand, a variable speed control solution can adjust the speed of the motor, therefore optimizing energy use. Simply exchanging an IE0 motor with an IE3 fixed speed will not save energy because the rotational speed increases (which also increases energy use), unless other modifications are made to the system.

The results summarized in Table 1 show the additional energy savings possible when employing motors with higher efficiency classes compared with adding a drive with to a standard IE0 motor. Note that the IE2 motor had marginally higher energy savings compared with the IE3 motor. This was possibly because the drive and motor were not being properly optimized as a system.

When the drive is specifically paired with the motor, as in the two IE4 examples, the energy savings is comparable to installing a motor with two to three efficiency classes above IE3 motors without a drive and installing a paired motor-drive combination can result in annual savings of up to 6 percent of the cost of electricity and the equivalent of the annual electricity for a family of four (at least in Sweden). ☺

¹ www.energimyndigheten.se/tester/tester-a-o/elmotorer-15-kw

² Ecodesign directives 0.75 to 375 kW motors (Lot 11) and electric motors and speed controls (Lot 30)

Table 1. Characteristics of three induction (asynchronous) motors, corresponding to efficiency classes IE0, IE2, and IE3

20 hp (15 kW) 1,500 rpm	Efficiency class	kWh/y on a pump	Efficiency gain from non-IE	Annual savings at 0.10€/kWh from reference
Induction	IE0	96,943	0%	Reference
Induction	IE2	94,607	2.4%	233€
Induction	IE3	95,240	1.8%	170€
Synchronous reluctance	IE4	92,658	4.4%	429€
Hybrid permanent magnet	IE4	91,249	5.9%	570€

Note: all motors were tested using a drive under a variable load protocol.

CASE STUDY

HVAC Retrofit Returns 53 Percent in Savings

When a prominent developer, investor, and manager of commercial properties in Northern California and Northern Nevada retrofitted seven rooftop HVAC units with Software Motor Company (SMC) motors, it saw total annualized HVAC fan energy savings of 53 percent.

The company, with more than four million square feet under management, is committed to sustainable and resilient asset management, including energy performance improvement across its portfolio.

APPROACH

The company had a specific goal to optimize HVAC system energy efficiency and make it intelligent. The ideal HVAC solution would:

- remotely correlate rooftop unit (RTU) motor data with thermostat data collected by its building automation system;
- evolve from scheduled to predictive maintenance operations and dynamic maintenance scheduling; and
- feature remote monitoring and fault detection for better service quality so its facilities team could respond to HVAC issues before customers had complaints about how the system was performing.

PROJECT SCOPE

Pilot to retrofit a property's seven RTUs by replacing existing 1 hp fixed speed induction motors with 1 hp smart motors

BUILDING LOCATION

20,000-square-foot building in Santa Rosa, California

SOLUTION: SMART MOTOR SYSTEM

The smart motors feature a patented switched reluctance design. Industry results highlight exponential improvements against standard induction motors in performance capabilities including:

- Torque
- Power density
- Efficiency
- Versatility

The smart motor system combines Internet of Things (IoT) building automation technology to help building operators, facility managers, and certified contractors create intelligent and efficient energy systems.

It provides real-time visibility and actionable insights for key components of commercial and industrial buildings. The motors use electricity only when needed to perform useful work and are less expensive to own and operate than conventional induction motors.

Paul Wickberg,
Executive Vice
President of
Sales, SMC

RESULTS

By replacing seven induction motors in RTU applications with smart motor systems, the company realized:

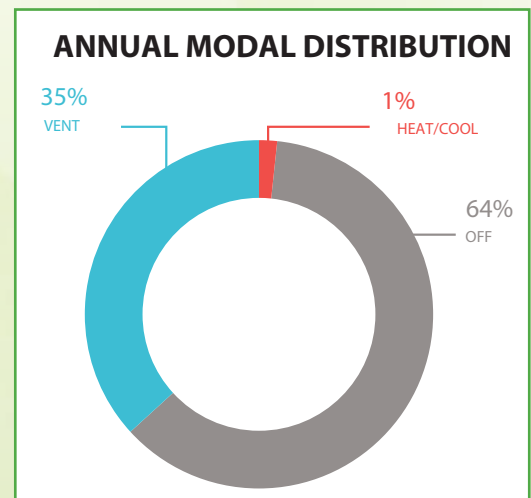
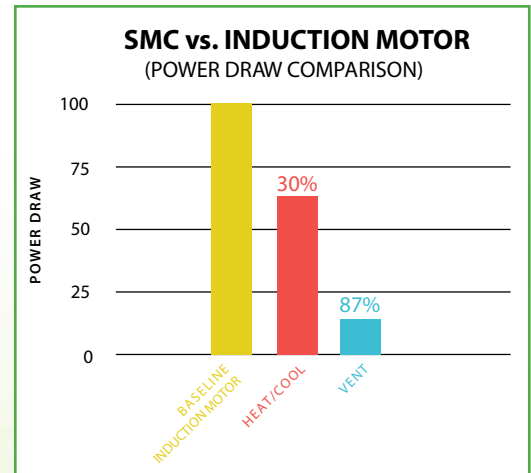
- total annualized fan energy savings of 53 percent;
- power draw savings of 30 percent in heat/cool mode (1,550 RPM) and 87 percent in vent mode (690 RPM); and
- monthly energy savings of 881 kWh with energy use reduced from 1,659 kWh before the project to 778 kWh after it.

The system's remote monitoring capabilities also let SMC detect when a motor pulley broke and alerted maintenance teams that it needed to be fixed.

CONCLUSION

By replacing seven motors in its RTU HVAC system, the company achieved total annualized fan energy savings of 53 percent. The significant energy savings and reduced peak demand shrank the building's carbon footprint and improved the company's operations tied to sustainability and resiliency.

The simple motor design and predictive maintenance capabilities made the system more reliable and resilient. Equally important for a company that owns and leases office space, the company could better monitor and control comfort levels for the building's occupants. ☞



Water Delivery More Reliable with Systems



Alex Boesenberg,
Senior Manager,
Government
Relations, NEMA

Although water is easily dismissed as not related to energy, that is far from the case.

Thousands of horsepower are required to pump water reliably over hundreds of miles of utility piping to commercial and residential customers who expect nothing less than clean, fresh water delivered at sufficient pressure when they open a tap. The reliable delivery of potable water also involves metering, controlling, and maintaining water utility systems, spread out over many square miles.

Most ownership models (e.g., private, for-profit, and municipal) do not lend themselves to upgrades and efficiency. Cost management and the immediacy of casualty repair lead to systems that are built or repaired to designs that lack the ability to thoroughly diagnose, monitor, and control energy and water consumption. While highly controllable water utility system equipment exists, it is not sold as frequently as it might be because of cost sensitivity.

Learn more at www.waterenergytoolkit.org.

Enter energy savings performance contracts (ESPCs). When planned and executed well, a partnership between utility owners and operators and an energy service company (ESCO) enables an excellent balance of business realities and energy efficiency. The ESCO model is not new, but its application to the water sector continues to grow.

The arrangement creates a win-win situation:

- A contractor is empowered to select the best and most capable components for a system that can be efficiently monitored and administered.
- The contracting owner sees reduced energy consumption, improved performance, and, because of the way many contracts are written, clear, budget-friendly energy cost figures for yearslong budget cycles.

Increased use of digitally linked sensors facilitates monitoring and control. Leak detection is improved and proper long-term management of large capital assets (especially pumps and electric motors) helps managers both forestall and foresee maintenance needs.

The age of existing capital systems also lends them to energy upgrades in other areas, such as lighting, where LED retrofits of older, less-efficient technologies can provide significant savings to offset other long-payback capital purchases like large electric motor/pump installations. There are few secrets related to accomplishing these broad, component-partnering upgrades, but all too often they are impeded by obstacles in local planning and budgeting processes.

NEMA is encouraged by the continued interest and investment in ESPCs for water utilities. ESCOs can provide useful proposals, and water utility owners seeking to make their own investments can use online materials, such as the reports¹ and findings from NEMA's 2015–2016 Strategic Initiative for Increasing Energy Efficiency in Urban Water Systems, available on the NEMA website. ☉

¹ <https://www.nema.org/Standards/Pages/Increasing-Energy-Efficiency-in-Urban-Water-Systems.aspx>

CASE STUDY

City Upgrades Water Meters with Smart Infrastructure Project

For years, city leaders in Martinsville, Virginia, knew that a replacement for thousands of water meters was inevitable. Upgrades like these are a necessary but significant capital expense for any municipality, and Martinsville was able to make the project a reality without raising resident taxes or fees.

The local government experts at Johnson Controls partnered with Martinsville to plan, prioritize, and enable the improvements through an energy savings performance contract (ESPC). Through the ESPC, the \$7.8 million of infrastructure improvements are offset by guaranteed energy and operational savings.

Thousands of aging water and electrical meters were replaced with advanced metering infrastructure. These new meters reduce maintenance costs and ensure full revenue from utility payments for the city by guaranteeing accurate metering for a full 20-year period. Data can be captured electronically and viewed from city offices; this completely streamlines the meter reading process by removing the need to visit each home and business one by one.


With real-time insights and data, the city has elevated customer service to a new level. Automatic alerts about unusual activity are flagged to the city in real time, providing an opportunity to proactively reach out to



Photo courtesy of Johnson Controls

homeowners and business owners and let them know that they may have a leak or an electrical issue, such as an outage or a fire risk.

In addition to meter upgrades, the city replaced 3,000 streetlights with new LED lighting for a more high-quality, consistent, and cost-effective lighting solution.

The yearlong water meter upgrade project was completed in March 2017 in tandem with lighting and electrical meter upgrades. The initiative is expected to deliver \$582,000 in savings each year. 

Dennis Siegert,
Water Director,
Johnson Controls

Learn More About ESPCs

According to the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE), an energy savings performance contract (ESPC) is a budget-neutral approach to make building improvements that reduce energy and water use and increase operational efficiency.

By partnering with an energy service company (ESCO), a facility owner can use an ESPC to pay for today's facility upgrades with tomorrow's energy savings—without tapping into capital budgets. State and local governments can implement these projects in their own facilities, as well as promote and support them through ESPC programs.

Ideal candidates for ESPC projects include any large building or group of buildings such as city, county, and state

buildings; schools; hospitals; commercial office buildings; and multifamily buildings. The size and scope of projects are governed by the savings opportunities in facilities, the types of funding sources that can be applied, the minimum size project an ESCO is willing to manage, and the financing capability.

Government facilities are generally good candidates for ESPC projects, because with long-term ownership of the facilities, governments allow for 10- to 20-year financing terms. In contrast, commercial facilities often have a three-year payback threshold and may reject a comprehensive ESPC.

Learn more at www.waterenergytoolkit.org and visit the EERE ESPC Toolkit at <https://betterbuildingsolutioncenter.energy.gov>. 



Responsive Lighting Systems Enhance Energy Efficiency

Peter Lafreniere, Cable Product Manager for AFC Cable Systems, Inc., a part of Atkore International

Mr. Lafreniere leads product strategy for the Cable Solutions business unit's cable product line and is responsible for its strategic innovation initiative.

According to the United States Department of Energy (DOE) *Building Energy Codes Program: National Benefits Assessment*,¹ commercial and residential buildings account for approximately 41 percent of all energy consumption and 72 percent of electricity usage in the United States.

Because of this, the DOE has a vested interest in developing national codes to support the improvement of energy efficiency in buildings. When properly followed, these codes reduce energy use and greenhouse gas emissions over the life of buildings.

The DOE implemented the Energy Policy Act of 1992 (EPACT92) to outline various measures designed to lessen the nation's dependence on imported energy, provide incentives for clean and renewable energy, and promote energy conservation in buildings. EPACT92 gave rise to the Building Energy Codes Program, providing a comprehensive collection of resources, model adoption policies, compliance software and tools, and training modules based on best practices related to energy codes.

Now, nearly every state in the U.S. requires some form of energy efficiency in commercial spaces. Builders must comply with energy codes as stringently as they comply with codes for health and safety. The benchmark for commercial building energy codes in

the U.S. is ANSI/ASHRAE/IES Standard 90.1-2013, which sets the minimum requirements for energy-efficient design and construction of new buildings as well as new systems in existing buildings.

Lighting energy consumption accounts for a disproportionate amount of a commercial building's energy use. Whether through behavioral practices (e.g., lights left on when there are no occupants in the room), lighting design, or lighting controls that are set beyond a comfort level, there are various reasons lighting is the culprit of many energy-efficiency issues.

To account for this, Standard 90.1 requires some method of automatic lighting shutoff based on power allowance calculations. One of the mandatory lighting control requirements states that automatic lighting controls must be able to dim the fixtures closest to windows in the primary zone depending on how much daylight is hitting task surfaces. Controls must also respond separately for the secondary zone, thereby necessitating multiple zone controls.

Zones are established based on a combination of factors. The challenge is to minimize the number of control zones (as each control zone adds to cost) while ensuring maximum response of the control system to daylight availability to save the most amount of energy while providing appropriate lighting.

Daylight Harvesting Critical

Daylight harvesting is an energy-efficient lighting design that reduces energy consumption by adjusting the amount of artificial lighting used to illuminate a space based on the amount of daylight coming in. It also meets Standard 90.1 requirements when implemented properly. Lighting control systems are used to dim or adjust electric lighting in response to changing daylight availability, so when daylight penetrates into spaces, the amount of artificial lighting is reduced automatically.

Daylight harvesting systems automate this process, removing the human element of control by using a light sensor equipped with a light-sensitive photocell to measure light levels. This information is sent to a controller that is connected to the lighting control system that will dim or switch lights in response to the measured level.

Depending on a facility's need and application, daylight harvesting controls may be implemented through open-loop or closed-loop systems. Both can impact businesses' people, productivity, and energy savings.

Open-loop systems measure only the natural light coming in and do not measure the interior electric lighting. The light sensor is typically mounted outside of the building or near a window facing away from controlled light fixtures. In an open-loop system, lighting is adjusted based solely on natural light. It is often preferred for applications that are not dependent on accuracy or in outdoor environments such as a hallway or atrium, parking lot, or garage.

Closed-loop systems, which are generally considered more accurate, measure the combined contribution from both natural and electric lighting. The light sensor measures real-time light levels and control is typically limited to a single zone per sensor. Closed-loop is common in applications where a specific target light level is configured and will be closely maintained. It is also used for precise task-based lighting levels and where people remain in the space, like in small offices, classrooms, museums, and studios.

Daylight harvesting reduces energy consumption and saves money on lighting costs by using natural resources in place of electric lights. The combination of natural and artificial light also offers the best of both worlds—the productivity boost of natural light combined with the predictability of an artificial lighting system.

Moving Toward Sustainability

The estimated cumulative benefits from the Building Energy Codes Program through 2040 are significant. The cumulative energy savings attributed to the program will total nearly 46 quads of full-fuel cycle energy in 2040, or 44 quads of primary energy, equivalent to almost an entire year's worth of primary energy consumption from the U.S. residential and commercial sectors at current consumption rates. Cumulative carbon savings by 2040 are estimated at 3,478 million tons.²

Lighting manufacturers are moving toward sustainability through the proliferation of efficient light-emitting diode (LED)-based products. This adaptation is also driving the use of dimmable fixtures. LEDs may be finely adjusted, operating in a continuously dimmable range from 10 to 100 percent.

Electrical manufacturers are also developing products that provide an economical method to wire controlled lighting, such as a cable that contains power and control conductors under one armor. Another technology allows control for up to three dimming zones, combining electric lighting and control circuits within a single interlocked armor, which can replace up to six individual cable runs, increasing productivity and reducing costs, and providing the building owner with a secure lighting system.

As technology advances and buildings become smarter and more connected, building energy codes have responded by becoming stricter. As a result, the ASHRAE Board of Directors voted to place Standard 90.1 on continuous maintenance. As new limits appear in ASHRAE 90.1 and the International Energy Conservation Code®, manufacturers are implementing new controls to meet the limits.

Future Is Bright

Conserving lighting use and adopting more efficient technologies can yield substantial energy savings. Some of these technologies and practices have no upfront cost while others pay for themselves over time in the form of reduced building costs.

Design principles like daylight harvesting are becoming common practice, not only to provide better working environments and higher levels of worker satisfaction and productivity but also to increase energy efficiency. Because manufacturers are taking note and continuously adapting to more progressive and enhanced technologies, the future of responsive lighting systems is bright. ☺

NEMA's LED Dimming Compatibility Program helps consumers find LED bulbs and dimmers that work together. Visit www.nema.org/led-dimming to learn more.

1 "National Benefits Assessment, 1992-2040," *Building Energy Codes Program*, March 2014, <https://www.energycodes.gov/building-energy-codes-program-national-benefits-assessment-1992-2040-0>

2 DOE Energy Efficiency & Renewable Energy, "Codes Fact Sheet," April 2015, <https://www.energy.gov/sites/prod/files/2015/07/f24/Codes%20Fact%20Sheet%207-10-15.pdf>

Wire and Cable Manufacturers Connect on Trade in D.C.




On June 27, volunteer Members of NEMA’s various wire and cable product groups participated in a series of meetings coordinated by NEMA Government Relations on Capitol Hill and with two Executive Branch agencies responsible for trade policy. The meetings built on themes from the NEMA Wire & Cable Industry Forum held the previous day (see page 5).

NEMA Members spent the morning meeting with staff members responsible for trade policy in the Senate offices of Majority Whip John Cornyn (R-TX), Ted Cruz (R-TX), David Perdue (R-GA), and Doug Jones (D-AL). Discussion topics included the Administration’s tariffs on aluminum imports and planned tariffs on many Chinese-made products, including some types of electrical wire and cable.

A 10 percent tariff on imports of aluminum rod, which is used to manufacture aluminum stranded wire, went into effect for suppliers in Canada,

Mexico, and the European Union on June 1, following the March 23 implementation date for other countries. However, the market impact was felt as early as March 1, when President Trump first announced the tariffs. On June 20, the Office of the U.S. Trade Representative (USTR) announced 25 percent tariffs on aluminum and copper wires and cables from China, effective July 6, and proposed the same level of tariffs on additional products.

In the afternoon, a larger group met with Nazak Nikakhtar, Assistant Secretary of Commerce for Industry and Analysis, to discuss the Administration’s tariff initiatives. In her position since March, Ms. Nikakhtar acts as the Commerce Department’s primary liaison with U.S. industry and trade associations “to help address industry concerns and support American competitiveness.”

For the day’s final meeting, the NEMA group visited USTR staff members responsible for industrial metals at the agency’s Office of Small Business, Market Access and Industrial Competitiveness. In part, the office handles negotiations with foreign governments related to the Administration’s tariffs and quotas on steel and aluminum imports. 

Scott Wilde of Superior Essex (left) and Ravi Ganatra of CME Wire and Cable were among the Members participating in the June 27 wire and cable lobby day on trade and tariffs. Not pictured is Seth Weisberg of Service Wire Company. Photo by Craig Updyke

SPOTLIGHT



Stephen Tuckwell, Vice President and Business Line Manager, ELANTAS, PDG, Inc.


I Am the Electroindustry

For nearly 40 years, I have been working with magnet wire enamel, impregnating varnishes, and other insulating materials. As a chemist, I find it to be a fascinating field—one that I’m always trying to explain to new electrical engineers. Simply put, insulating materials are primary materials that enable motors and transformers to work. That’s because they keep electricity where you want it to be.

When we build an electromagnetic device, such as an electric motor, magnetic forces are created by wire coils that are made of magnet wire, which is coated with an electrical insulating layer known as enamel. It is important to keep individual wires insulated from each; otherwise the motor or transformer will short and fail.

Since insulation also keeps the user from coming into contact with the electricity that is powering the device, it is integral to its safety.

Standards are very important in the electrical insulation industry. Customers need to meet all the electrical standards associated with manufacturing motors and transformers, especially as they relate to electrical insulation. Thus, insulation standards become part of the product standards.

The electrical insulation marketplace is very dynamic. There has been much consolidation among its manufacturers over the last few years. They must work closely with electric device manufacturers to ensure the development of new ideas and enable the electric motor and transformer manufacturers to continue to meet new market requirements. Being a voting representative in the electroindustry is, in essence, a matter of survival. 

Postponement of Code Adoption Impacts Safety

Several states in the Northeast have not yet adopted the 2017 *National Electrical Code*® (NEC). The obstacles to adoption—whether administrative, legislative, or regulatory—are frustrating because they postpone the credibility of new products and installation changes that provide safer electrical systems.

The Connecticut Legislative Review Board (LRB), for example, recently sent back to the State Building Inspector (SBI) a report on changes to the State Building Code because it lacked substantiation for the modifications. The SBI's report contained all the proposed changes that the Codes and Standards Committee (CAS) reviewed and modified over the past two years. The report also reflected changes to the 2015 version of the International Code Council codes (I-Codes) and the 2017 NEC. Although the CAS and SBI's office will provide the additional information to the LRB, the process will push adoption to October 2018 rather than the original date of July 2018.

Meanwhile, the Rhode Island legislature has before it HB 7773, which would remove the NEC and the Rhode Island Building Codes from a mandate requiring a cost analysis for all state regulations. The governor executed an order and a bill was passed to require such an analysis for all regulatory changes. As the NEMA field rep in the area, I was involved in the technical review of the 2017 NEC, but all the work was postponed because of the cost of performing this analysis and the time involved in locating vendors to do it. HB 7773 passed the

House and is now in a Senate committee. The bill focuses on the fire and life safety of building requirements and should not be subject to cost analysis. The analysis is ongoing and the timeline and outcomes are uncertain.

The Maryland legislature has tried over the past two years to promulgate a statewide electrical code. The effort, which has failed passage in committees, would standardize licensing and installation and is tied to statewide licensing for master electricians. The Maryland State Electrical Code is disseminated through the state fire marshal's office and is for state buildings or counties that do not have a separate code adoption process. Some larger counties are in the process of reviewing and preparing to adopt the 2017 NEC, but there is no timeline to meet it.

The mayor of Philadelphia, Pennsylvania, recently signed a bill that would allow the city to adopt several of the 2018 I-Codes and the 2017 NEC for commercial occupancies. A 2017 statute gave Philadelphia the opportunity to jump ahead one cycle of the state's Uniform Construction Code (UCC), which will be based on the 2015 I-Codes and the 2014 NEC. The statute does not allow Philadelphia to update beyond the 2015 International Residential Code (an I-Code). The adoption date for the city and the state is October 1, 2018. The city will be aligned with the state in 2021 and must enforce the UCC at that time. 📍



Remembering Samuel “Keel” Kelly

The recent death of Samuel “Keel” Kelly is a great loss to the battery industry. Keel contributed so much to national and international standards work, both as an individual contributor and working group leader. Much more importantly, he was a fine person and a true gentleman.

Keel was a detail-oriented contributor to ANSI and IEC standards development for nearly 40 years. He brought his passion for quality assurance into the realm of battery Standards. As the long-time convener to IEC TC 35/MT 16 on the safety of primary aqueous electrolyte batteries,

he helped to enhance the global competitiveness of the U.S. battery industry. Keel appreciated how Standards could be used to benefit both industry and consumers. As a result of his long-time commitment and expertise, Keel received the IEC 1906 Award in 2004.

Keel was gifted in so many ways. He was a quiet leader, incredibly efficient, and always able to see a workable compromise. This balance of civility, willingness to listen, and maintaining his own position was a gift. 📍

Setting Standards



The NEMA Codes and Standards Committee posed for a group shot during its June meeting.

First row: Dan Neeser, Eaton's Bussmann Division; Sam Friedman, General Cable; Greg Steinman, Thomas & Betts, A Member of the ABB Group (Chair); Steve Campolo, Leviton Manufacturing Co., Inc.; Marilyn Williams, NEMA; Dave Kendall, Thomas & Betts, A Member of the ABB Group; James Wright, Siemens Industry, Inc.; and George Straniero, AFC Cable Systems, Inc., a part of Atkore International.

Second row: Mike O'Boyle, Signify; Fred Small, Hubbell Incorporated; Ray Horner, Allied Tube & Conduit, a part of Atkore International; Kevin Lippert, Eaton; and Kent Walker, Mersen USA Newburyport-MA, LLC.

Third row: Steve Ruffing, Nidec Motor Corporation; Dave Mercier, Southwire Company; Alan Manche, Schneider Electric; Vince Baclawski, NEMA; Anthony Serres, Signify; and Andrew Berezowski, Honeywell Security & Fire.

Not pictured: Steve Blais, Emerson Automation Solutions; and Steve Rood, Legrand/Pass & Seymour.

Photo by Bill Green

This Month in Standards

Ann Brandstadter

Manager, Standards Publications and Marketing, NEMA

NEMA MGRD R2-2018 *State Regulatory and Policy Considerations for Increased Microgrid Deployment* is a new report published in fulfillment of a NEMA Strategic Initiative. NEMA conducted a study to evaluate the most significant policy barriers affecting microgrid deployment. Based on successful state regulations and policies, NEMA also analyzed solutions that overcame these barriers. This report can be purchased in

hard copy and as an electronic download for \$250. NEMA MGRD R2.1-2018 is a summary of this report offered at no cost.

NEMA MS 5-2018 *Determination of Slice Thickness in Diagnostic Magnetic Resonance Imaging* describes a method for determining the slice thickness of proton images. It is available for \$79 in hard copy and as an electronic download at no cost. ©



Reserve Your Ad Space Now!

2019 Electrical Standards and Product Guide Coming Soon

Upgrade your company listing in the 2019 *Electrical Standards and Product Guide*. Published online, ESPG reaches more than 100,000 buyers, specifiers, contractors, and distributors annually with listings of NEMA Standards and related publications, electrical products, and NEMA Member manufacturers by product type. Advertising is open to all businesses related to the electroindustry. Product listings are available to NEMA Members only.

Reserve your ad space now. Contact Chris Riordan, National Sales Manager, at criordan@townsend-group.com or 202.367.2462.

Mexico's Network Code Key to Grid Modernization

NEMA Mexico participated in Expo Eléctrica, Mexico's biggest international electrical products trade show, held in Mexico City, June 5–7. It featured a panel with representatives of Mexico's energy regulator (CRE), national energy control center (CENACE), and the state-owned electric utility (CFE).

Each speaker noted that improvement of the nation's electrical grid would proceed regardless of which candidate won the July 1 presidential election. Demand for electricity and reliability are growing in Mexico.

Mexico's 2014 constitutional and legislative reforms to the energy sector included the opening of the electricity market to participation from the private sector in January 2016. Private-sector firms are making offers to install new power plants, while CFE retains control of all transmission and distribution lines. In the near future, new T&D lines, such as the DC line to be built in Baja California, may be possible for private companies as well.

CRE, the regulator, will develop regulations and standards for the grid. Faced with growing demand, the federal government published del Sistema Eléctrico Nacional: Código de Red (the Network Code)¹ in April 2016, establishing the minimum technical requirements for the grid for planning and operation of the electrical system. The technical requirements include all parts of the electricity industry: generation, transmission, and distribution. The Network Code is mandatory and CRE is responsible for enforcement and compliance.

The Network Code promotes increased reliability by requiring maintenance of the grid within minimum acceptable limits for voltage, frequency, reactivity, and service interruptions. If service is interrupted, the code requires the re-establishment of the system immediately. Accordingly, the modernization of the electrical system will require reliable electrical equipment and systems for monitoring and automatic management of the grid.

These circumstances point to good opportunities to grow the market for electrical products and systems in Mexico. CRE will require reliable



generation, transmission, and distribution. This will require new investments to replace old equipment, especially in transmission and distribution lines and control and metering equipment.

Through NEMA Mexico, NEMA works with government organizations like CRE, CENACE, and CFE, as well as with CANAME (the chamber of electrical equipment manufacturers) and ANCE (a standards development and testing and certification body), to promote the development of regulations for electrical equipment. ☎

The modernization of Mexico's electrical system will require reliable electrical equipment and systems for monitoring and automatic management of the grid.

Weighing in on Tariff Initiatives

NEMA testified at a public hearing July 24 on proposals made June 20 by the Office of the U.S. Trade Representative (USTR) to place 25 percent tariffs on a range of specific products from China, including certain electric motors, electricity meters, insulating materials, and wire and cable products. See page 4.

Also on July 6, USTR announced a process by which companies can petition to have a specific product exempted from the tariffs for one year, retroactive to July 6. That process closes October 9, 2018.

NEMA is also monitoring the impact of steel and aluminum import tariffs on Members and staying in close contact with Capitol Hill and the Executive Branch trade agencies. For more information on tariffs and trade, consult the NEMA Intelligence Portal, contact Craig Updyke at craig.updyke@nema.org, and follow NEMA's social media posts. ☎

¹ The Network Code is available in Spanish at dof.gob.mx/nota_detalle.php?codigo=5432507&fecha=08/04/2016

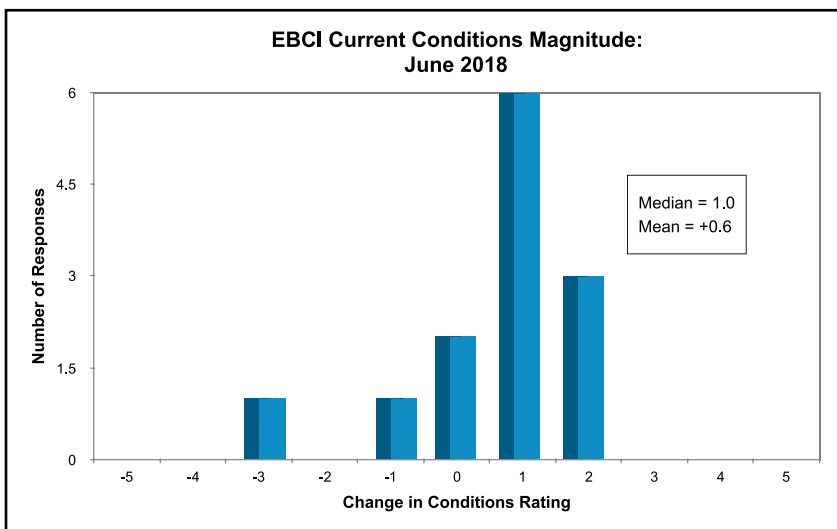
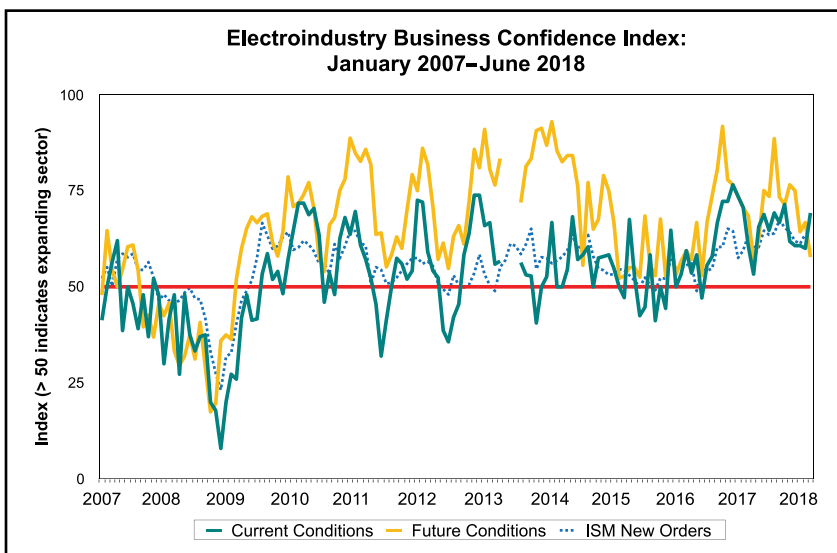
Current and Future Components Move in Opposite Directions as Policy Uncertainty Ramps Up

	Current Conditions (Compared to Previous Month)	Conditions Six Months from Now (Compared to Current Conditions)
EBCI	69.2 ▲	57.7 ▼
% Better	54% ▲	46% ▼
% Worse	15% ▲	31% ▲
% Unchanged	31% ▼	23% ▼

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.



A nine-point jump brought June's Electroindustry Business Confidence Index (EBCI) current conditions component to its highest reading since January. Although a larger share of respondents noted worse conditions, those reporting better conditions constituted a majority in June, helping to bring the overall score to 69.2. The solid topline number was tempered by respondent comments that pointed to an undercurrent of uncertainty along with sector-specific struggles brought about by trade actions and the tax bill.

The reported intensity of change in electroindustry business conditions increased compared to the previous month's measure. The mean value edged up from 0.5 in May to 0.6, and the median value moved from 0 to 1 in June. Panelists are asked to report intensity of change on a scale ranging from -5 (deteriorated significantly) through 0 (unchanged) to +5 (improved significantly).

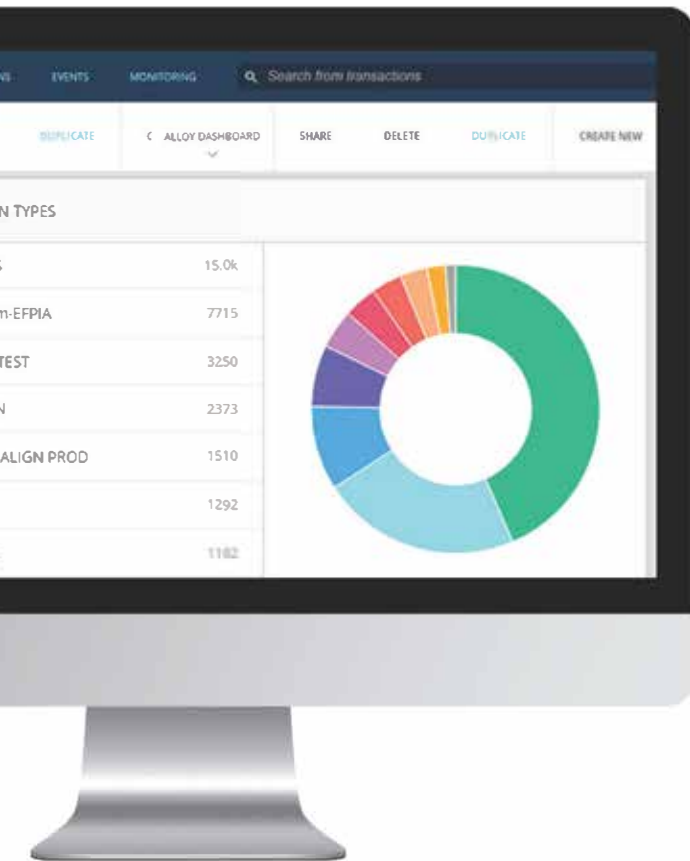
While the current conditions measure expanded by just over nine points, the future conditions component contracted by an opposite and nearly equal amount, dropping from 66.7 in May to 57.7 in June. The proportion of panel members that reported expecting worse conditions doubled while the share of those expecting better conditions in six months edged lower. Member comments ranged from optimism about pent-up demand to concern about a potential recession driven by trade policy and the results of an overheating economy.

Visit www.nema.org/ebci for the complete June 2018 report. 📄

STOCKART

- Cover, 8-9: ©istockphoto.com/lnok
- 8-11: ©istockphoto.com/paYoshimi
- 10-11, 13: ©stockadobe.com/Michal Hubka
- 12: ©istockphoto.com/Okea
- 12: ©istockphoto.com/imantsu
- 14: ©istockphoto.com/Morsa Images
- 18: ©istockphoto.com/yoh4nn
- 19: ©istockphoto.com/jaguarblanco

Track, analyze and automate document processes with IDEA Exchange



IDEA Exchange is the leading provider in electronic data interchange (EDI). We automate the quote-to-cash cycle so customers get their orders on time, and you get paid faster.

- ✓ Enhance customer service with faster process times and direct communication
- ✓ Increase operational control by tracking documents online
- ✓ Eliminate errors and inefficiencies by making redundant processes digital

"IDEA Exchange reduces our operating costs enabling us to redirect our people from manual repetitive tasks to revenue-generating initiatives that increase the value we provide to our customers."

Greg Chun

VP of IT @ McNaughton-McKay

idea 
EXCHANGESM

Visit www.idea4industry.com to get started today!

Proven Worldwide



23 million inverters, 15 million servo axes and 360,000 robots in the field are proof positive that Yaskawa has the engineering expertise, innovative technology and unsurpassed quality to inspire complete customer confidence.

The Yaskawa P1000 variable frequency drive provides simple, reliable, cost-effective control for variable-torque loads through 1000 HP. Specific application features, energy savings, and network connectivity make the P1000 a great choice for industrial fans and pumps.



No matter how you add it up, nobody equals Yaskawa. Call us today.



For more info: <http://budurl.me/YAI1186>

Yaskawa America, Inc. Drives & Motion Division 1-800-YASKAWA yaskawa.com

YASKAWA