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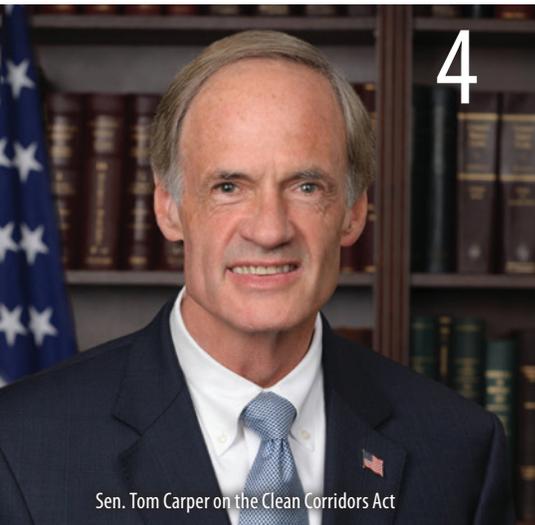


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CONTENTS



4

Sen. Tom Carper on the Clean Corridors Act



18

Don Iverson on the 2020 NEC



21

How will AMLO approach infrastructure?

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We thank our advertisers:



8	Transforming Transportation Steve Griffith, PMP, Industry Director, NEMA
11	Connected Transportation Sparks EV Adoption Andrei Moldoveanu, Technical Director, NEMA
12	Selecting the Right Electric Motors and Drives Mike Logsdon, Vice President of Technology, Regal Beloit
14	Copper Helps to Power the Electric Transportation Revolution
15	Case Study: New Study Finds Insights on Implementing Connected Vehicle Technology
16	Case Study: A Lifesaving Application for Drones
17	Case Study: Port of Long Beach at Epicenter of Seaport Electrification
2	Comments from the Chairman
3	Views
5	Electric News
18	Codes & Standards
19	Spotlight
20	Advocacy
21	International
22	Trends
24	Business Analytics
25	Endnotes from the President



FROM THE **CHAIRMAN**

From planes to trains to automobiles, everything about how we move from point A to point B is about to change. We are on the cusp of a revolution in transportation moving us toward a future that is increasingly connected, electrified, shared, and—soon—autonomous.

Several new technologies and technology applications are widespread across the country such as initial ride-hailing and car-sharing activated by smartphone applications; electrified transportation, including vehicles, ferries, bicycles, and scooters; connected vehicles (AVs); and on the horizon, unmanned aerial vehicles (UAVs), or “drones.”

In addition, advanced communication networks are facilitating connected systems and the use of deep data and analytics to support new transportation technologies. Embodied within the Internet of Things, both people and items can be connected through networks that potentially will influence many aspects of our daily driving, such as route planning, real time route modification, accident prevention, and even vehicle safety features that would prevent a fatigued or intoxicated driver from operating a vehicle.

A key component in the future transportation systems ecosystem will be infrastructure. Vehicle-to-infrastructure (V2I) is a communication model that allows vehicles to share information with the components that support a highway system and NEMA Members' products represent the “I” in V2I. Whether it is traffic management controllers and assemblies, signaling elements, school beacons, or outdoor and roadway lighting systems, effective communication with the vehicle is imperative in order to create a safer, more efficient transportation system.

The transportation sector today represents the single largest user of non-electrical energy (accounting for 25% of total U.S. energy use), and electric alternatives are commercially available and increasingly affordable. This represents an opportunity for NEMA and Member companies to accelerate their efforts in the electrification of the transportation industry. Additional areas that NEMA could grow into include seaports, airports, and rail terminals and crossings.

The time is ripe for NEMA manufacturers to capitalize on these opportunities as we move forward on this transportation transformation. ☺

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A Tipping Point for Transportation

With the advent of connected and autonomous and electric vehicles (CAV and EV), the transportation industry is about to change dramatically from its current iteration. These changes could bring significant benefits to America's roads, as they have already been shown to improve traffic flow, reduce roadway injuries and fatalities, and reduce emissions. The NEMA Transportation Management Systems and Associated Control Devices Section (3TS) plays a vital role in supporting CAV and EV by creating connected vehicle initiatives and introducing Standards to ensure a smart, connected vehicle ecosystem.

While technology is improving rapidly, cities', counties', and states' methods of procurement have mainly remained the same. Most public agencies continue to use a style of acquisition known as asset management. In these cases, the agency chooses the products it will buy in the future based off what it owns already, severely limiting the scope of what the agency might purchase. For example, an agency that uses an assets-based procurement method will purchase and lay fiber optic connections before it can deploy an intelligent transportation system (ITS). This costs the agency additional time and money, when taking an alternative approach may enable the agency to deploy an ITS quickly and efficiently, with fewer costs.

One alternative approach is known as outcomes-based contracting. This type of procurement focuses on purchasing technology based on the outcomes it delivers. This means agencies can buy technologies with significant, proven benefits, even if the agency doesn't own a qualifying resource.

One could draw a comparison with the way businesses purchase electric power. When purchasing electricity, the buyer doesn't first

purchase power poles and hydroelectric dams; instead, they use an existing network owned by the power company. This method of procuring goods and services has several key benefits, including reduced costs, leveraging private sector partnerships, and reduced implementation time. This gives agencies more access to resources like cloud computing, shared intelligent infrastructure, and electric vehicle deployment.

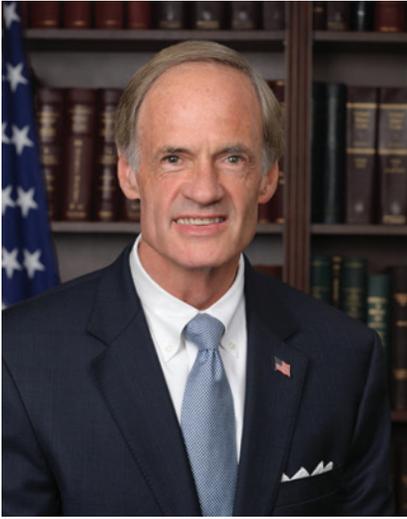
Under outcomes-based contracting, a city would not need to purchase and lay fiber optic connections before deploying an ITS. The agency could utilize and build upon the existing cell network by contracting with the cellular network owner, making cellular-based ITS a viable alternative. This saves the agency both money, as they don't have the exorbitant cost of purchasing and installing fiber at each of their intersections, and time, as the communications network is already in place.

Combustion engines, fossil fuels, concrete, and the unwieldy method of asset management purchasing have long dominated the transportation sector. However, if public agencies want to remain relevant and diligent in their duty to provide for their citizens, they must act now. They must seek new methods of infrastructure management, such as outcomes-based contracting, to keep up with the rapid change in technology coming from the private sector. ☺



Mr. Mulligan chairs the NEMA 3TS Transportation Section.

Give the Green Light to Electric Vehicle Infrastructure



Sen. Carper is the top ranked Democrat on the Environment and Public Works Committee.

Global electric vehicle manufacturing is booming, and the automobile industry tells us this is just the beginning. While this is a positive development for clean air and our collective efforts to address climate change, without federal support to spur consumer demand for these vehicles, American drivers, workers, and automakers might not see the full benefits of this technology domestically. That's because the electric car future lies in making sure that these cars can get the power they need, and right now, the United States is falling short of seizing the tremendous opportunity before us to put America back into the driver's seat of the world's clean energy economy.

China is driving to dominate an electrified future, and the Chinese are not looking in the rearview mirror. If trends continue, China could account for half of the global electric vehicle market share by 2025. More than one million electric vehicles were sold in China in 2018, and sales are on track to almost double in 2019. And it's not just China. Economists project that by 2035, all new cars sold in Europe will be electric. Meanwhile, Chinese and European auto companies are reaping the massive rewards of ambitious campaigns and increasing demand for cleaner cars.

So with our technological prowess and world-class workforce, why is the United States stuck in the slow lane? Unlike China, our country has yet to build the charging infrastructure needed to support growth in this market. At the end of 2018, there were fewer than 68,000 fast-charging public charging points built here in the U.S., while China had in place almost five times that amount.

On our highways, petroleum-based fueling stations are rarely farther than the next exit. In comparison, for electric vehicle owners needing to charge away from home, charging stations are

too few and far between, which means that many American consumers are hesitant to purchase cars that could leave them stranded before their destination. When drivers fuel up—whether at a gas station or an electric car charging port—they need to feel confident that their vehicle can go the distance.

In March, I introduced legislation that would address this “range anxiety” problem head-on. The Clean Corridors Act (S. 674) would create a 10-year grant program that would invest \$3 billion in the installation of electric vehicle charging stations and hydrogen fueling infrastructure along designated corridors within our National Highway System. It would help ensure that every driver in America, in every region, has greater access to charging and fueling stations for their electric cars.

This legislation has won support from a wide range of stakeholders beyond the environmental community, including the National Electrical Manufacturers Association, the Edison Electric Institute, organized labor, and transportation organizations like the American Highway Users Alliance.

This Congress, as we work on the Environment and Public Works Committee to reauthorize our transportation programs, it is essential we rebuild and modernize our roads, highways, bridges, and transit system to withstand the worsening impacts of climate change and support the vehicles of the future. By expanding and improving access to electric and hydrogen fuel stations with legislation like the Clean Corridors Act, we can increase consumer demand for these vehicles, while reducing air pollution and ensuring that these cars of the future are built right here in America. That's something that Republicans, Democrats, and Independents should support.

We have a great opportunity before us, and we can't let it pass us by. 🇺🇸

NEMA Forms New Connected Vehicle Infrastructure Committee



Dave Miller, Principal Systems Engineer at Siemens, speaks at the Connected Vehicle Industry Workshop. Photo by Jena Passut

Recognizing the need to promulgate the widespread adoption of connected vehicles, the NEMA Transportation Management Systems Section has commissioned a Connected Vehicle Infrastructure Technical Committee.

Attendees at a Connected Vehicle Industry Workshop that occurred at NEMA in early April echoed a common theme that industry has an imperative role in moving this technology forward and making it more mainstream.

“Industry growth is being hindered by a lack of confidence at the state, city, and local DOT level,” said Section Chair Bryan Mulligan. “A key element for the success of connected and automated vehicles is vehicle to infrastructure (V2I) communications and developing a set of Standards to ensure vehicles, traffic signals, and other electronic roadway safety assets can talk to one another. The NEMA Connected Vehicle Infrastructure Technical Committee was formed to accomplish just that.”

Energy Storage Update



Photo courtesy of ANSI/USTDA

NEMA Senior Program Manager Brian Marchionini presented on energy storage codes and Standards activities at the U.S.-Africa Clean Energy Standards Program workshop in Johannesburg, South Africa. His presentation highlighted the new NEMA ESS 1 Standard for uniformly measuring and expressing the performance of electrical energy storage systems. ANSI organized the workshop in coordination with Eskom, the South African utility. Eskom is considering Standards-related aspects of energy storage systems to support their upcoming procurement of 360 MW/1440 MWh of battery energy storage. Attendance at the meeting helped keep NEMA engaged in regional activities and facilitate information exchange.

Book-a-Speaker



Steve Griffith, Industry Director, NEMA Transportation Systems Division, will participate on a panel

about connectivity networks at the Connected and Autonomous Vehicles conference on May 16 in Santa Clara, Calif. Learn more at tmt.knec365.com/connected-vehicles.



Donald R. Leavens, NEMA Vice President and Chief Economist, will give the keynote address on NEC requirements

at the Utility Supply Management Alliance annual meeting on May 20 in Scottsdale, Ariz. For more information, log on to bit.ly/2IqyCsN.



NEMA Field Representative **Bryan Holland** will give the keynote address on June 18 at the NFPA Conference

and Expo in San Antonio. Check out www.nfpa.org/conference/.

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

Latest NTCIP Revision Focuses on Data Exchange

Jean Johnson, Technical Program Manager, NEMA

With the advent of connected and autonomous vehicles, NTCIP 1202 v03 *Object Definitions for Actuated Signal Controllers (ASC) Interface* provides a standardized way to exchange data so that traffic control systems respond effectively to the presence or absence of one or more vehicles or pedestrians at an intersection.

A revision of NTCIP 1202 v02 (circa 2005), NTCIP 1202 v03 also standardizes the data exchange between an ASC and a roadside unit, which is a field device serving as an interface to connected and autonomous vehicles.

At an intersection, an ASC coordinates traffic phases that permit vehicles and pedestrians to efficiently use an intersection and avoid collisions. An example of a traffic phase is “permit vehicles to turn right,” while displaying “Don’t Walk” to pedestrians in the conflicting crosswalk. Based on the number of vehicles and pedestrians wishing to pass through an intersection, the ASC may extend or decrease the amount of time a traffic “phase” is active. ASCs can reduce traffic congestion and its associated effects, such as delays, emissions, and

unnecessary fuel consumption, while effectively coordinating vehicle, pedestrian, bicycle, and emergency vehicle flows.

NTCIP is a family of data protocol Standards that specifies commands and data formats for communication between a Traffic Management Center (TMC) and field devices (such as traffic signal controllers at an intersection). In cooperation with the U.S. Department of Transportation, NEMA (and its Transportation Management Systems Members), AASHTO, and ITE founded NTCIP in 1993. For further information, see www.ntcip.org.



Connected vehicles can help prevent crashes at busy intersections. Photo courtesy of U.S. Department of Transportation

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NEMA Calls for Proposals for Revision to ANSI C84.1-2016

A new revision of ANSI C84.1 is scheduled for publication in June 2020. This edition is likely to consider higher allowable voltage ranges and/or voltage rise in dedicated circuits for renewable energy resources to coordinate with IEEE 1547 and the *National Electrical Code*®. Send comments and proposals to Program Manager Khaled Masri (khaled.masri@nema.org) by May 30.

It's important to submit proposals and comments on the form and use exact language—underlining new text and using strikethrough for text to be deleted. A copy of the Standard is available and the proposal/comments form can be downloaded at www.nema.org/C84.1Comments.

The scope of ANSI C84.1 is as follows:

This Standard establishes nominal voltage ratings and operating tolerances for 60 Hz electric power systems above 100 volts. It also makes recommendations to other standardizing groups with respect to voltage ratings for equipment used on power systems and for utilization devices connected to such systems.

This Standard includes preferred voltage ratings up to and including 1,200 kV maximum system voltage, as defined in the Standard.

In defining maximum system voltage, voltage transients and temporary overvoltages caused by abnormal system conditions such as faults, load rejection, and the like are excluded. However, voltage transients and temporary overvoltages may affect equipment operating performance and are considered in equipment application. ©

Khaled Masri, Program Manager, NEMA



Photo by Jena Passut

Alan Manche, Vice President, External Affairs, Schneider Electric, offers effective leadership strategies to attendees of the recent NEMA Leadership 2020 Forum. ©



Photo courtesy of IFIA

Members of the International Federation of Inspections Agencies (IFIA) met with NEMA representatives recently to discuss cybersecurity and the Internet of Things, as well as medical devices and ongoing U.S. trade negotiations. Pictured are Joan Sterling (Intertek), Phil Squair (NEMA), Roberta Telles (IFIA), Hanane Taidi (IFIA), Kevin J. Cosgriff (NEMA), and John Caskey (NEMA). ©

John Malinowski Named 2019 IEEE Fellow

John Malinowski, Senior Manager of Industry Affairs (retired from Baldor Electric Co.), of Fort Smith, Arkansas, has been named an Institute of Electrical and Electronics Engineers (IEEE) Fellow. He is being recognized for contributions to motor efficiency manufacturing regulations and Standards.

Malinowski is Immediate Past Chairman of NEMA MG1 Motor and Generator Section, and Baldor's representative for energy advocate organizations. He is a Senior Member of IEEE, a member of the IEEE Industry Applications Society, and past Director-at-Large of IEEE IAS Executive Committee. Malinowski is

a Member of the IEEE Pulp and Paper Industry Committee and Past Chairman for the Forest Products and Drive & Control Systems Subcommittees. He is also active with the IEEE Petroleum and Chemical Industry Committee and serves on several IEEE Standards Working Groups. ©



Steve Griffith, PMP,
Industry Director,
NEMA

Steve Griffith is the
NEMA Industry
Director for the
Transportation
Systems Division
and the principal
staff liaison for
NEMA's Internet
of Things and
Cybersecurity
activities.

Transforming Transportation

We are in the midst of a transportation technology transformation that is increasingly connected, electrified, shared, and perhaps ultimately autonomous.

Rapid advances in transportation technology in the past few years alone have complemented the interconnectivity that we've come to know as the Internet of Things (IoT). This network of physical objects that are embedded with or connected to electronics, software, sensors, and other devices enable them to achieve greater value by exchanging data with the manufacturer, operator, and other connected systems.

Driving Transformation

This exciting data-rich environment will be the genesis for a multitude of mobility applications that keep traffic flowing and make it easier for people to plan their travel experience. Imagine, for instance, apps that find open parking spaces, locate available last-minute ride-share partners, guarantee you make your bus or train connection, or help a blind pedestrian cross the street.

Furthermore, imagine if an application could save gas by optimizing the phasing of traffic signals to eliminate idling and unnecessary stops and starts. Or if an app could help you avoid congestion by taking alternate routes, taking public transit, or rescheduling your trip—any of which can make your trip more eco-friendly.

There are four main technologies that will drive the transportation transformation: ride-sharing, electrification, connected/autonomous vehicles, and drones.

RIDE SHARING

Mobile technology has enabled people to access new transportation options with the push of a button. Companies like Lyft, Maven, Uber, and Zipcar have introduced a new way for people to participate in the sharing economy as drivers, riders, or both. Within the urban environment, ride sharing already has eliminated the need for some individuals to own vehicles. Riders can use their smartphones to check availability, make a reservation, and unlock a vehicle.

ELECTRIFICATION

The transportation sector represents the single largest user of non-electrical energy, accounting for approximately 29 percent of total energy use in the United States.¹ While the U.S. currently lags behind China and Europe in terms of vehicle electrification, a number of global original equipment manufacturer's have announced plans to produce or expand their electric vehicle (EV) portfolio over the coming years. Two primary factors affecting the growth of EV sales are declining costs and decreased range anxiety. Advances in battery technology will exert downward pressure on prices, and national efforts are underway to deploy EVSE infrastructure. Companies like Electrify America are committed to building a nationwide network of workplace, community, and highway chargers that are convenient and reliable.

CONNECTED/AUTONOMOUS VEHICLES

According to IHS Markit, annual autonomous vehicle sales will exceed 33 million in 2040 and autonomous mobility will be a feature in more than 26 percent of new car sales.² Automated features such as lane departure warning, adaptive cruise control, blind spot detection, and active braking are already available.

The optimal deployment of connected/automated vehicles will require smarter streets, with infrastructure connected to other infrastructure and to the traveling vehicles. Because of the volume of data likely to be produced, agencies will likely need to adopt cloud and edge computing processes to manage and analyze the data.

DRONES

From large reconnaissance aircraft to small quadcopters available to the public, unmanned aerial vehicles (UAVs, or drones) are an increasing presence in our airspace. According to the Federal Aviation Administration, more than a million commercial and noncommercial drones are registered in the United States, with estimates ranging as high as six million drones that will be registered by 2021.

Drones are currently used in infrastructure inspection, agriculture, real estate, film, first responder operations, and insurance. They have potential use in delivery services. These applications can create efficiencies, lower costs, and remove workers from hazardous or dangerous situations.

¹ Energy Information Administration, U.S. Primary Energy Consumption by Source and Sector, 2017

² <https://www.greencarcongress.com/2018/01/20180102-ih.html>

Eliminating Speed Bumps

The digital future of transportation promises safer streets, better public and environmental health, and reduced costs in very concrete ways. For example, fewer vehicles on the road mean fewer traffic fatalities and injuries, less congestion, and lower vehicle emissions. Less of a need for parking frees up land for more beneficial uses. Efficient logistics improve productivity and mobility. And enhanced economic development translates to a higher quality of life by decreasing household expenses and business transportation costs.

There are a number of challenges—speed bumps, if you will—that need to be addressed before these benefits can be realized, like changing outdated regulatory systems, updating communications networks, modernizing infrastructure, mitigating cybersecurity risks, and creating new frameworks to effectively utilize data.

Overcoming these challenges will require a coordinated and collaborative effort between key stakeholders that have traditionally been on opposite ends of the transportation ecosystem—federal and state governments and the private sector.

With the creation of the NEMA Transportation Systems Division, NEMA is working with industry to smooth out the bumps in the road. 

A Cool Option for EV Charging

In preparation for the 2011 *National Electrical Code*[®], a group of experts on electrical safety, including several NEMA Members, was asked to propose requirements for a new category of products called electric vehicle supply equipment (EVSE), popularly (and incorrectly) known as EV chargers. The EV industry was new, and there weren't many safety Standards for the EVSEs. Even though the NEC is a safety installation code, and not a product one, the implementation was a legitimate one.

To be safe, the experts asked that EVSE cables be selected from a number of trusted options already listed in the code. Those codes could offer a guarantee that EV customers handling EVSEs would be protected both from electric shocks and temperature.

As the EV industry progressed, the demand quickly grew for a charging time comparable with filling a traditional car's fuel tank. That could be accomplished by pumping more electric current at higher voltages. An issue arose when using NEC-recommended cables. In order to keep the cables cool enough to handle, they would have to be built to have such huge diameters that the cables would be impractically heavy and rigid.

One way to solve this is a cable technology that has been used until now only for exotic applications. The technology sounds simple. A hot cable is placed inside another cable that circulates very cold fluids around it to keep the external jacket safely warm. The cable technology needs a pump, sensors to control the temperature and flow, and a heat exchange mechanism to get rid of the heat—all under centralized control. Compared with a regular cable, this cooling cable would cost much more. In fact, it's no longer a cable—it's a complicated system.

Given the market interest, UL has drafted an annex on this topic to the UL 2202 Standard that governs dc fast chargers (DCFC). Armed with the assurance that certified DCFCs are protecting the EV user and, after a lot of convincing from NEMA, the 2017 NEC has relaxed its EVSE requirements, allowing for liquid-cooled cable options. Only one "minor" problem remains: the EVs should be capable of handling that much power. 

Andrei Moldoveanu, Technical Director, NEMA

EV Spark Ignites Revolution

On today's roads, good things are moving fast and multi-directionally. A spark anywhere triggers others in expected and unexpected places.

Tesla ignited the current electric vehicle (EV) spark in 2008 with its Roadster, which in turn enabled subsequent models. The very idea got people so excited about a mass-produced and competitively priced EV that more than 400,000 customers paid \$1,000 each to reserve one that would be delivered at an undefined future date.

The spark ignited the auto industry at large with nearly every major automaker introducing EVs or new hybrid models. Several countries even committed to eliminating internal combustion engines in cars by 2040.

Since EVs work on batteries, the charging equipment industry became fundamental to successful EV adoption. It started small with chargers that plugged into regular household receptacles and took all night for the battery to charge. The next move was to improve the speed by plugging the EV supply equipment (EVSE) into beefed-up dedicated branch circuits. While charging the EVSE in four to six hours seems reasonable in one's garage, waiting that long while on the road was not. Faster charging speeds became the next goal.

A new charger iteration, the direct current fast charger (DCFC), does a good job topping off a battery, but a full charge still needs about an hour. And technologies continue to evolve so that more electricity can be "pumped" into the vehicle faster, bringing the charging time to as little as 10 minutes. The problem now, however, is that the battery and the car's electrical distribution system need to handle that amount of power. We can expect more iterative improvement for the foreseeable future.



Many Roads to Travel

The EV spark also triggered a revolution in batteries. The cost of the basic EV lithium-ion battery decreased by 80 percent in fewer than ten years, and this trend is likely to continue as the result of a relentless push to improve charging speed and storage capacity parameters.

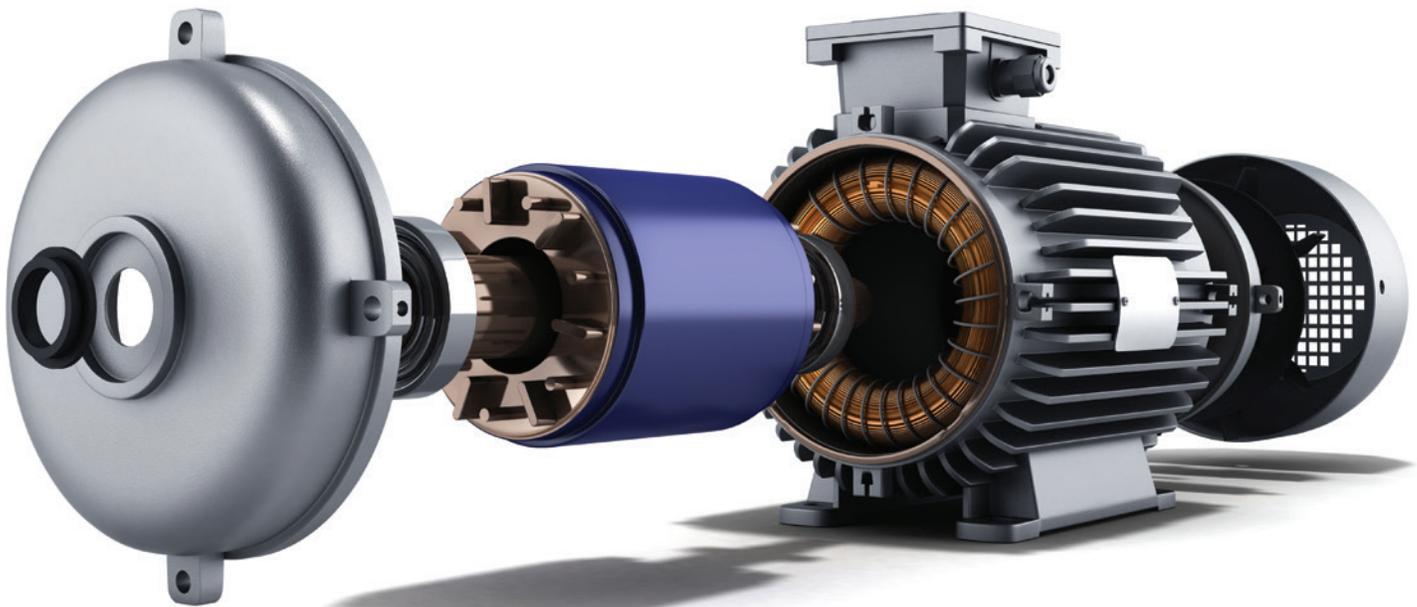
Since volume drives down price, we may end up with more batteries than the EV industry alone needs. Far from being a problem, excess batteries can be used as energy storage to help fast-charge an EV, thus relieving stress on the grid. These batteries can also help the grid when renewable energy sources (i.e., transient sources like solar and wind) are deployed or during demand swings.

Passionate drivers may find the EV's propulsion potential exciting. In addition, by using four independent motors for the wheels, maneuverability is improved, which is beneficial when there is inclement weather. For other drivers, the prospect of not driving at all is equally attractive and autonomous, driving technology has made extraordinary strides. Despite setbacks, auto-piloted cars have already reached noteworthy safe driving records and the industry is working hard to improve those.

Meanwhile, wireless charging has been struggling to pick up speed. While it uses technologies employed in non-contact charging applications like electric toothbrushes and cellphones, there have been problems. One is the precision of a car positioning itself over an emitting antenna. An autonomous car can mitigate this problem. Once it detects the charger's antenna, it can position itself perfectly for maximum energy transfer efficiency. This, in turn, solves a huge problem in the smart city of the near future: how self-driving cars can refuel automatically.

EV market penetration may be slow in the eyes of some observers, but 40 percent current annual growth is proof that this transportation spark has started some currents. ☺

Andrei Moldoveanu,
Technical Director,
NEMA



Selecting the Right Electric Motors and Drives Is Key to Vehicle Electrification

Mike Logsdon,
Vice President of
Technology, Regal
Beloit

Mike Logsdon
has more than 30
years of industry
experience in
electric motors
and power
transmission
equipment.

The transportation sector's systems are rapidly moving away from internal combustion engines and toward electrification. Engineers now have many design and performance options thanks to significant advances in electric motor and control technologies. They can prioritize performance requirements and their understanding of design tradeoffs to make the best choice. For a successful electrification program, here are a few main considerations:

First, engineers must choose the form factor required for the electric motor. These form factors include radial with internal rotor (traditional motor), radial with external rotor (commonly used in motorized fans), axial (thin, flat form factor), or conical (a mix between radial and axial). Engineers make these decisions mostly based on size and weight requirements:

- Radial machines are best when smaller diameters are required and axial length is not as critical.
- Axial machines are best when minimum axial length is critical and diameter is flexible. Axial machines are also well suited for high torque and high-efficiency direct drive applications due to their larger diameter and inherently high pole count.

Once form factor is determined, engineers must next consider motor electromagnetics. Options include induction, permanent magnet (PMAC, PMDC, or brushed dc), and reluctance type (switched reluctance or synchronous reluctance). Many factors go into selecting the right type of motor, including efficiency, torque, speed, power density, battery life, reliability, gearing, and total system cost.

In parallel with motor selection, engineers must consider control topology and location of the control. The “control” typically consists of the power electronics that provide voltage and current to drive the motor as well as electronics that interpret input signals and control the power electronics. Variable frequency drives or inverters that use pulse wave modulation that vary the speed of the motor typically drive induction motors and most permanent magnet motors. Characteristic transportation applications may use centralized controls that drive multiple motors or a configuration of motors with their integrated controls. The physical layout of the vehicle and application parameters such as ingress protection, temperature, vibration, performance, reliability, and system cost usually determines the selection.

Motor Type			Performance Factors					
Form Factor	Electromagnetic Type		Efficiency	Torque	Speed	Power Density	Reliability	Cost
Radial	Induction	Internal Rotor	Low	Low	High	Low	High	Low
		External Rotor	Low	Low	Med	Low	High	Med
	PM	PMAC	High	Med	Med	Med	Med	High
		PMDC	Med	Low	Med	Med	Med	High
		Brushed DC	Low	Low	Low	Low	Low	High
	Reluctance	Switched Reluctance	Med	Med	High	Med	Med	Med
Synchronous Reluctance		Med	Med	Med	Med	Med	Med	
Axial	Induction	Induction	Low	High	Med	Med	High	Med
	PM	PMAC	High	High	Med	High	Med	High

Relative comparison of motor type for given performance factors in electrified transportation systems

The good news is that there are many options for a system engineer to choose from when designing an electrified vehicle. Options exist with today’s technology that can easily meet—or even far exceed—the performance of existing internal combustion engine designs. Perhaps the biggest challenge is energy storage onboard the vehicle; this can be accomplished by battery power alone or by also using a small internal combustion engine in a hybrid approach.

System efficiency is paramount in selecting the right design. While most motor and control manufacturers have a very broad portfolio of ac motors and controls, they have developed few options for mobile applications with dc inputs. Custom designs may be attractive from a form factor and performance standpoint but cost more until manufacturers achieve significant production volumes.

Motor and control manufacturers are rapidly developing cost-effective, high-performance standardized platforms for vehicle electrification. Overall, the future is bright for electrification in the transportation sector, and we can expect to see electrified vehicles of all types in the near future. Ⓜ

Minimize the Risk of Surges

U.S. sales of electric vehicles (EVs) passed the one million milestone last September. Electric vehicle supply equipment (EVSE) is critical to the performance of electric vehicles. This equipment is usually exposed to overvoltages and surges and can result in severe damage to the charger and the car itself. A surge is a brief spike in an ac or dc cycle—less than a millisecond.

The best way to minimize the risk of a surge is to install a surge protective device (SPD). An SPD is “a protective device for limiting transient voltages by diverting or limiting surge current; it also prevents continued flow of follow current while remaining capable of repeating these functions.”

An ideal SPD diverts a harmful surge current to ground under a surge condition and appears as a high impedance under normal operating conditions. For more information about SPDs, please visit the NEMA Surge Protection Institute website at www.nemasurge.org. Ⓜ

Muhammad Ali, Program Manager, NEMA

Copper Helps to Power the Electric Transportation Revolution



Zolaikha Strong,
Director of Energy
Policy & Electrical
Markets for the
International
Copper Association

The transportation sector contributes the largest share of greenhouse gas emissions in the United States. According to the Environmental Protection Agency (EPA), cars, trucks, trains, ships, airplanes, and other vehicles account for 28.5 percent of CO₂ emissions nationwide, just edging out energy sector emissions.¹ However, electric vehicles (EVs) and electric buses are shifting this dynamic and moving the U.S. toward a sustainable transportation future.

Efforts to transition the nation to electric transportation are well underway and even exceeding expectations. In 2018, the U.S. surpassed 1 million EVs in total sales²—seven years ahead of industry forecasts for annual sales.³ Looking ahead, global prospects are even more exciting. The International Energy Agency forecasts that there will be 125 million EVs on the road by 2030.⁴

Copper, one of the world's most effective and efficient electrical conductors, is a key material driver of EVs and EV growth.

Copper is found in EV inverters, batteries, and electric motors. EVs use 85 to 183 pounds of copper in total, nearly four times the amount used in a conventional car. Hybrid and electric buses need even more copper, containing between 183 and 814 pounds.

As EVs and charging stations continue to become more widespread and affordable, copper will continue to be essential for supporting the infrastructure needed for electric vehicle charging; 5 million charging ports⁵ will be needed in the next decade.

As the nation and world race to a sustainable energy future, new technology will allow us to redesign transportation while reducing greenhouse gas emissions. The associated EVs and EV infrastructure will be supported by the conductivity and reliability of copper and will rely on more skilled electrical professionals than ever before.

It's critical that the nation invests in career and technical education programs to strengthen and grow our electrical workforce to meet the demands of EV production and the installation of charging infrastructure and stations in homes, buildings, and communities across the nation. ☑

1 Environmental Protection Agency, *Sources of Greenhouse Gas Emissions*, <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#transportation>

2 Mark Kane, "Plug-In Electric Cars Sales in U.S. Surpass 1 Million," *Inside EVs*, October 2018, <https://insideevs.com/1-million-electric-cars-sold-us/>

3 The Edison Foundation Institute for Electric Innovation, *Plug-in Electric Vehicle Forecast: 2016-2025*, March 2017, https://www.copper.org/environment/sustainable-energy/pdf/eei_iei-pev-forecast-2016-2025pdf.pdf

4 *Global EV Outlook 2018*, International Energy Agency, <https://www.iea.org/gevo2018/>

5 Edison Electric Institute, *EEL-IEI Report Forecasts 7 Million Plug-In Electric Vehicles Will Be On U.S. Roads By 2025*, June 2017, <https://bit.ly/2v3c3Us>

New Study Finds Insights on Implementing Connected Vehicle Technology

One of the most pressing debates in the smart mobility sphere is the question of how to implement connected and autonomous vehicle (CAV) technology: should manufacturers use dedicated short-range communication radios (DSRC) or cellular-based vehicle-to-everything (C-V2X)?

CAV technologies have the potential to improve roadway safety. They are being used to improve communications between vehicles, infrastructures, cyclists, and pedestrians. Although these technologies are a recent addition to the marketplace, they have several key real-world applications, which include emergency vehicle pre-emption, collision warnings, red-light-running alerts and many others. In order to address the DSRC vs. cellular debate, Applied Information, Inc. (AI), and the University of Alabama (UAB) deployed and tested both technologies in the streets of Tuscaloosa, Ala.



Figure 1: Traffic Cabinet Setup

The main advantage of DSRC radios is that they provide point-to-point communications, allowing for near-instant communication between units. Recently, however, cellular-based technologies have gained favor in the transportation industry as an alternate communication platform. Proponents argue that, at the speed cellular technology transmits data, any potential latency doesn't affect the practical implementation of CAV applications. With the coming of high-speed 5G, cellular communication will reach the speeds necessary to handle point-to-point communication between vehicles and infrastructure.

In 2017, in order to evaluate the ongoing debate, AI and UAB partnered to deploy connected vehicle (CV) technology in 85 intersections throughout Tuscaloosa, creating a living lab. The team deployed both DSRC radios and cellular-connected devices to create a "hybrid connected vehicle system." Additionally, the team rolled out an app that provided residents with C-V2X communications.

AI and UAB have found several key results so far. Traditionally, the main justification for choosing DSRC technology over cellular is that DSRC communications have a much lower latency period. However, this project showed 4G LTE communications had a latency period of less than 300 milliseconds.

The study also found that, in practical terms, C-V2X technology was easier to distribute to residents. Units that communicate with DSRC radios cost around \$1,000 on average and usually require modification of one's vehicle. This makes widespread distribution of DSRC technology expensive and impractical for most people. However, a majority of Americans have a smartphone capable of using cellular technology today, and most automotive companies have promised to include 5G C-V2X communications in their upcoming cars. This means that C-V2X communications will come at no cost to the end user. Even if a vehicle weren't directly programmed with CV technology, drivers could easily download an app to access C-V2X communications.

To learn more about this project, visit appinfoinc.com and cavt.eng.ua.edu.



Figure 2: Connected Vehicle Smartphone App

Bryan Mulligan,
CEO, Applied
Information Inc.

Bryan Mulligan is the Chair for the NEMA 3TS Transportation Section. Connect with him on all things transportation at appinfoinc.com and listen to his talk show "TravelSafely with Bryan Mulligan" on Business Radio X.

A Lifesaving Application for Drones



Katy Milner Ross,
Partner, Wiley Rein
LLP

Katy Milner Ross is a telecommunications attorney who also advises clients on U.S. unmanned aircraft systems' legal, regulatory, and public policy issues, including analysis of FAA and FCC regulations and state and local considerations.

One day soon, unmanned aircraft systems (UAS, commonly called drones) may be able to deliver pizzas and packages to our doorsteps. But some in the UAS industry are using UAS to deliver even more essential cargo—lifesaving medical devices. The Federal Aviation Administration (FAA) recently approved Flirtey, a drone delivery company, to conduct beyond visual line of sight (BVLOS) UAS flights to deliver automated external defibrillators (AEDs). The FAA granted Flirtey this authority in connection with Flirtey's participation in the UAS Integration Pilot Program (IPP), an FAA-led program launched in 2017 that brings together local governments with private sector entities to study safe drone integration into the national airspace.

Cardiac emergencies can happen anywhere, and prompt defibrillation after a cardiac event can mean the difference between life and death. Drones present a unique way to get AEDs to victims, particularly those in rural or otherwise challenging areas to reach. A drone can carry an AED to the location of a victim and permit a bystander to detach and use the device quickly. Swedish researchers testing AED-carrying drones found that the drones arrived more quickly than emergency medical services in all eighteen test flights they conducted, saving a median time of 16:39 minutes.¹

Flirtey's flights under the IPP are a good first step but will not immediately lead to widespread medical device delivery. The FAA's current rules for commercial drone operators forbid BVLOS flights, thus precluding the use of delivery drones to reach remote victims.² Eventually, as the FAA authorizes more expanded operations, the agency should permit routine BVLOS operations, but those rules are likely years away.

In the interim, operators can petition the FAA for a waiver of this rule. FAA Part 107 waiver applicants must describe their proposed drone operation and satisfy the FAA that the operator understands the operational risks associated with the activity and has undertaken methods to lessen or mitigate such risks. For example, the FAA will want to understand how the pilot will be able to continuously determine the position, altitude, and movement of the drone and how the pilot will avoid other aircraft, people, and obstacles. If the FAA grants the waiver, the applicant will receive a Certificate of Waiver detailing the effective waiver dates, which may be up to four years, and the waiver provisions. Common waiver provisions for BVLOS flights include mandatory use of at least one visual observer or safety pilot to aid in drone operations and ensuring that all personnel are properly trained to operate UAS BVLOS.

For now, authority to conduct BVLOS drone delivery of medical devices is rare. As the regulatory landscape for commercial use of drones continues to develop, innovators may discover more ways that drones can improve our lives—and perhaps our health. ☺

¹ Andreas Claesson et al., *Time to Delivery of an Automated External Defibrillator Using a Drone for Simulated Out-of-Hospital Cardiac Arrests vs Emergency Medical Services*, Research Letter, 317 *Jama* 2332 (2017)

² 14 C.F.R. § 107.31

Port of Long Beach at Epicenter of Seaport Electrification

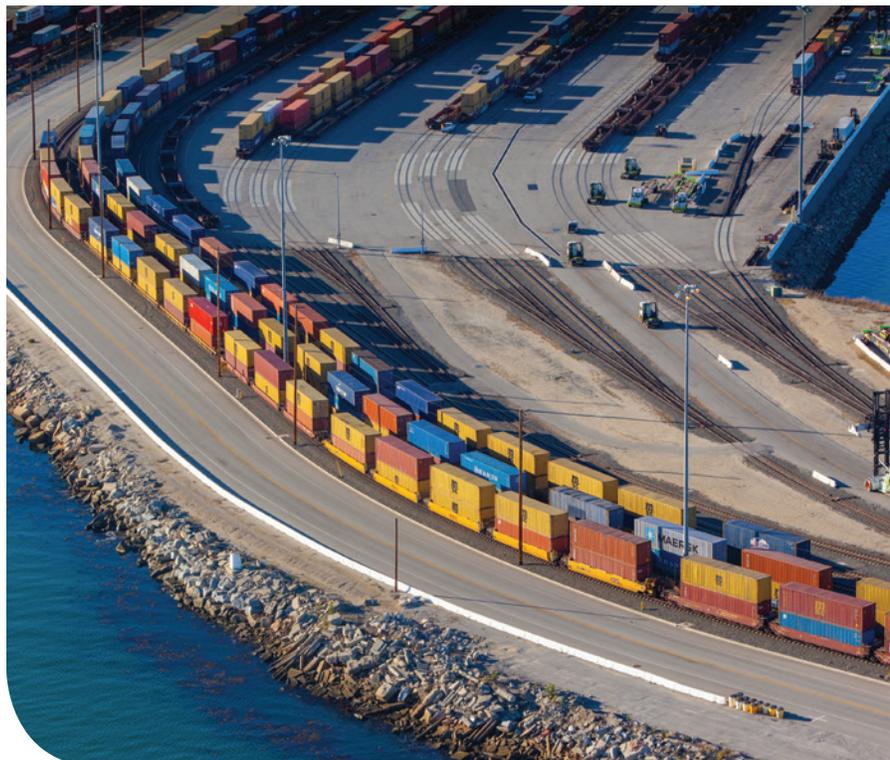
The Port of Long Beach is the second-busiest container port in the United States. It acts as a major gateway for U.S.–Asian trade, occupying approximately 3,500 acres of land and 4,600 acres of water in the city of Long Beach, Calif. Each year, the port handles more than 7.5 million 20-foot container units with cargo valued at \$194 billion.¹

The port is often at the epicenter of electrification discussions in the U.S. In 2017, the Clean Air Action Plan Update² set the port on the path to moving goods using zero emissions by 2035. After receiving \$80 million in grant funding, the port is moving ahead with six projects to demonstrate the zero-emissions equipment and advanced energy systems in its operations, including:

- the demonstration and deployment of zero-emissions terminal equipment featuring nine electric rubber-tire gantry cranes, 12-yard tractors, and four hybrid and electric drayage trucks;
- a sustainable transformation of the port's terminal with 34 pieces of zero-emissions cargo-handling equipment, two of the cleanest container ships to call on the West Coast, an electric-drive tugboat, five electric trucks at an off-dock container yard, and two heavy-duty truck charging outlets;
- the design and installation of electric charging infrastructure such as conduit, wires, transformers, and switchgear;
- a microgrid at the port's Command and Control Center;
- a demonstration of five zero-emissions cargo-handling vehicles, including three never-before-tested battery-electric top handlers and a head-to-head comparison of a hydrogen fuel truck and a battery-electric yard truck; and
- a blueprint to electric vehicles within the port community.

Read more about the port's path to zero emissions at <http://www.polb.com/environment/air/zeroemissionsgrants.asp>. ©

by Steve Griffith



1 Port of Long Beach Facts at a Glance, www.polb.com/about/facts.asp

2 Port of Long Beach Clean Air Action Plan, www.cleanairactionplan.org/about-the-plan

Photos courtesy of Port of Long Beach

2020 NEC Continues the Tradition of Electrical Safety

Late in the 19th century, America experienced a surge in technological inventions. Unfortunately, there also was a lack of standardization and safety for those innovations. In 1897, a group of like-minded people worked together to form an electrical safety Standard to address the expansion of electrical products. The result—the *National Electrical Code*® (NEC)—is now on its 55th edition.

Today, the electrical industry has seen another technological wave in the NEC. With that kind of expansion, Standards and codes must address potential electrical hazards.

The 2020 NEC process began in January, and revisions include plenty of public input and committee work. The results are that the electrical code is revealing how it will look as we approach the final steps. Here are some of the highlights from the process:

GROUND-FAULT PROTECTION

The change in 210.8(A) will require that all **125-volt through 250-volt receptacles** use GFCI protection. The code panel also removed the 15- and 20-ampere limitations in previous editions to expand the requirement. This would require that manufacturers protect electric dryers and ranges.

SURGE PROTECTION

The modification of 230.67 will require a surge protective device (SPD) in all dwellings. The location of the SPD shall be an integral part of the service equipment or located immediately adjacent to it.

EMERGENCY DISCONNECTS FOR DWELLING UNITS

Code 230.85 will require an emergency disconnect at a readily accessible location outdoors at dwelling units. This new requirement addresses concerns from the fire prevention community for the safety of their first responders. Ⓞ

Peter Weems

Senior Director of Policy & Strategy,
MITA

New Standard Addresses Medical Equipment Servicing

In March, MITA published NEMA/MITA 2 *Requirements for Servicing of Medical Imaging Equipment*, a Standard that describes and defines the minimum quality management system (QMS) requirements for the servicing of medical imaging devices to ensure return to a safe and effective condition for its intended use. Until now, there have not been any QMS Standards developed specifically for servicing of medical imaging devices. MITA saw this as a critical gap that needed to be filled in order to protect patient safety and device integrity.

Servicing a medical imaging device is a complex and often difficult activity that poses a range of serious risks to patients and operators if performed improperly. Performance of servicing activities within an appropriate QMS by properly trained personnel using qualified, properly sourced parts greatly reduces the risk of harm to the patient or operator and greatly improves the performance of the device. A QMS is a highly valuable tool for

ensuring that medical imaging devices consistently meet applicable requirements and specifications. Further, a properly implemented and managed QMS will drive an organization to continually improve and consistently deliver quality service to its customers.

The requirements of this Standard are intended to be applicable to any medical imaging equipment servicing organization, regardless of size, or the specific equipment maintenance services it provides. The provider of applicable services may be an individual organization or may be an operating unit within an organization.

It is our hope that this Standard will be widely adopted by interested stakeholders. Further, we anticipate future work that will lead to an ANSI Standard on this issue. Ⓞ

NEMA Motors and Generators Standard Revises Four Sections

ANSI/NEMA MG 1 *Motors and Generators* assists users in the proper selection and application of motors and generators. It contains practical information concerning performance, safety, testing, and manufacture of ac and dc motors and generators.

MG 1 now includes 2018 updates to Parts 7, 12, 30, and 31:

- Harmonization of MG 1 Part 7 with vibration requirements in IEC 60034
- Current industry practice to test for energy-efficiency regulatory compliance only at the voltage marked in the “rated voltage” field of the motor nameplate
- Maximum locked rotor current requirements for fire pump motors have reverted back to those specified in NEMA MG 1-2014
- Use of coupling capacitors for PD detection (Parts 30 and 31)

MG 1-2016 is available for \$565 in hard copy and electronic download at <https://www.nema.org/Standards/Pages/Motors-and-Generators.aspx>.

Other recently published Standards:

NEMA PE 7-2018 *Communications Type Battery Chargers* is available for \$86 in hard copy and as an electronic download at no cost.

ANSI C37.50-2018 *Low Voltage AC Power Circuit Breakers Used in Enclosures—Test Procedures* and

ANSI C37.51-2018 *Metal-Enclosed Low Voltage AC Power Circuit Breaker Switchgear Assemblies—Conformance Test Procedures* are each available for \$84 in hard copy and as an electronic download at no cost.

NEMA/MITA 2-2019 *Requirements for Servicing of Medical Imaging Equipment* is available as an electronic download at no cost.

NTCIP 1202 v03 *Object Definitions for Actuated Signal Controllers (ASC) Interface* is available for \$255 in hard copy and as an electronic download.

NEMA ESS 1-2019 *Standard for Uniformly Measuring and Expressing the Performance of Electrical Energy Storage Systems* is available for \$150 in hard copy and as an electronic download. 📄

I Am NEMA

Have you ever thought about how much time you spend in traffic? Living in the Washington, D.C., metro area, I can personally attest to the amount of time Americans spend stuck in traffic. Before I embarked on my career at NEMA, I often spent around three hours commuting each weekday from my home in Alexandria, Va., out to the Dulles Airport area and then back again. Needless to say, I was tired, frustrated, and sometimes quite angry.

When the time came to sell our house and find a new location, my wife and I thoughtfully considered the transportation impacts. She was working in Washington, D.C., so mass transit needed to be accessible, and I needed to cut down on my daily commute, so we settled on a location in Falls Church. Eventually I resigned from my job out near the Dulles Airport and began working for NEMA, allowing me the opportunity to take mass

transit as well. I now enjoy a 30-minute metro commute and a five-minute leisurely walk to the NEMA office.

Transportation is important in any economy. It facilitates trade, exchange, and travel. The transportation ecosystem is transforming, heading toward a future that is increasingly connected, electrified, shared, and ultimately autonomous. A key component of that ecosystem is its corresponding infrastructure—an area that NEMA and its Members specialize in.

The mission of the NEMA Transportation Systems Division is to promote the tools and infrastructure associated with the movement of people and/or goods from “point A” to “point B” in safe, cybersecure, and efficient ways. As the Division’s Industry Director, I am “driven” in my commitment to grow the division, finding new opportunities for NEMA and its Member companies. 📄

SPOTLIGHT



Steve Griffith, Industry Director, NEMA Transportation Systems Division

NEMA Fly-Out



Representatives from NEMA recently flew to California to meet with legislators there. Above, the NEMA delegation meets with Assemblymember Ed Chau, Chair, Privacy and Consumer Protection Committee and staff members.

Outlook for the 116th Congress: Tax Extenders Are On Again, Off Again

A number of important tax credits of interest to NEMA Members expired at the end of 2017. Despite multiple attempts to move legislation extending these credits, Congress has not been able to get the job done.

NEMA is particularly interested in the tax credits related to building efficiency and electric vehicles. Most recently, on March 26, NEMA wrote to Rep. Michael Thompson, Chairman of the House Ways and Means Select Revenue Measures Subcommittee, expressing strong support for a multi-year extension of four tax incentives that collectively promote the U.S. as a global leader in modern electricity technologies.

Our letter called out the following four provisions:

- Alternative Fuel Vehicle Refueling Property Credit (§30C):** We urge a multi-year extension of the §30C credit to provide a forward-looking incentive to install the charging infrastructure necessary to enable adoption of next-generation vehicles.
- Plug-in Electric Drive Vehicle Credit (§30D):** We urge a multi-year extension of the two-wheeled credit and a lifting of the 200,000-vehicle cap of the §30D credit to ensure America's continued leadership and dominance in the global EV industry.
- Energy-Efficient Commercial Buildings Deduction (§179D):** We urge a multi-year extension of the §179D deduction, which has provided outsized economic benefits in the form of leveraging private investments in energy-efficient buildings and thousands of well-paying jobs that cannot be outsourced.
- Investment Tax Credit for Energy Storage:** We urged Congress to fix the investment tax credit (ITC) in §48 and §25 regarding energy storage as an eligible technology. There is bipartisan, bicameral support for an ITC fix, which would ensure a level playing field for energy storage to compete with other resources eligible for the credit.

Unfortunately, despite the fact that NEMA and many others are pressing Congress to act, we will have to wait for results. ☹️



The AMLO Approach to Infrastructure

Even before taking office on December 1, 2018, Mexican President Andrés Manuel López Obrador, known as AMLO, announced the cancellation of the \$13 billion construction of a new airport for the capital city. Citing allegations of corruption, the president decreed improvements would be made instead to existing facilities, including a military airfield, to reduce traffic congestion. The president's goals of combating corruption, creating jobs, and boosting national competitiveness are evident in two additional public works projects.

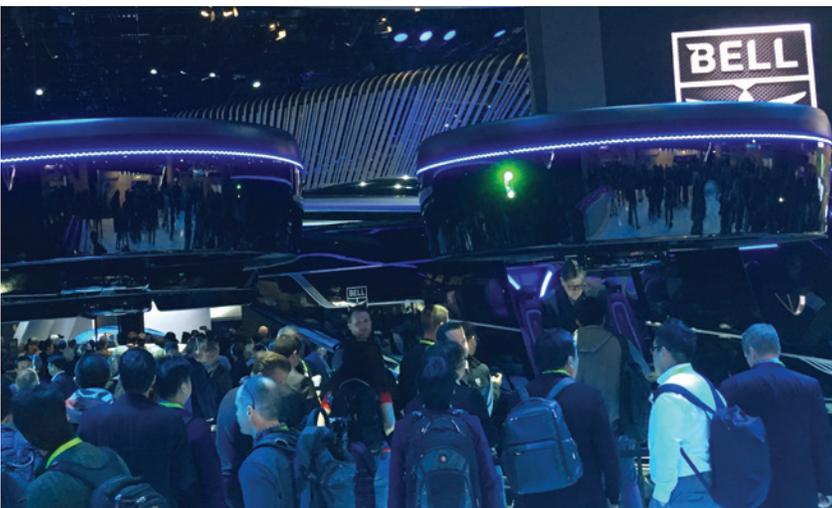
López Obrador is moving ahead with a \$6.5 billion, 900-mile railroad project in the Yucatan peninsula to link towns, cities, and tourist attractions. At the head of the project is the National Fund for Tourism Development (FONATUR), a Mexican agency responsible for tourism projects, which has named Canadian company Bombardier, the China Railway Construction Corporation, and a Spanish firm, Construcciones y Auxiliar de Ferrocarriles (CAF), as possible bidders. The agency plans to use existing tracks and build new ones using existing rights-of-way along highways or electrical transmission lines.

On March 18, Energy Minister Rocio Nahle announced four parties were invited to bid for the construction of an \$8 billion new refinery in Dos Bocas, Tabasco, for the state oil company known as Pemex. Fifty percent of the refinery must be “national content.” At the announcement, President López Obrador added that his government intends to set aside funds to modernize Pemex's existing six refineries and to start oil production on twenty new sites. López Obrador has set a goal of national self-sufficiency in gasoline; at present, 70 percent of domestic demand is met by imports, most of which come from the U.S.

Mexico is the top export destination for U.S. electrical equipment within NEMA scope. NEMA's field office in Mexico City supports 24 product sections on technical Standards and market development projects. ☺

Cybersecurity, Data Privacy, and Standby Power Discussed at NEMA-Moderated CES 2019 Panel

The Internet of Things (IoT) wave was evident more than ever at the 2019 Consumer Electronics Show (CES) held recently in Las Vegas where more than 4,500 exhibitors showcased their latest tech innovations. Industry Director Steve Griffith moderated a panel there called, “Navigating Regional and Global Policies for IoT Consumer Markets.” During the panel, attendees discussed how international trade policies like GDPR, and industry regulation, may inhibit opportunities for global IoT devices, networks, and services. They also discussed common issues such as cybersecurity, data privacy, interoperability, and energy impacts (such as standby power).



Photos by Steve Griffith

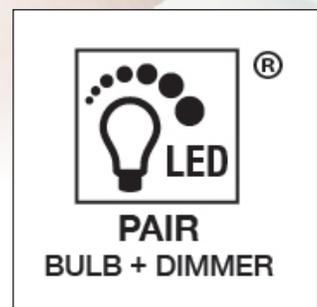


Join the Effort

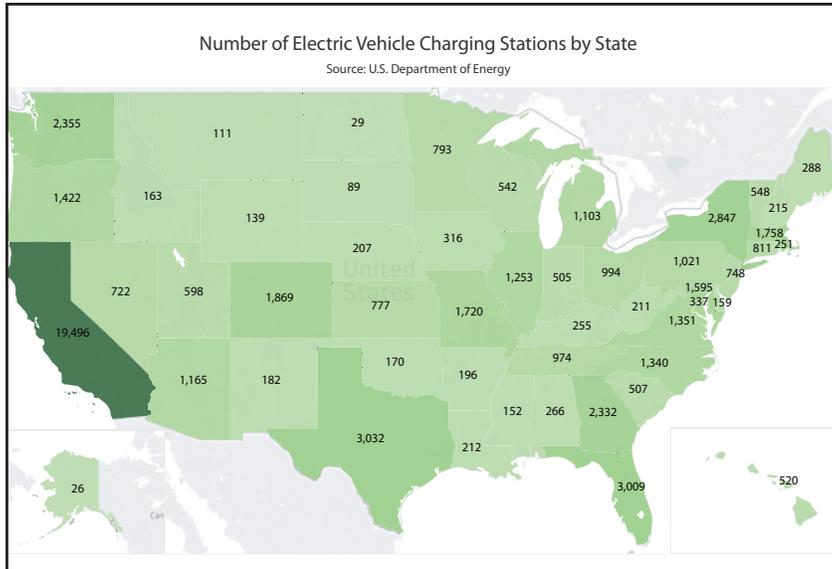
Help consumers find LED bulbs
and dimmers that work together.

Join the NEMA LED Dimming Compatibility Program. Manufacturers of LED lamps and dimmers that meet industry standards can use this logo on qualified product packaging.

Visit www.nema.org/led-dimming to join the program.



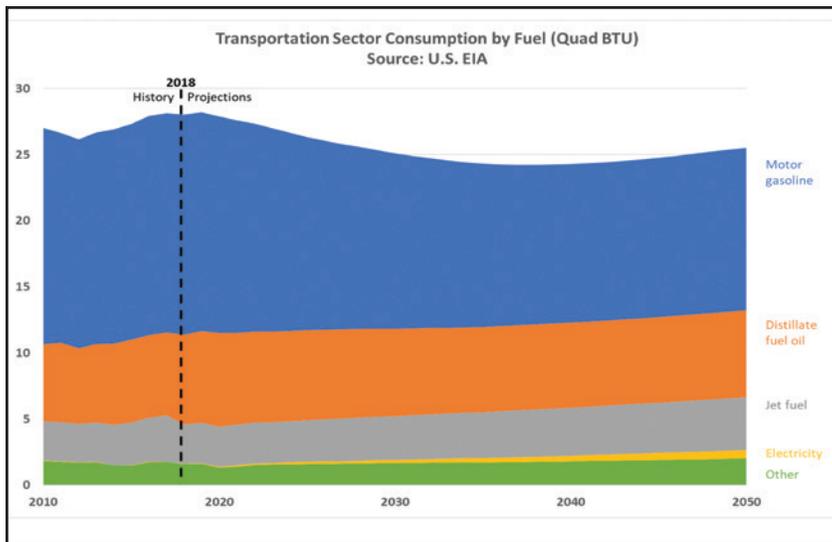
Transportation Provides Electrification Opportunities



Companies are electrifying the transportation sector by shifting investments away from traditional internal combustion engine vehicles and to the manufacturing of electric vehicles (EVs), charging stations, and batteries.

According to the U.S. Energy Information Administration (EIA), in 2018, United States energy consumption was 99.8 quadrillion British thermal units (BTU) after peaking at 101 quadrillion BTU in 2007. The transportation sector accounted for 28 percent of energy use in 2018—only slightly behind the electric power sector.

Transportation is the largest consumer of petroleum and other liquids, particularly motor gasoline and distillate fuel oil, according to the EIA. The opportunities to shift this fuel consumption toward electricity are abundant. States are leading the charge in the effort to fuel transportation using electricity by passing legislation and creating EV incentives. California has 92 such laws and incentives.



Despite the state and federal push, electricity as a fuel for transportation accounted for less than 0.1 percent of total fuel by the sector in 2018. By 2050, EIA estimates that ratio will reach only 2 percent in their base case. While some forecasts are more optimistic, most expect electricity to continue to be a small fraction of the transportation fuel composition. As fuel economy standards stop requiring additional efficiency increases in 2025 for light-duty vehicles and in 2027 for heavy-duty vehicles, consumption of petroleum and other liquids will increase, unless new regulations are adopted.

The current infrastructure for fueling vehicles with electricity is another hurdle hindering faster diffusion of EVs. Nationwide, public EV charging stations have increased 20.6 percent from 2017 to 61,067, nearly double the 2015 count.

Keys to faster EV adoption will be battery technology advances that improve affordability and driving range as well as increased investment in charging station infrastructure. Along the way, the proliferation of EV manufacturers and charging systems will wane.

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

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NEMA Helps Drive Transportation Innovation

Advancements in electric vehicles are taking off. Manufacturers are producing vehicles in larger numbers, and the cost of their batteries is quickly going down. Meanwhile, population growth, traffic congestion, and the need for infrastructure fixes will motivate the manufacturing of smarter infrastructure systems and devices.

But electric vehicles are a fraction of a global movement toward connecting our transportation fleet. We know the future of transportation is connected, electric and—within not too many years—autonomous. But how do we make sure that our infrastructure and its control devices are ready when that future becomes present? What can we do with electrification and digitalization now to mitigate today’s real traffic issues?

To start, NEMA Member companies make traffic control systems and devices and assist with developing related Standards and guidelines.

NEMA also has product Sections that support electrified transportation, including the Electric Vehicle Supply Equipment/Systems Section. The Section’s scope includes communication and software for EVSE and dc charging systems. The Transportation Management Systems and Associated Control Devices Section scope includes items that assist Intelligent Transportation Systems, including products that support integrated transportation management and control systems (signals, traffic controllers, communications devices and systems, software and firmware, and more).

“To be successful, connected vehicle infrastructure must be interoperable, future proof, reliable, and maintainable by local agencies,” Bryan Mulligan, NEMA Transportation Management Systems and Associated Control Devices Section Chairman and President of Applied Information, Inc., said in a NEMA press release.

NEMA supports the development of Standards that will connect autonomous vehicles with highway infrastructure, including how Traffic Management Centers connect, communicate, and share data with other vehicles and evolving networks of roadside devices. Also, NEMA formed the Connected Vehicle Infrastructure Technical Committee (CVIT) to develop consistent technical requirements for connected vehicles and other roadside devices. These include NEMA Standards for traffic signals, school zone beacons, pedestrian crossings, and other electronic devices that control the movement of vehicles and pedestrians on the nation’s roadways.

Investments in infrastructure—and new state and federal laws—are needed now. That is why NEMA supports the effort by Senator Tom Carper to build an electric vehicle charging infrastructure with his Clean Corridors Act (See “Give the Green Light to Electric Vehicle Infrastructure” on page 4).

NEMA Standards, advocacy and business analytics efforts will be important to driving transportation into the future . . . a future that will arrive faster than we think. ☺

Kevin J. Cosgriff
NEMA President and CEO

2019 Editorial Calendar

July/August

Building Systems

Systems efficiency modeling

September/October

Industrial Products & Systems

Smart manufacturing

November/December

Building Infrastructure

The connected customer—Creating dynamic systems with passive devices

November/December

Medical Imaging

PROVIDING POWER FOR YOUR JOURNEY

ONE CABLE AT A TIME

Southwire is the Smart Solution for Your EV Needs

Southwire offers an array of automotive cables for electric vehicles. From battery cables to brake cables, from standard charging cables to our innovative liquid-cooled DC fast charging cables, we will work with you to engineer and supply the right solution for your application

For more information contact your Southwire Sales Representative, email Rhonda.Rogers@southwire.com, or visit Southwire.com.



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