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Talk of change is in the air. Change for the better, change for the future.

Change has been repeatedly discussed in mass media and in private conversations. While political debates have centered on how our government can or should change, NEMA continues to drive change for the benefit of our member companies.

Our strategic initiatives are focused on change. Next year is likely to see significant change in our nation’s tax laws. NEMA is ahead of the curve by establishing a tax reform working group to evaluate the likely impact of proposed tax changes on our member companies, and to consider new approaches to incentivize energy efficiency retrofitting in buildings and factories.

On the medical imaging side, our medical division (MITA) is working hard to change the tax laws by repealing an ill-conceived new excise tax on medical devices that threatens jobs and dampens American innovation and is leading change in the important area of radiation dose reduction.

Smart Grid is at the forefront of the change our member companies are bringing to the delivery of electricity across our nation. NEMA is leading this change by working with our industry partners to stand up SGIP 2.0, educating consumers about the value of smart meters, and seeking harmonization with international bodies.

NEMA has also emerged as a leader in energy storage, which is changing the way facilities and installations across the country will operate in the future. NEMA has been selected to hold the secretariat to the U.S. Technical Advisory Group on the IEC’s Energy Storage Systems project.

With strategic initiative funding, NEMA will drive the expansion of markets for high performance building projects. We are leading the effort to change the way the government does its accounting so energy savings performance contracts can be used to retrofit scores of federal buildings, and we are considering the feasibility of new energy efficiency tax incentives to expand the market for retrofitting of commercial buildings.

Sometimes, changes in the wrong direction need to be stopped. Some states have started to abandon the three-year code adoption cycle in order to save money. This is bad for consumer safety and bad for our members and we have a strategic initiative to work for stakeholders across the country to ensure that the regular code adoption cycle is maintained.

We are making positive changes in how NEMA and the industry do business. NEMA will have a new state-of-the-art conference center in March of 2013. This will save our member companies time and money with fewer and better coordinated industry meetings.

Finally, NEMA is a leader in international change—working closely with our partners around the world to harmonize standards and open markets and opportunities for our members.

I hope you enjoyed reading electroindustry this year. As I pass the torch of NEMA chairmanship on to another, I look back at a rewarding year and being a part of this association that is changing the future of our industry. 😊

Dominic J. Pileggi
Chairman
We Must Continue to Advocate for Continued Investment in the Grid
Gregory B. Kenny, President and CEO, General Cable

How do you think about grid modernization? There is no arguing that significant investments have been made to make our electrical grid operate more effectively. Billions of dollars have been invested in advanced metering infrastructure systems and integrating renewable sources of power generation. However, we need to accelerate the investment into the physical assets.

There is a growing gap between overall demand and investment. Every four years, the American Society of Civil Engineers (ASCE) publishes The Report Card for America’s Infrastructure. In its 2011 report, ASCE estimates that an additional investment of $107 billion is needed by 2020 to fund the investment gap for electricity infrastructure. With the proliferation of advanced communication devices and the need for quick processing of information, the need for access to clean, reliable power is essential. In order to maintain a viable and stable economy, it is imperative that there is continued investment in the infrastructure to support a stable grid.

INVESTMENT TRENDS
From 2001 through 2010, ASCE reports that annual capital investments averaged $7.7 billion for transmission and $19.8 billion for local distribution systems. While the investment in electrical infrastructure has increased in the last decade over prior periods, there is a need to replace aging equipment and debottleneck congestion points.

At the end of 2010, 70 percent of all transmission lines and power transformers were 25 years or older and 60 percent of circuit breakers were more than 30 years old. Without replacing or upgrading hardware, the grid will be exposed to equipment failures resulting in potential power outages. Much of the older equipment has capacity limitations that will create congestion points, again, resulting in potential outages. NEMA members must continue to advocate for continued investment to keep our grid healthy.

INVESTMENT CHALLENGES
We must find a way to make it easier for planned investment to translate into actual investment. Since much of the demand for transmission and distribution (T&D) equipment comes from regulated entities, there is a big challenge to understand the timing and approval process. Permitting and siting of transmission facilities has long been challenging because of opposition over visibility impacts (“not in my backyard”) and other environmental concerns. This process can take years and the effect on the supplier base influences our decisions on hiring new employees and long-term capital investment. It is difficult to create a case for manufacturing investment when project timing is measured in years and the approvals of the transmission projects are uncertain.

Distribution has its own set of challenges. Rate-case judgments by the local utility commissions can either increase or curtail distribution investment. This, too, poses challenges for manufacturing capital investment or job creation, as the ability to react to short-term swings in demand is difficult.

NEMA members need to advocate for a strong voice with federal and local government agencies to encourage more integrated planning, thereby streamlining the commissions’ processes in order for NEMA members to drive their own continued investment.

INVESTMENT IN NORTH AMERICAN MANUFACTURING
The strength of the NEMA members’ North American T&D manufacturing base is one of the most impressive industrial platforms serving any industry. These flexible platforms consistently deliver reliable, quality products to keep the grid performing at its best. In addition to ample capacity and solid capabilities, we need to continue our investment in advanced technologies.

Many aspects of the grid have accelerated in recent years, but we cannot become complacent. In order to leverage the industry’s strong North American asset base we must bring new ideas to market and create new products, which will continue to make us the strongest manufacturing base in the world. Our T&D grid is a complex system on which we rely daily to bring power to our businesses and our homes.

In order to maintain the strength of our industry and our overall economy, NEMA members must not only continue to advocate for continued investment in the grid, but also for more streamlined processes to encourage investment in our technology and in our people.
On August 15, 2012, NEMA and several other stakeholders submitted to Energy Secretary Steven Chu a petition for a direct final rule for electric motors. A direct final rule is a relatively new type of rulemaking tool, whereby a rulemaking is conducted on an accelerated timeline, skipping framework documents, data analyses, and proposed rules.

The key to a direct final rule is that submitters

- have a good technical argument and proposal, and just as importantly,

- that stakeholders represented in the petition include all major entities to minimize a dissent later.

A direct final rule may be appealed, but if all major stakeholders are included in the original petition, then chances are very low that this will happen.

**STRATEGIZING A WINNING APPROACH**

NEMA and representatives from energy advocacies began collaborating two years ago, knowing that a second tier of electric motor rules was inevitable. By beginning early, consensus and agreement could be reached offline and differences resolved in private.

Originally, the intent was a legislative path, but the partisan political climate of early 2012 made this unrealistic. The stakeholders redirected their efforts and began to retool the legislative language into rulemaking arguments. In Spring 2012, the stakeholders met with the Department of Energy (DOE) to explore its willingness to consider such an approach and obtain feedback. The meeting was positive, with many questions asked and ideas shared.

The stakeholders returned to their internal meetings and began crafting the formal petition. At the core of the petition is a reinterpretation of the definition of an electric motor, which expands the scope of affected products. This expansion is accomplished without requiring any changes to federal law or code, a key consideration.

While the stakeholder group was working, DOE continued normal rulemaking efforts and released a Preliminary Technical Support Document (PTSD) in July. The PTSD built on previous discussions by expanding the scope of affected products, and hinted at levels of performance for those products already regulated which were of significant concern.

The petition working group kicked into high gear and completed the petition for submission on August 15. The petition seeks to both expand the scope of affected products and also raise the bar slightly for some already regulated, but it stops short of pursuing maximum-technology (max-tech) efficiency solutions. By doing this, the petition steers clear of untested technological innovations in materials and designs that they have just completed. The joint stakeholders believe that the petition is not only able to be published more quickly than the standard rulemaking (it is lagging behind its due date), but that the requirements it lays out are more readily accomplished compared to new technologies which would have to be developed and tested.

By leveraging innovations and solutions already developed, which were done largely without changing the final size and shape of existing motors, end-use products that integrate the motors will not have to be redesigned as often. This saves time, manpower, and costs on the road to final installation.

Leveraging market data that NEMA had already gathered and some of the analysis tools from DOE PTSD, the joint stakeholders estimate the energy-savings potential of the petition at more than 1,290 TWh (or 4.4 quads), over the 30-year period typical of DOE rulemakings. This can be accomplished without having to develop or invest in untested max-tech solutions or redesign end-use equipment to accommodate highly-modified motors.

At the time of submission, joint petition stakeholders included NEMA, American Council for an Energy-Efficient Economy, Appliance Standards Awareness Project, Alliance to Save Energy, Earthjustice, Natural Resources Defense Council, Northwest Energy Efficiency Alliance, Northeast Energy Efficiency Partnerships, and the Northwest Power and Conservation Council. The California Energy Commission and California Investor Owned Utilities are expected to endorse the petition, as are several other organizations.

The joint stakeholders continue to identify and contact potential supporters in state and regional energy offices and elsewhere.

The petition may be found on the NEMA website, Rulemaking Comments page: www.nema.org/Motors-Joint-Petition
FEDERAL REGULATIONS
In July, the Department of Energy (DOE) published a Preliminary Technical Support Document for the electric motors rulemaking. NEMA responded in early September with copious comments.

More significantly, on August 15, NEMA and several other stakeholders submitted to Energy Secretary Steven Chu a petition for a direct final rule for electric motors, a relatively new type of rulemaking tool. (See NEMA and Partners Submit Joint Stakeholder Petition for Electric Motor Energy Efficiency Regulations, page 5)

NEMA and several members attended a public meeting in August at DOE for a new rulemaking for furnace fans. This rulemaking is being tracked because it might indirectly regulate the motors which power the fans. The motors most affected are the type called electrically-commutated motors, or ECMs. They are currently unregulated. This rulemaking is significant for other reasons: furnace fans are a component in a larger system, i.e., furnaces, which are already federally regulated. How the regulation of this component will be balanced against and influenced by existing regulations on the finished product is a rulemaking to be watched.

There has been little movement in lighting-related rulemakings since mid-year, with the June 25 NEMA comments to the light emitting diode (LED) lamps test procedures proposed rule being the most recent. The high intensity discharge (HID) lamp and HID fixtures rulemakings are expected to be the next milestones reached, but the timing is unknown.

ENERGY STAR®
In early September, NEMA commented on the latest draft of the ENERGY STAR® Lamps Specification. This is an all-in-one light bulb specification intended to combine compact fluorescent lamps (CFLs), LEDs, and any others that might come along. It has been referred to in the past as a technology-neutral specification, but in practice, it is more of a consolidated reference, often citing different performance and test requirements for a given lamp type.

NEMA looks forward to more than one face-to-face meeting to discuss comments with EPA directly, and we continue to push for more public stakeholder meetings that include meetings with retailers and utilities, who are the primary source for lamp sales.

NEMA is advocating for strategic meetings to decide the future of the ENERGY STAR lamps programs in terms of defining success and criteria sunsetting successful programs, or how to redirect and retask them. The old method of simply raising the energy efficiency bar every few years is facing diminishing returns due to the limits of technology. The efficiency jump from incandescent to CFL or LED is huge and remaining jumps are much smaller.

EPA has taken the attitude that improvements should now center on consumer satisfaction through improved performance, but NEMA and members have lodged strong concerns over prescriptive designs, commoditization of the market, restraint of trade, and cost implications for recommended improvements. This issue is still being discussed, and may set the tone for other ENERGY STAR programs as efficiency technology reaches practical limits.

CALIFORNIA TITLE 24 BUILDING EFFICIENCY REGULATIONS AND TITLE 20 APPLIANCE EFFICIENCY REGULATIONS
In September, the California Energy Commission (CEC) published its Final Statement of Reasons and Summary and Response to Public Comments for the January 2012 Appliance Regulations Rulemaking (Title 20) for Battery Chargers and Self-Contained Lighting Controls.

Most, if not all, NEMA comments regarding lighting controls were accepted with little explanation, but additional details were provided as to why only exit signs were exempted from the battery charger regulations, leaving egress lighting and other safety-related illumination affected.

The CEC wrote, as promised verbally, that “combination unit” exit/egress lighting products will be exempted since they contain an exit sign. Besides this, no significant Title 24 or Title 20 milestones were reached over the summer, due in part to normal summer slow-down and perhaps moreso to a complete changeover in CEC staff for these regulations in June 2012.

NEMA is forging new relationships with the new staff members and expects the same good rapport between our organizations as before.

Alex Boesenberg, Regulatory Affairs Manager | alex.boesenberg@nema.org

NAED Releases Study on ESCOs
The National Association of Electrical Distributors has released a new study describing the energy service company industry and identifying potential benefits of electrical distributors developing partnerships with ESCOs.

The report’s Executive Summary is available at naed.org.
Engaging in TPP Trade Talks

NEMA staff participated in the September 9 stakeholder engagement event during the Trans-Pacific Partnership (TPP) trade negotiations in Leesburg, Virginia. Negotiators from nine countries met in there in September to make progress on a regional free trade agreement.

NEMA staff is in regular contact with U.S. government negotiators for TPP, but the event provided an important opportunity to speak directly with negotiators from the other parties. At the time of the recent talks, TPP countries included Australia, Brunei, Chile, Peru, New Zealand, Malaysia, Singapore, U.S., and Vietnam. Canada and Mexico formally joined TPP talks on October 8.

After the September event, NEMA provided feedback to the Office of the United States Trade Representative staff on how to improve similar events as TPP negotiations continue.

The next formal round of TPP negotiations is scheduled for December in New Zealand.

Gene Eckhart, Senior Director for International Operations | gen_eckhart@nema.org
Craig Updyke, Manager of Trade and Commercial Affairs | cra_updyke@nema.org

NEMA Organizes Group on “Conflict Minerals”

The Securities and Exchange Commission (SEC) in September published the final rule implementing a 2010 federal law requiring public companies to perform due diligence and fulfill auditing and reporting requirements relative to their supply chains for products that contain one or more of the “conflict minerals.” They are gold, tin, tantalum, and tungsten.

The final rule was adopted by the SEC on August 22; its effective date is November 13.

NEMA has formed a working group of interested member companies to support their efforts to understand and comply with the new rules. The first reports by public companies with shares listed on U.S. exchanges will be required for 2013 by May 2014. NEMA is also active in the National Association of Manufacturers’ working group on conflict minerals.

Any NEMA members interested in joining the working group should contact Craig Updyke in NEMA Government Relations.

Craig Updyke, Manager of Trade and Commercial Affairs | cra_updyke@nema.org

Extending Carbon Footprint Analysis to Ballasts, Connectors

NEMA members are aware of the ongoing strategic initiative designed to help member companies assess the “carbon footprint” of electrical products. The initial phase of this project is complete and the summary report of first phase activities is available for member review at www.nema.org/First-Phase-Report.

The current focus of the project is to obtain further insights to the newly developed methodology by applying it to another set of focal products. The first phase consisted of energy-efficient lamps and ac inductor motors. NEMA staff and project contractors from the MIT Materials Systems Laboratory are working with members of the ballast and electrical connector sections.

The first phase of the process involves choosing one or more representative products from these two sectors, working with the section to develop bills of materials and product templates, and using the templates to acquire product composition data from the companies through NEMA/BIS. MIT will then perform the statistical analysis to determine the key factors that drive the energy use and greenhouse gas emissions of each product.

The ultimate intent of NEMA’s Carbon Footprint Initiative is to produce an analytical tool that can be applied as broadly as possible across the spectrum of electroindustry products. We cannot achieve this goal, however, without the ongoing insights and technical expertise of our member company experts.

The next phase of collaboration, scheduled for completion in spring 2013, will refine this industry tool.

Mark A. Kohorst, Senior Manager of Environment, Health, and Safety | mark.kohorst@nema.org
Incentive Regulation for Grid Reliability Helps Close Investment Gap

Paul Centolella, Vice President, Analysis Group

U.S. businesses and consumers increasingly rely on digital devices that require reliable electric service. However, the power grid is in urgent need of modernization. In 2001, an Electric Power Research Institute (EPRI) study found that outages and power quality incidents were costing businesses $119 billion to $188 billion per year. Between 2001 and 2010, the number of major outages reported to the U.S. Energy Information Administration (EIA) doubled. (EIA collects data on outages affecting more than 50,000 customers.)

Much of our electric infrastructure was built more than 40 years ago. At this point, most of our distribution equipment is approaching or has exceeded its expected useful life. The American Society of Civil Engineers (ASCE) recently estimated that maintaining the U.S. electric infrastructure will require $673 billion in new investment by 2020, an amount greater than the net “plant in service” owned by U.S. investor-owned electric companies. This will require a significant increase in expenditures compared with the rate of utility investment over the past decade.

According to ASCE, 88 percent of the required increase in investment through 2020 is in electric distribution and transmission. If those additional investments are not made, ASCE concludes that:

As costs to households and businesses associated with service interruptions rise, GDP will fall by a total of $496 billion by 2020. The U.S. economy will end up with an average of 529,000 fewer jobs than it would otherwise have by 2020. In addition, personal income in the U.S. will fall by a total of $656 billion from expected levels by 2020.

Although uninterrupted service has never been more important to consumers, regulation often fails to offer utilities consistent incentives to minimize the sum of customer outage costs and utility costs. Instead, regulatory proceedings frequently focus on the justifications for any additional utility costs after minimum levels of reliability have been achieved. Proposing incentives based on reducing outage costs to consumers is one way to reframe the regulatory issue and help close this investment gap.

Building a Modern, Reliable Grid

To improve reliability in the distribution system, where most outages occur, leading utilities are starting to deploy Smart Grid technologies, including:

- Sensors that enable “condition-based” maintenance, rather than operating equipment to failure;
- Automated reclosers that isolate outages, avoiding service interruptions for thousands of customers;
- Community energy storage, distributed generation, enhanced power electronics, and micro-grids to maintain service to critical loads; and
- Advanced meters that have accelerated service restoration by allowing the utility to rapidly locate outages, efficiently position repair crews, and send alerts and updates to vulnerable customers.

EPRI estimates that in the next 20 years, U.S. Smart Grid investments could produce as much as $445 billion in present value reliability benefits, one of the largest single categories of benefits associated with such investments. (Overall, EPRI estimates the economic benefits of Smart Grid investments would be between 2.8 and 6 times the cost of such investments.)

Understanding Consumer Outage Costs

Estimates of customer outage costs can provide the foundation for benefit-cost analyses of potential reliability improvements and for aligning utilities’ incentives with consumer benefits.

There are established methods for estimating the costs to consumers of service interruptions. Those costs, of course, will vary by customer type. One recent review estimated average.

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4 American Society of Civil Engineers, Failure to Act: The Economic Impact of Current Investment Trends in Electricity Infrastructure (2011)
5 Edison Electric Institute, Industry Data: Statistical Highlights (September 1, 2012)
6 American Society of Civil Engineers, Failure to Act: The Economic Impact of Current Investment Trends in Electricity Infrastructure (2011) at 8
7 Ibid. at 10
8 NEMA, After the Storm: Strategies for Reducing the Impact of Power Outages through a Stronger, Smarter Electric Grid (2012)
9 Electric Power Research Institute, Estimating the Costs and Benefits of Smart Grid, Final Report (March 2011) at 4–5
costs to consumers for one hour of interrupted service on a summer weekday afternoon. The researchers found that the average cost for small commercial and industrial customers was $373 per unserved kilowatt hour (kWh). For large commercial and industrial customers, the average cost was $25 per unserved kWh, and for residential customers, the average cost was $2.60 per unserved kWh. Power outages that last days clearly are very costly. However, the average cost per unserved kWh during a four- or eight-hour outage is generally less than that it would be during shorter service interruptions. Thus, if the total duration of outages is equal, more frequent service interruptions add to customer costs.

Exploring Reliability Incentives

Policy makers are starting to consider incentive regulation for reliability; state statutes have included requirements for the creation of reliability-based performance incentives. Meanwhile, the U.K. Office of Gas and Electric Markets is implementing its RIIO (Revenue = Incentives + Innovation + Outputs) model of incentive regulation which would set output-based incentives for grid reliability. Such incentives represent a first step in encouraging utilities to make needed investments and move beyond simply complying with minimum reliability requirements.

These examples have not yet expressly adopted outage costs as the basis for reliability incentives, but incorporating reductions in customer outage costs is a logical next step. Such an approach would facilitate the use of a shared-savings mechanism that could help align utility incentives with consumer value. It also would reduce the risk that customers who place a higher value on reliability would pursue behind-the-meter generation when doing so may be more costly and less valuable than comparable improvements that could be implemented by the utility.

As utilities and their regulators consider reliability incentives to reduce customer outage costs, they will need to address certain economic and technical questions on a utility specific basis:

- How should customer outage costs be estimated?
- What reliability improvements are achievable?
- How should performance be benchmarked given differences in data collection and among circuits?
- How should major events be considered, if at all, in the incentive mechanism?
- How should the costs of reliability improvements be allocated?

Incentive regulation can provide a utility a framework for assessing the economic value of different investments and flexibility to make those expenditures with the greatest reliability benefits. It encourages investments that reduce consumer outage costs and help modernize the power grid.

Mr. Centolella is a former commissioner on the Public Utilities Commission of Ohio with more than 30 years of experience in utility regulation, economic and energy consulting, and public utility and environmental law. He serves on the Smart Grid Interoperability Panel Governing Board and the Secretary of Energy’s Electricity Advisory Committee.

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12 Ibid

13 See, for example: 220 Illinois Compiled Statutes Chapter 5/16–108.5

14 C. Jenkins, RIIO Economics: Examining the economics underlying Ofgem’s new regulatory framework, Florence School of Regulation Working Paper (June 2011)
At first the idea seemed preposterous: Get regulators and government officials from the states that make up the Eastern Interconnection into one room and develop interconnection-wide planning proposals for nearly two-thirds of the country.

This was the challenge Congress offered when it passed the American Recovery and Reinvestment Act (Recovery Act) in 2009. Even as regional transmission planning had expanded across the Interconnection over the last decade, there was no forum or systematic process for thinking beyond the usual borders, as there had been in the West for three decades. The 42 planning authorities within the Eastern Interconnection encompass (or fall within) regulated and restructured states, organized markets and single utility territories, coal states and “green” states, and everything in between.

When the Recovery Act presented an opportunity to start this important work, we seized it. And as we pass the second anniversary of the program, we are not only meeting expectations, we are surpassing them.

The Eastern Interconnection States Planning Council (EISPC, pronounced “icepick”) is developing a series of mapping tools, studies, and white papers that will provide policy makers and the public with a wealth of useful information and analysis on energy resources and possibilities across the Interconnection.

But even more importantly, we are building a new level of understanding among the 39 states and two cities (the District of Columbia Public Service Commission and the New Orleans City Council Utilities Regulatory Office) that make up the council, developing a greater appreciation for the regional differences within the Eastern Interconnection.

EISPC Leads the Way

EISPC’s mission covers two categories. First, in conjunction with the Eastern Interconnection Planning Collaborative and other stakeholders, EISPC has played a leadership role in shaping a comprehensive interconnection-wide transmission analysis. This project included the development of a baseline infrastructure across all of the planning authorities, agreement on eight future resource scenarios and multiple sensitivities, and the selection of three scenarios for a full transmission build analysis and production cost modeling.

A key challenge was coming to a common understanding about not only what the future looks like, but what the present looks like as well. Each state factors its own set of considerations into its baseline assessments of infrastructure and growth, capacity, and needs. Over the course of several months, EISPC members met to come to a consensus on apples-to-apples data that could be rolled into an interconnection-wide view, and to agree on assumptions and inputs that would drive the models predicting the future of the electric grid in the East.

Fortunately, the breadth of this analytical exercise allowed the disparate states to study many of the issues and policy questions most pressing to them.

Second, EISPC is producing a series of studies and white papers that will provide information and analysis for policymakers.
and the public to use as they consider critical resource and transmission planning issues. The white paper, *Market Structures and Transmission Planning Processes in the Eastern Interconnection*¹, details market structures throughout the 39 states and discusses how differences could affect private investment and state approaches to planning and resource development.

In the first quarter of 2013, we will roll out EZView, a mapping tool that will enable policymakers, companies, stakeholders, and citizens to evaluate a complex set of variables that affect how suitable (or unsuitable) any broad area will be for development of clean energy infrastructure. From there, we will release a number of studies evaluating the potential and tradeoffs for the development of demand-side resources, Smart Grid, and nuclear, renewable, and coal generation.

There will also be a lot of new information about how state laws, rules, regulations, and orders affect the identification of energy zones in the Eastern Interconnection. Each of these will be powerful resources as we all make choices that will bring us into the energy future for our country.

Although we are proud of the work we are doing, the greatest accomplishment of EISPC so far has come in forming and continuing this interconnection-wide conversation about our energy future. We have been careful to retain our regulatory independence and recognize that we all come to this conversation from different places and with different policy priorities.

The process of working through these resource and transmission planning issues on a broader scale, however, helps form the decisions we each make at home and helps us fit our decisions into a broader context than existing regional processes allow. FERC Order 1000³, which was issued well after we began, seems to contemplate this as well.

What we’ve achieved over the last few years represents an important and unprecedented first step in the East, and we look forward not only to finishing these specific projects, but continuing this effort into the future. ©

Mr. Nazarian also serves as chairman of the Maryland Public Service Commission.

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¹ www.community.nrrr.org/documents/68668/9b2a7442-0061-4c45-9a64-a5c2dec0058f

² www.ferc.gov/industries/electric/indus-act/trans-plan.asp

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After the Storm

Strategies for reducing the impact of power outages through a stronger, smarter electric grid

- What is a Smart Grid?
- What Can Public Officials Do to Promote Smart Grid?
- Advanced Metering Infrastructure
- Distribution Automation
- Demand Response
- Energy Efficiency Products
- Distributed Energy Resources
- Microgrids
- Downed Power Lines
- Resources

Available for download @ www.nema.org/AfterTheStorm
Underground or Overhead?
Exploring Issues of Cost and Reliability

Dennis Doss, General Cable Technical Marketing Director, Electric Utility

In the early 1900s, utilities and municipalities began putting medium-voltage paper-insulated lead-covered cables and rubber-insulated low-voltage cables in ducts below city streets. In the mid-1950s, a cost-effective and easier to install alternative was introduced—polyethylene-insulated underground cable. Since then, significant improvements have been made to where service life of overhead and underground systems are now on par.

Anyone who has experienced a lengthy power outage from storm damage understands that underground power delivery systems are more reliable than overhead systems, but when an underground system fails, locating the failure is more difficult and repairs can take much longer, especially if there is no contingency power source. Repair can mean digging up lawns, gardens, and streets. In fact, a large southeast utility company discovered that while underground systems do significantly reduce outages from hurricane winds, damage to the underground system from flooding was extremely costly. It now limits underground services to new construction only.

There is increasing public sentiment and pressure from special interest groups to move power lines underground—out of sight, out of mind. Aside from aesthetics, property values are higher in neighborhoods where utilities are placed underground. There is also a safety aspect—the risk of injury from fallen power lines is eliminated.

Commonly accepted estimates put the initial cost of underground systems at five to ten times more than overhead construction, while overhead systems have higher operation and maintenance costs (e.g., tree trimming). Depending on whether it is new or old construction, utilities have several programs to recover some of the initial expense of underground systems. In new construction, utilities will often require developers to pay the expense since they will likely recuperate the cost because of higher property values. However, it is ratepayers who eventually foot the bill. Looking at key decision factors for overhead versus underground systems, there is clearly a dilemma of cost versus benefit.

Various factors such as site access, soil conditions, vegetation, and routing will influence installation cost and reliability of underground systems. When the cost of an underground system is low and benefits are high, “undergrounding” may be the right decision. But it is no silver bullet. The cost of putting cables underground is still magnitudes higher than overhead systems. While underground systems are more reliable, when outages do occur, they tend to last much longer.

The push to put utilities underground is driven by the voice of the ratepayer through discussions with public utility commissions—the same groups of people who have to ultimately fund the increased costs.

Mr. Doss has 15 years of experience as standards engineer at a southeastern electric utility, and 25 years at General Cable Corporation as senior product engineer, director of product engineering, and now technical marketing director.

### Top Four Reliability Risks for Overhead and Underground Systems

- **Overhead**
  1. Falling trees and limbs
  2. Storm damage (high winds)
  3. Ice buildup (regional issue)
  4. Animal contact

- **Underground**
  1. Physical damage from dig-ins (=90%)
  2. Physical damage from installation
  3. Poor workmanship
  4. Voltage surges

Mr. Doss has 15 years of experience as standards engineer at a southeastern electric utility, and 25 years at General Cable Corporation as senior product engineer, director of product engineering, and now technical marketing director.
Combined heat and power (CHP) is not a technology in and of itself but rather an increasingly attractive way to approach energy usage in building and community designs.

CHP (or cogeneration, as the name suggests) is the simultaneous generation of useful heat and electricity as opposed to the traditional separated heat generation and pure electricity consumption from the grid. CHP systems are already used in some energy-intensive industries including steel, chemical, paper, and petroleum production.

Smaller micro-CHP and mini-CHP systems are now being implemented in hospitals, military installations, and universities because of their benefits as a distributed energy resource (DER). Just like other DER assets, CHP will ultimately be integrated into microgrids and likely will be a source of revenue from sales of power back onto the grid. Overall, the benefits are twofold: increased energy surety and energy efficiency with lower total costs in the medium to long term.

In critical research, healthcare, public safety, datacenters, and other operations seconds down—let alone missed frequency cycles—can have severe human and capital costs. CHP mitigates these concerns by providing independence from the grid when needed, without the intermittency inherent to non-storage–tied renewables. Quality power free from voltage spikes and sags can be generated and CHP systems can island themselves from the grid without the use of diesel generators. These types of generators have been cited to fail 67 percent of the time when in operation for more than 24 hours during extended electricity outages and are commonly the source of air pollution fines.

In further contrast, utility electricity generation efficiency is estimated to be from 29 percent to 45 percent by the time it is used in buildings as a result of transmission and distribution losses and inefficient heat conversion. Gas turbine CHP plants can achieve efficiency rates between 70 percent and 85 percent. For example, a 5MW CHP gas turbine is capable of providing enough captured waste heat to produce 59,000 pounds per hour of steam or 1,200 tons of chilled water using an absorption chiller.

Most importantly, CHP has a lower lifecycle cost in many scenarios. CHP turbines can cost approximately 20 percent more than a traditional central utility plant on a parity basis, but they can realize decreases of 25 percent to 40 percent in annual utility costs, providing a quick return on investment for a building owner or campus operator. The falling prices of natural gas resulting from the extraction of shale gas further strengthen the potential savings using CHP.

For these reasons, the Department of Energy (DOE) and the Environmental Protection Agency (EPA) set a goal of doubling CHP capacity between 1999 and 2010. DOE has suggested that CHP plants have the potential to represent 20 percent, or 241 GW of U.S. electricity generation capacity, by 2030.

In a continuation of this spirit, President Obama recently issued an executive order on August 30, 2012. Accelerating Investment in Industrial Energy Efficiency calls for 40GW of new CHP facilities by 2020. The executive order calls for departments of Energy, Commerce, Agriculture, and EPA to convene workshops and research the subjects.

Ultimately, the stated intent of the order is to increase the competitiveness of U.S. manufacturing, lower energy costs, free up future capital for business investment, reduce air pollution, and create jobs.

Mr. Franks (ryan.franks@nema.org) coordinates NEMA’s efforts in the energy storage and microgrid industries, along with traditional NEMA technical activity. An engineer, he worked at the United States Patent and Trademark Office and performed private intellectual property analysis.

GridWeek, an annual event focused on the Smart Grid, was held October 2–4 in Washington, D.C. Now in its fifth year, it provides a forum to discuss pressing industry topics such as microgrids, cybersecurity, energy management, and the role of Smart Grid installations on military bases.

This year, NEMA President and CEO Evan R. Gaddis joined in a roundtable discussion on how best to communicate the value of the Smart Grid to utilities and consumers.

Several NEMA member companies participated in the event including Elster, Nexans, and S&C Electric.

During the plenary session on October 4, the GridWeek Advisory Board recognized the Smart Grid Interoperability Panel (SGIP) and all of its participants “for significant achievements in ‘Taming Smart Grid Complexity’ in the pursuit of an interoperable grid.”

“It’s a real honor for the SGIP and its individual participants to be singled out for this recognition. With the strong support of NIST, we’ve accomplished a great deal in the past three years,” said George Bjelovuk, Secretary of the SGIP Governing Board. “As we transition to an industry-led, non-profit organization in the months ahead, it’s more important than ever that we have the recognition, support, and active participation of the Smart Grid industry.”

Chrissy L. S. George, Assistant Editor/Writer | chrissy.skudera@nema.org
Among the excellent sessions and good ideas that GridWeek provided to the industry was a nugget called “Drivers to Tame Complexity.” This roundtable featured members of the Smart Grid community including Paul DeMartini (Newport Consulting Group), Eric Dresselhuys (Silver Spring Networks), Doug Kim (Southern California Edison), Mark McGranaghan (Electric Power Research Institute), and Larry Bekkedahl (Bonneville Power Administration).

The challenge, as described by the panel, is that utility companies are working from a five-year long-range plan to buy assets that might have a 30-year lifespan, which must function appropriately in a constantly changing operational and regulatory environment. The question posed by Mr. Dresselhuys to utilities with California service territories, was, “how many mandates coming out of the CPUC [California Public Utilities Commission] were part of your long-range plan five years ago?”

The solution to accommodate this challenge was provided by a fellow panelist. According to Mr. Kim, standards-based Smart Grid architectures create the building blocks that will not only support the rapid pace of change on the technology side, but also provide a pathway to support legacy equipment in the grid.

The concept of Smart Grid architectures goes way beyond the physical path of electrons associated with the grid that evolved over the course of the 20th century. The traditional one-way power flow from the generating plant to the end-user customer is now superimposed over a network of variable electric loads and distributed generating sources such as electric vehicles, energy storage, solar panels, and wind turbines.

The only way to accommodate these high levels of variability and maintain the expected high quality of service for customers is to tie the grid to a robust control environment. More than just a collection of dials and switches, this environment must include an information architecture, tools to gather wide-area situational awareness, a variety of communications networks, and the necessary measures to secure it all in a way that meets the business needs of the utility company.

SGIP Responds

The Smart Grid Interoperability Panel (SGIP) was created by the National Institute of Standards and Technology (NIST) to provide a forum for industry to address these kinds of complex issues.

Within SGIP, the Smart Grid Architecture Committee (SGAC) has taken on the task described by Mr. Kim, a member of SGIP Governing Board. Employing core principles such as flexibility, affordability, upgradeability, and maintainability, SGAC has come up with innovative conceptual and architectural models that tie standards to applications that provide Smart Grid’s core functionality.

This work is reflected in the NIST Framework and Roadmap for Smart Grid Interoperability Standards (Special Publication 1108R2) and the emerging architectures of the Smart Grid Coordinating Committee of the European Union.

SGAC will continue to work with industry and government personnel in the U.S. as well as their peers abroad to advance the architectures associated with Smart Grid standards. Its ultimate vision is a set of harmonized principles on which any Smart Grid service can be delivered around the world.

Those interested in getting involved with SGAC or examining its artifacts can visit www.nist.gov/smartgrid or www.sgip.org.

Mr. Molitor (Paul.Molitor@nema.org) is currently on loan from NEMA to SGIP 2.0, Inc., as transition manager during the startup phase and is responsible for mapping current SGIP activities into SGIP 2.0.
Reducing Customer Outages—
Smart Distribution through Layered Intelligence™

Avnaesh Jayantilal, PhD, Activity Director for the Integrated Distribution Management Systems, Alstom Grid
Christopher A. McCarthy, Director of Automaton Systems for Strategic Solutions, S&C Electric Company

The current economic climate has created a challenge for electric distribution utilities in determining the right direction and choice of technologies in which to invest in order to reliably and economically manage their distribution grids. They are continually being challenged by customers and regulators to improve service reliability and quality by reducing unplanned outages.

In parallel, regulators—federal and local—are advocating policies for increasing renewable energy, including solar and wind that is connected directly to distribution voltage levels, and for energy-efficiency programs, including demand response, to further reduce our carbon footprint.

Electric distribution utilities understand that continuing to plan and invest in their existing grids for peak capacity in this challenging economic climate with increasing uncertainty may no longer be a valid investment strategy moving forward. The industry is starting to investigate solutions from advances in other industries, such as telecommunications.

To manage the growing complexity, utilities are adopting Smart Grid technologies, initially through pilot programs including those led by the Department of Energy (DOE) under the American Recovery and Reinvestment Act economic stimulus package. These pilot programs have enabled industry to innovate and deploy new technologies, whilst also proving the viability and business case for these technologies to enhance grid operations.

Smart Distribution

The industry introduced the term “smart distribution” to classify these new challenges and technology solutions. Although still an evolving concept, it addresses several industry objectives:

- support self-healing and autonomous restoration—the ability to restore healthy sections of the network after a fault without intervention by distribution operators
- support distributed energy resource deployment—the capability of incorporating generation, storage devices, demand response, and electric vehicle charging
- support bi-directional flow of energy and information—the ability to actively manage the flow of energy from distributed energy resources and to effectively use the bi-directional flow of information for enhanced distribution grid operations
- enhance security of supply and power quality—the ability of the distribution grid to maintain supply to customers under abnormal conditions and quality of power delivered at a level that meets customers’ needs
- minimize investment and operations costs—providing a high level of overall efficiency in the distribution grid through innovation, advanced energy management, and support for third-party service arrangements
- minimize the potential for delaying investment in distribution grid and centralized generation for peak load management
- minimize technical and commercial losses—utilizing efficient devices and control technologies to reduce losses at all points in the grid and reduce costs and carbon emissions
- resist physical and cyberattacks—the ability to withstand attacks to the physical distribution grid and its control systems either directly or via the internet

Electric distribution grids are complex to manage because of rural population, size of land areas covered, and the age of existing equipment. A key area in which new Smart Grid technologies have shown potential to address the above issues is the detection and isolation of faults for faster service restoration (also known as self-healing).

This is being accomplished initially with the deployment of advanced distribution automation (ADA) equipment, which includes automated feeder switches and fault-interrupting devices that actively manage and correct faults in the field. It is traditionally referred to as local fault management. Recently, the deployment of smart meters and automated metering infrastructure provide an alternative for distribution utilities to detect customer outages and potential faults instead of waiting on customers to call during outages.

To benefit from these new technologies, utilities have started to augment their basic control room SCADA (supervisory control and data acquisition). It is software with enhanced distribution management and grid optimization modules, known as integrated distribution management systems (IDMS). An IDMS platform includes SCADA, distribution management, and outage management modules, and is used for enhancing distribution control room operations.

IDMS is capable of using all available information to locate faults and automatically restore healthy portions of the distribution grid, i.e., centralized fault management. For the sections that do require manual intervention, the above information will help guide the crew to the approximate location instead of having them locate the fault manually. This helps reduce fuel costs (carbon emissions) and customer outage times, thus improving reliability indices.
Combining Real-Time Response with Regional Control

In January 2012, S&C Electric Company and Alstom Grid announced an integrated solution that combines S&C’s IntelliTeam® SG Automatic Restoration System and Alstom Grid’s e-terradistribution™ IDMS. An evolving methodology known as Smart Distribution through Layered Intelligence™, it integrates and optimizes local and centralized fault management technologies through enhanced integration between an IDMS platform and ADA equipment.

An integrated IDMS-ADA solution combines rapid, real-time response to system conditions and represents a significant step for the industry because it is a truly integrated solution, not just an interoperable solution, enhancing control room operator usability and situational awareness.

By providing an integrated solution, utilities are now able to deploy Smart Grid technologies with confidence that the true value of these technologies is realized to enhance customer satisfaction from improved grid reliability. The new solution also supports self-reporting of system reliability, efficiency, and capacity improvements. These help utilities track the benefits from investments in Smart Grid technologies. And by sharing some of this outage data including expected time for customer restoration using online social networking services, customer satisfaction has improved significantly.

The Smart Grid pilot programs have created jobs, stimulated technology innovation, fostered public-private partnerships, and renewed academic interest in electrical engineering while simultaneously re-energizing the younger generation to pursue careers in this industry. With the continued support of DOE and regulators, the industry is now looking forward to the day when customers will no longer experience sustained outages without transparent restoration information.

Thomas Edison once said, “There’s a way to do it better—find it.” Smart distribution is the better way for electric utilities.

Dr. Jayantilal is responsible for vision, strategy, product management, and business development for solutions and technologies in electric distribution utilities. A senior member of IEEE and a member of IEC, his interests include enhancing grid performance through innovation and solutions.

Mr. McCarthy, a registered professional engineer, has participated in R&D, marketing, and field application support for IntelliRupter® PulseCloser. He is also responsible for product management, application support, and strategic marketing for all automation products.
Implementing the Smart Grid Layer by Layer

Steve Griffith, PMP, NEMA Program Manager

Our society is critically dependent on a reliable supply of electric power. The aging infrastructure of our transmission and distribution networks threatens the security, reliability, and quality of its supply. Environmental issues have moved to the forefront with concerns regarding greenhouse gases and climate change.

Faced with the need to further improve operational efficiencies, utilities must deal with challenges associated with an aging workforce as well as expectations for flexibility and improved services by regulators, customers, and the marketplace. Implementing Smart Grid is based on building blocks that combine digital sensors, communications, automation, information integration, and changes in operational business processes.

Customers, demand-side energy automation, and distributed generation technologies form the base layers. These are supported by smart meters; intelligent monitoring, switching, and control devices; and distribution automation. A utility-wide, two-way data communications network connects customers, distributed resources, and smart devices with the enterprise systems and applications, enabling self-healing grid operation and demand/distributed resource management.

Supporting the base layers is myriad of information processing, analysis and software applications that provide intelligence and support operations. A Smart Grid relies on systems and process integration as well as integrated information management.

An implementation roadmap should include:

- strategic planning
- holistic approach
- a justifiable business case
- identification of enabling capabilities
- practical, balanced, and leveraged solutions

Challenging Consumers, Interoperability, Transmission

Smart Grid requires a coordinated implementation and roll-out that spans several years and covers design, implementation, and change management, as well as strategies for cost recovery and regulatory alignment.

The transformation away from a “silo-based” business to a more holistic approach to systems planning, power delivery, and customer services also requires a sound business case that includes costs and benefits associated with the transformation of technology and business models. Personnel and processes need to be identified. Business solutions should augment current capabilities and interoperate with existing systems and processes.

Most plans for Smart Grid center on significant changes in residential power. Consumers will need to understand and accept two-way monitoring technology that controls peak power requirements. A dynamic pricing model will provide incentives for consumers to change energy-use patterns. Use of the internet to link data flow between utilities and customers creates a need for cybersecurity. A by-product will be the generation of more consumer data with more potential vulnerabilities. An additional concern is the power grid itself. An attacker could penetrate a network, gain access to control software, and alter load conditions to destabilize grid operations. Cybersecurity standards will need to be developed and devices that enable the grid will need to be secured.

Smart Grid implementation ultimately depends on linking numerous devices at several points into a seamless data flow. It can’t be done with proprietary software or meters that don’t talk to the utility. Open-architecture solutions and agreed-upon standards represent a step forward. Interoperability among Smart Grid standards is probably the most complicated challenge. They must include a number of interfaces (e.g., between the grid and plug-in vehicles) and need to take into account external factors (e.g., geomagnetic storms).

Restructuring the grid for better transmission of resources is another major challenge. Putting electricity generated by renewables onto the grid depends on building more and different high-voltage lines. This is a challenge: first, ownership and interests are dispersed; second, high-voltage lines often generate protests from citizen action groups; and finally, there is an investment issue with replacing transmission lines.

Planning is complicated as there is no single owner of transmission lines. The exception is federally-owned land. The Department of the Interior processes applications for major transmission corridor rights of way on lands it owns. Many stakeholders agree that selecting sites for new transmission lines should be a state responsibility. Replacing transmission lines are not the only solution. Keeping distribution local wherever possible will also need to be considered.

For all the enthusiasm generated, it will take concerted action and long-term commitment to reap all the benefits of Smart Grid. Cutting across this vision is the tension between federal leadership and the fact that much of the concrete action must come from states, utilities, and businesses.

Before joining NEMA, Mr. Griffith (steve.griffith@nema.org) managed projects in communications and IT networking infrastructures for Department of Defense facilities.
Land of Giants™
Integrates Architecture, Infrastructure

Thomas Shine, AIA, RIBA, Choi + Shine Architects

The field of architecture is perpetually caught between the realms of engineering and art. Similarly, civic engineering has arrived at a comparable crossroad with the emergence of environmentally sensitive design. A new role is emerging that calls for the collaboration of these disciplines to consider the aesthetics of infrastructure and its effect on the built environment and its inhabitants.

Beautifully designed buildings and structures enrich our lives, deepening respect for the environment. Large civil engineering projects are rich with examples of brilliant design. However, much of our infrastructure, from water towers to pylons, has been aesthetically ignored. With population densities increasing, there is a growing tension between people’s desire for beautiful places and the infrastructure required to support our cities. The aesthetics of infrastructure design is a new field that addresses this tension.

Existing pylons are superb examples of efficient engineering, elegant in their economic solution to the functional needs of modernization and industrialization. Since their emergence, aesthetics have been largely ignored. Pylons are tolerated as necessities. The process of transforming infrastructure into something desirable occurs with the design of the Land of Giants™. By using a human form, this functional infrastructure is transformed into public art. Rather than trying to hide infrastructure, the design seeks to draw attention to the pylon-figures, creating site-specific sculptures that, when designed skillfully and sensitively, become tourist destinations. The design seeks to delicately integrate the pylons into the landscape. They neither dominate the scenery nor hide their necessity.

Such functioning public art could encourage more consciousness of the design of infrastructure (utility poles, street lighting, pavements, traffic lights, etc.), ubiquitous features of our cityscapes and landscapes that we no longer recognize because of their abundance. As the public becomes increasingly aware of the built environment, resources, and energy consumption, beautifully designed infrastructure can diminish the resistance often encountered when proposing new structures. Indeed, in some instances for the Giants, the debate has become a tussle over the most suitable location for a new project, where high visibility and accessibility are seen as assets.

The design of the Land of Giants transforms mundane electrical pylons into statues on the landscape by making only small alterations to existing pylon design. From a series of minor alterations to a well-established, open-lattice, steel-framed tower emerges a series of towers that are powerful, solemn, and variable.

The pylon-figures can be configured to respond to their environment with appropriate gestures. As the carried electrical lines ascend a hill, the pylon-figures respond by changing posture, imitating a climbing person. Over long spans, the pylon-figure stretches to gain increased height, crouches for increased strength, or strains under the weight of wires. The pylon-figures can also be arranged in groups to create a sense of place through deliberate expression. Subtle alterations in the hands and head combined with repositioning of the main body parts allow for a rich variety of expressions. Placed in pairs, they can be seen walking in the same direction or opposite directions, glancing at each other as they pass by or kneeling respectively, head bowed at a town.

Each pylon-figure is made from the same major assembled parts (torso, forearm, upper leg, hand, etc.) and uses a library of pre-assembled joints between these parts to create the pylon-figures’ appearance. This design allows for many variations in form and height while the cost is kept low through identical production, standard assembly, and construction.

It is anticipated that seeing the Land of Giants will become an unforgettable experience, elevating the towers to something more than a merely functional product of necessity. Like the statues of Easter Island, it is envisioned that these 150-foot tall, modern caryatids will take on a quiet authority, belonging to their Icelandic landscape yet serving the people, silently transporting electricity across all terrain, day and night, sunshine or snow.

Mr. Shine (tshine@choishine.com) is a registered architect with Choi + Shine Architects, creators of the Land of Giants.
Bernard H. Falk Award Winner Jon Wellinghoff Exemplifies Dedication to Electroindustry

For new technologies to flourish in a regulated market, innovators need regulators who understand the value of innovation. This year’s Bernard H. Falk award winner, The Honorable Jon Wellinghoff, is such a visionary.

A Federal Energy Regulatory Commissioner since 2006, Jon Wellinghoff was named chairman of the Federal Energy Regulatory Commission (FERC) by President Obama in 2009.

Mr. Wellinghoff has advanced the cause of innovation in the electrical sector and promoted Smart Grid through his bold leadership and commitment to open, competitive markets.

His achievements include opening wholesale electric markets to renewable resources and providing a platform for participation of demand response, energy storage, and energy efficiency. All of these technologies are key components of the Smart Grid.

According to Mr. Wellinghoff, “Unleashing information on energy and prices allows consumers to use their energy smartly. The first step is to give consumers access to the real costs of delivered energy—so that they’re not in the dark.”

FERC was given a critical role by the Energy Independence and Security Act of 2007 with regard to Smart Grid standards. FERC’s responsibility is to adopt standards critical to ensure Smart Grid functionality and interoperability. FERC also established a rate policy for assurance of recovery of future Smart Grid costs.

While innovation is central to Mr. Wellinghoff’s vision, so is effective planning for the future of the nation’s electric grid.

FERC Order 1000, a hallmark of the chairman’s tenure, encourages more comprehensive and more efficient transmission planning, as well as greater coordination within and among regions to ensure that FERC’s mission—that market rates, terms, and conditions are just, reasonable, and not unduly discriminatory or preferential—is carried out.

“While innovation is central to Mr. Wellinghoff’s vision, so is effective planning.”

Chairman Wellinghoff has empowered FERC’s 1,500 employees to support his mission. As chairman, he created FERC’s Office of Energy Policy and Innovation, which is responsible for investigating and promoting new efficient technologies and practices in the energy sectors under FERC’s jurisdiction.

In 2009 and again in 2010, he welcomed NEMA into FERC headquarters to lead Smart Grid Technology Days to demonstrate to FERC staff our industry’s technologies that are revolutionizing the grid. Both events were a huge success.

“My staff and I talk with innovators in our industry to learn about the barriers to different types of innovation,” he said. “After that, I task them with their assignment and we work to figure out ways to break down those barriers so we can incorporate innovation into the system.”

After earning two degrees in mathematics and one in law, Mr. Wellinghoff spent 37 years as an energy attorney in regulatory, consumer, and commercial law. Prior to joining FERC, he was in private practice focusing exclusively on client matters related to renewable energy, energy efficiency, and distributed generation.

He served two terms as the State of Nevada’s first Consumer Advocate for Customers of Public Utilities as well as held staff positions in the U.S. Senate and at the Federal Trade Commission. He participates on numerous industry committees and has been a guest lecturer at universities around the U.S. that include the Vermont Law School; the University of California, Berkeley; Massachusetts Institute of Technology; Princeton University; George Washington University; the University of San Diego; and the University of Oregon.

The Honorable Jon Wellinghoff has exemplified service and dedication to the electroindustry. He has earned his place on the distinguished list of Bernard H. Falk Award recipients. He will be honored with the Excellence full-lead crystal sculpture, a Baccarat Crystal piece designed by David Tisdale.
For nearly 60 years, the Elastimold® brand has defined industry standards for underground cable accessories and switchgear with premier products and unmatched technical support and service.

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For more information call **1-800-326-5282** or visit [tnb.com](http://tnb.com)
ABB Opens New High Voltage Cable Factory to Support Transmission Grid Reinforcement

Bill Rose, Manager, Media Relations, ABB Inc.

A new ABB factory that will produce high-voltage transmission cables has opened in Huntersville, North Carolina—an initiative that will contribute to the development of the North American power system.

ABB held a grand opening and ribbon-cutting event with state and local officials on September 19 at the new facility, located just north of Charlotte. The opening occurred less than 18 months after a groundbreaking ceremony with North Carolina Governor Beverly Perdue.

The plant is topped by a distinctive 430-foot extrusion tower—already a landmark in northern Mecklenburg County—built to allow the insulation material to cool symmetrically around the metal cable conductor.

ABB employees will manufacture high-voltage and extra high-voltage transmission cables for both ac and dc applications, including high-voltage direct current systems. These cables, primarily for underground use, are also well-suited to integration of power from remote renewable energy sources, such as wind and solar installations, onto the grid.

More than 135 people will work at the $90 million facility. It is ABB’s first high-voltage cable plant outside Europe, and its first manufacturing factory in the U.S. in nearly a decade. The company has invested more than $11 billion in the past three years on acquisitions such as Baldor Electric Company, Thomas & Betts, and Ventyx, as well as expansions to existing plants. These investments, including Huntersville, have made the United States ABB’s largest market for the first time. ABB now employs nearly 30,000 people across the U.S., Mexico, and Canada.

ABB already has a substantial presence in the state, employing more than 2,000 people in eight locations. Its North American corporate headquarters are based in Cary and ABB’s Power Products/Power Systems divisional headquarters are located on the Centennial Campus of North Carolina State University in Raleigh. This campus is also the site of ABB’s new Smart Grid Center of Excellence—a futuristic lab and demo center for utilities to test new equipment on a live Smart Grid-enabled network—as well as a major Corporate Research Center, one of only eight that ABB operates around the world.

“The cables made here in Huntersville will go a long way toward modernizing not only ABB’s North American operation, but they will also play a vital role in modernizing our North American power grid and integrating renewable energies like wind, solar, and hydro with greater efficiency and reliability,” said Enrique Santacana, ABB Inc. president and CEO, North America, at the event.

“In fact, this plant is part of a larger initiative within ABB to refocus on the U.S. market that has resulted in over $11 billion invested over the past three years. This facility is special...because it represents the first completely new facility ABB has built in the U.S. in nearly a decade. We are very happy to be here.” ☺
DOE Hosts Energy Storage Innovators

Energy storage experts from around the world gathered in Washington, D.C., in September for a Peer Review and Update Meeting of the U.S. Department of Energy (DOE) Energy Storage Systems Program (ESS).

The conference served as a forum for energy storage innovators to share ideas and for DOE to offer a snapshot of its research, development, and demonstration programs.

Much of the discussion was led by ESS Program Manager Imre Gyuk, PhD; leaders from the National Energy Technology Laboratory, Sandia, Oak Ridge, Pacific Northwest National Laboratories; and others from Advanced Research Projects Agency—Energy (ARPA-E).

The federal government’s involvement in energy storage began in earnest through funding provided in the American Recovery and Reinvestment Act (ARRA, or the Recovery Act).

As the Recovery Act was being crafted in Congress, NEMA was a strong advocate for funding of Smart Grid Regional and Energy Storage Demonstration Projects (SGDP) and ARPA-E.

Of the 32 SGDPs funded by ARRA, 16 are considered energy storage demonstrations. The federal government provided some $185 million for these 16 projects, which have a total value of about $770 million. Representatives of many of these projects provided updates on their work to the conference.

The technologies vary widely from advanced lead acid, lithium-ion, and flow batteries to flywheel and battery second-use concepts. The applications of these technologies also cover a spectrum: load following, peak shaving, ramping control, frequency regulation, voltage smoothing, distributed energy, and grid integration of renewable resources such as wind and solar power.

The Recovery Act also kick-started funding for ARPA-E in the amount of $400 million and the program has since received annual appropriations and developed a solid reputation on Capitol Hill as a credible R&D organization geared toward developing transformational energy technologies and bridging the gap (“the valley of death”) between basic energy research and development/industrial innovation.

DEMONSTRATING BEST AND BRIGHTEST

During the week, exciting field demonstrations, lab projects, and analysis tools were on display. East Penn and collaborator Ecoult reported on their successful 2012 launch of a PJM Regulation Services project using the East Penn UltraBattery® technology.

A host of flow-battery manufacturers demonstrated the growing market share of their technologies, including Ashlawn Energy, who presented on the largest North American flow battery located in Painesville, Pennsylvania. Ashlawn’s system is increasing the efficiency and performance of one of the ten oldest power plants in the nation.

Finally, the conference program pointed to resurgence in flywheel use employing new materials such as carbon-fiber composites from newcomer Amber Kinetics.

DOE’s ES-Select® Tool, developed by Sandia and DNV KEMA, was released earlier in the year and is providing a valuable resource for customers to assess the feasibility of using an energy-storage technology system type based on the intended application.

With the assistance of Navigant Consulting, DOE has published its Energy Storage Computational Tool which monetizes the potential costs and benefits of an energy storage system for utility applications.

News items on energy storage in the past year have been a mix of pessimism and optimism. The DOE ESS Peer Review Conference provided evidence for the latter with DOE and various multinational corporations highlighting their faith and backing of the best and brightest energy innovators.

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East Penn and its subsidiary Ecoult provide simultaneous voltage smoothing for consistent energy levels and peak at the Public Service Co. of New Mexico’s Prosperity Energy Storage Project in Albuquerque. The project is funded by DOE. Photo courtesy of East Penn
On September 12, the National Institute of Standards and Technology (NIST) held a ribbon-cutting ceremony for a new facility on its Gaithersburg, Maryland, campus. Designated the Net-Zero Energy Test Facility, the two-story experimental laboratory was designed to mimic a typical 2,700-square-foot residence. Its purpose is to demonstrate that a typical-looking suburban home for a family of four can generate as much energy as it uses in a year.

Complete with plumbing, electrical, and HVAC systems, the facility has four bedrooms, three bathrooms, and a working kitchen. Similarities to an average home end there, however. Starting with the walls, the normal 6-inch framing, insulation, and sheathing is augmented with four inches of exterior foam insulation between the siding and an adhesive weather barrier to seal the house on all sides. There is a 10.2 kilowatt photovoltaic solar panel installation on the upper roof to supply electricity, and a thermal water heating system on the lower roof to alleviate the need for electric water heating.

Summertime cooling is augmented by in-ground loop coolant systems.

The facility has been designated a LEED® Platinum building by the U.S. Green Building Council. LEED (Leadership in Energy and Environmental Design) is a third-party certification program and nationally accepted benchmark for the design, construction, and operation of high performance green buildings.

Inside the facility, the heating/cooling system, electrical system, and appliances are typical and built to the latest energy-efficient standards. The plumbing system, however, is not typical; the hot and cold water supply to each end-use device has individual piping with remotely-controlled on/off solenoid switches to facilitate control and monitoring.

During the first year of operation, the lab will be sealed, with no one allowed inside and very limited access allowed only to NIST personnel. Computer software will trigger mechanical controls to simulate the activities of a family of four living in the residence. Lights will turn on and off; appliances will run; sinks, showers and toilets will be actuated; even small devices will emit heat and humidity just as people would. All of these activities will be monitored by NIST scientists, and the data will be used to determine if the house is performing as modeled.

During periods of peak electric production by the photovoltaic system, excess energy will be sent to the local utility grid through a smart meter. When the house requires more energy than it can produce, it will draw electricity from the grid. The intent is to show that over the course of a year, the facility can produce as much electricity as it consumes for a net-zero energy balance.

The facility was funded by the American Recovery and Reinvestment Act of 2009, and was constructed almost entirely of products and equipment made in the U.S. Support for design and construction were obtained from the U.S. Department of Energy and from local and regional architectural and construction firms.

Visit www.nist.gov/el/nzertf for more information, images, and a short video.

Steve Molitor, Manager, High Performance Buildings and Industrial Energy Efficiency Coalition | steve.molitor@nema.org
Give the Gift of Safety this Season

Shopping, decorating, baking, and holiday entertaining are part of what makes the holiday season a cherished time. These customs, however, can also contribute to a heightened level of stress. Despite what may be a daunting holiday to-do list, it is vital that safety practices aren’t overlooked during the hustle and bustle of the season. During its annual holiday safety awareness campaign, Electrical Safety Foundation International (ESFI) is encouraging consumers to Make Safety a Tradition of the winter holiday season from hanging the first hook to dismantling the last decoration and everything in between.

When it comes to achieving the perfect holiday décor, it is important that safety rather than style be your foremost concern. When purchasing a live tree, check for freshness. A fresh tree will stay green longer, reducing the risk of fire. Keep trees fresh by refilling the tree stand daily. If you buy an artificial tree, look for the label “Fire Resistant.”

Always purchase electrical decorations and lights from reputable retailers and check that a nationally recognized testing laboratory has approved them. Inspect them for damage, such as cracked or frayed sockets, loose or bare wires, and loose connections, before use. Never connect more than three strings of incandescent lights together. Consider using battery-operated candles in place of traditional ones. Remember to turn off, unplug, and extinguish all decorations when going to sleep or leaving the house. While there may be no place like home for the holidays, safe homes are the greatest places for hosting memorable celebrations.

Perhaps one of the most challenging traditions of the holiday season is making a shopping list and checking it twice. Safety can also make a great gift for the person who has everything, or other hard-to-buy-for relatives or friends.

A home electrical inspection makes a great gift for those with older homes. Many potential hazards can be identified during an inspection, allowing them to be corrected before tragedy can strike.

Unlike gifts that may be quickly forgotten, your loved ones will continue to benefit from the gift of safety long after the holidays have ended.


Julie Chavanne,
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Medical imaging and radiation therapy technologies continue to advance at an unprecedented rate. As both precision and utility of diagnostic imaging and radiation therapy increase, the companies who develop and manufacture this equipment are also working tirelessly to ensure that these technologies are as safe as possible.

The industry has undertaken a series of initiatives in recent years to enhance patient safety by reducing exposure to unnecessary medical radiation, from establishing universal protocol standards to developing dose notification technology.

In 2010, the Medical Imaging & Technology Alliance (MITA) published NEMA XR 25 *Computed Tomography Dose Check* that introduced two novel features to assist the imaging team in providing better care: dose notifications and dose alerts. Computed Tomography (CT) manufacturers also released the CT Dose Check Initiative, a commitment to add new features to CT scanners, such as the dose notification and alert features as well as a new dose recording feature to help providers understand how their facility compares to local and national standards.

In June 2012, MITA highlighted a series of dose-reduction initiatives, including the XR 26 *Computed Tomography Access Control* standard that will require the institutionalization of administrative privileges, access levels, and the recording of clinical protocols to ensure appropriate use.

MITA members are also incorporating new breakthrough product features and system innovations, such as dose-monitoring technologies aimed at reducing radiation dose while continually improving the ability of these technologies to aid physicians in diagnosing and treating diseases. These new dose-reduction efforts build on existing industry-wide initiatives to develop and implement additional patient protection features for CT and radiation therapy (RT) equipment, guaranteeing that scans and treatment are safe and effective. Additional new sophisticated product features and safety checks are under development and will be introduced in the near future.

MITA also participates in industry-wide efforts to reduce radiation dose. Together with the Advanced Medical Technology Association (AdvaMed), MITA launched the Radiation Therapy (RT) Readiness Check Initiative to further enhance the safety of RT equipment through the development and implementation of additional patient protection features that confirm that patient treatment plans are delivered as intended. The initiative also helps ensure that RT equipment, accessories, and patients are properly positioned prior to delivery of therapy.

Additionally, MITA collaborates with the larger imaging community including clinicians, physicists, and the federal government on initiatives such as the “Image Wisely,” “Image Gently,” and “Choosing Wisely” campaigns that focus on reducing unnecessary radiation exposure for adults and children, as well as educating patients and caregivers about benefits and risks of diagnostics and therapies. For its role in these campaigns, the Food and Drug Administration recently honored MITA with its prestigious Leveraging Collaboration Award.

The collective dedication of the imaging community has resulted in a significant reduction in ionizing radiation dose exposure over the past decade: experts calculate that dose exposure has declined by 75 percent since the early 2000s. The imaging and RT industry remains committed to providing lower dose exposure without sacrificing diagnostic or therapeutic quality.

Richard C. Mazzoni passed away in August after a 16-month struggle with cancer.

Mr. Mazzoni was active on several NEMA committees. He was the Power Electronics Section voting representative for Eaton before retirement.

He chaired the Electronics Section and its UPS Committee, and was Eaton’s alternate voting representative on SCAPC. He also served as an expert on the U.S. Technical Advisory Group for IEC TC 22 (Power Electronics) and as the U.S. Technical Advisor to IEC SC 22H (UPS), thus chairing the U.S. TAG for SC 22H.

Outside of his involvement with NEMA and the IEC, Mr. Mazzoni’s career was spent with a number of manufacturers in the consumer electronics and power electronics industries, and then as a private consultant specializing in product safety design and certification.

“...and support.”

**Gail M. Rodriguez, PhD, Executive Director of MITA | grodriguez@medicalimaging.org**
Mike Stone Assumes West Coast Field Rep Position

On August 26, 2012, Mike Stone began work as NEMA’s new West Coast field representative. Based in Northern California, he covers the Northwestern and Southwestern International Association of Electrical Inspectors (IAEI) sections, which includes 11 western states, Alaska, and Hawaii. He replaces Joe Andre, who retired earlier this year.

Mr. Stone has a long and varied career in the electrical and construction industries. He began his career as an electrician and journeyman. In 1986, he went to work for the County of Monterey, California, as a building inspector. In a subsequent inspection career, he worked for the cities of Monterey, Salinas, and Watsonville, all located in the Monterey Bay region of Central California. He progressed to positions of plans examiner, senior building inspector, inspection services manager, and building official.

In all jurisdictions, Mr. Stone was responsible for enforcement of all construction codes. Because of his electrical background, he was always a resource for performing the more difficult electrical inspections and helping other inspectors to understand the complexities of the National Electrical Code®. He also has broad experience as a building official in local code adoption, permit processes, and other construction codes, and hopes to bring the benefits of this experience to his position with NEMA.

While maintaining his regular employment, Mr. Stone also spent many years as a part-time instructor for electrical and building code classes. He taught at three community colleges as well as apprenticeship and journeyman classes for the International Brotherhood of Electrical Workers (IBEW). Active in IAEI and International Code Council (ICC) for 25 years, he served as chairman of IAEI Northern California Chapter in 2003 and president of the ICC Monterey Bay Chapter in 2005.

Mr. Stone has a number of professional certifications and educational accomplishments under his belt. He is ICC certified as a building official, electrical inspector, and in five other inspection categories. He is a certified electrician in California, and maintains his IBEW membership as a Journeyman Inside Wireman. He attended Monterey Peninsula College and Golden Gate University, and obtained a Bachelor of Science Degree in Business Administration/Management.

Vince Baclawski, Senior Technical Director, Codes and Standards | vin_baclawski@nema.org
NEMA Briefs Visiting Smart Grid Delegation from Colombia

NEMA was the only trade association selected to brief a visiting Smart Grid delegation from Colombia in October that featured representatives from:

- Ministry of Mines and Energy (MME)
- Energy and Gas Regulatory Commission (CREG)
- Planning Unit for Mining and Energy (UPME)
- ICONTEC (Interconexión Eléctrica), a national standards organization
- a private sector international transmission company responsible for more than 80 percent of electrical transmission in Colombia, as well as significant operations in Peru, Bolivia, and Brazil
- a private sector vertically integrated electricity utility Empresa de Energía del Pacífico
- three local distribution companies serving the metropolitan areas of Bogotá, Medellín, and Cali

The delegation was sponsored by the U.S. Trade and Development Agency (USTDA), a trade promotion agency of the U.S. government that historically has focused on infrastructure projects. Currently, USTDA sponsors a variety of projects worldwide in two areas of interest to NEMA—Smart Grid and intelligent transportation systems. These projects consist of reverse trade missions, training conferences/workshops, feasibility studies, pilot projects, and technical assistance.

To meet its growing electric power demand, Colombia is aggressively moving forward with the development of Smart Grid initiatives with the support of Colombia Inteligente, a multi-stakeholder group promoting Smart Grid innovation. The principal objective of Colombia Inteligente is to ensure that Colombia reaches efficiency by implementing best practices for energy usage and technologically efficient solutions in key subsectors.

The Smart Grid Interoperability Panel (SGIP) initially managed by the U.S. National Institute of Standards and Technology, and now transferring to the private-sector entity SGIP 2.0 Inc., is close to signing a Smart Grid cooperation agreement with Colombia, which would support the harmonization of Smart Grid standards and would thereby facilitate the adoption of U.S. Smart Grid technologies.

Paul Molitor, Transition Manager, SGIP 2.0, Inc., summarized the current position of the U.S. Smart Grid Roadmap, and the role SGIP 2.0 will play in cataloging standards approved for implementation to ensure interoperability of Smart Grid products. Mr. Molitor is on loan from NEMA to SGIP 2.0, Inc., during the startup phase. He is the former secretary and administrator of SGIP Interagency Task Force.

BACKGROUND ON THE COLOMBIAN ELECTRIC POWER SECTOR

Colombia’s electricity market was restructured in the 1990s and the state-owned energy supply companies were privatized. Electricity generation and commercialization are competitive activities that take part in the electricity market, while transmission and distribution are natural monopolies and therefore are regulated. Investments in new electricity generating capacity are made by the private generation companies. MME oversees the market.

Tariffs are regulated by CREG. Capacity planning is done by UPME, an affiliate of MME. UPME’s plans are recommendations and are not mandatory.

Colombia relies largely on its roughly 9,000 MW of hydroelectric power for 66 percent of its electricity. It also has approximately 4,000 MW of fossil fuel generation, of which 80 percent is natural gas and 20 percent is coal. In dry years, such as during El Niño periods, the split between hydro and fossil fuel generation is about 50–50. During particularly wet years, hydro can supply 80 percent of the country’s electricity needs. In response to growing demand, Colombia is planning to increase hydroelectric capacity 32 percent by 2018.

At the end of 2010, Colombia's installed electric power generation capacity reached 13,289 MW, of which 64.1 percent were hydro power plants while thermal and cogeneration facilities produced the remaining 35.9 percent (gas, coal-fired power plants, wind power, and cogeneration facilities).

SUMMARY OF BUSINESS OPPORTUNITIES

- The Colombian Electrical Power Systems market continues to represent an excellent opportunity for U.S. exporters. Colombia imported $954 million (U.S. dollars) in 2010 (up from $815 million in 2009), of electric power equipment with a U.S. market share of 33.4 percent.
- The U.S. Commercial Service in Bogotá anticipates continued growth, given Colombia’s expanding economy driving the demand for more electricity across all industrial sectors. The projected economy GDP growth is between 4.5 and 5.1 percent for 2012.
- The Colombian government is planning to develop new hydro generation projects to accommodate the expanded demand through 2018 and hopes to become a major exporter of electricity to the Andean region and Central America.
- In spite of increased competition from Chinese suppliers, U.S. equipment providers continue to benefit from long-standing compliance with industry standards, reliability, lower
citing demand response, advanced meter infrastructure, synchrophasors, dynamic line rating, energy storage, distribution management systems, and microgrids. The bottom line of the briefing was that the electrical grid of Colombia is in the process of modernization, all the significant utilities are looking to invest in Smart Grid technology in the near future, and the recently initiated U.S.-Colombia Free Trade Agreement provides significant competitive advantages to U.S. product manufacturers over competitors from Europe and Asia.

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Steve Griffith, PMP, NEMA Smart Grid Industry Director, | steve.griffith@nema.org

shipment costs, innovation, and a favorable exchange rate.

• On November 5, 2010, the Colombian government issued a decree (4114) that reduced import duties for a range of products, including those for the electric power generation sector, to an average of five percent.

• The recently-approved U.S.-Colombia Trade Promotion Agreement allows U.S. equipment exporters to be more competitive. Under the agreement, 65 percent of products will receive immediate duty-free treatment, with the remaining tariffs phased out over ten years. In addition, the ban on remanufactured products will be lifted.

• U.S. companies could benefit from the increased interest by electricity trading and distribution companies in reducing losses by acquiring leading-edge management and control systems technologies.

• A new regulatory framework is under development to expand the use of energy efficient systems and create awareness for the rational use of energy.

• The Colombian government, through the Rural Energy Program and other initiatives, is promoting the use of renewable energy sources, especially for off-grid and isolated areas.

More detailed information and assistance is available from Mr. Jacob Flewelling, USTDA Country Manager, Andean Region and Caribbean Basin (Jacob.Flewelling@ustda.gov).

A technical consultant to USTDA summarized the high-priority technologies of interest based on a study he conducted on behalf of the agency,
• Siting Transmission Corridors—A Real Life Game of Chutes and Ladders (2012) charts the challenges of siting transmission corridors, which are integral to the creation of a sustainable energy portfolio, job growth, and economic opportunity. Available at www.nema.org/TransmissionCorridorsGameboard

• NEMA and other stakeholders submitted to DOE a joint petition for a direct final rule for electric motors (www.nema.org/Motors-Joint-Petition). NEMA’s Rulemaking Comments page contains public comments to other federal and state rulemakings. Read more: www.nema.org/Policy-Rulemaking-Comments

• Stay Safe with tips from ESFI www.holidaysafety.org

This year’s Bernard H. Falk award winner, the Honorable Jon Wellinghoff, has chaired the Federal Energy Regulatory Commission (FERC) since 2009. Since the Energy Policy Act of 2005, FERC also is responsible for transmission and wholesale sales of electricity in interstate commerce. www.ferc.gov

Since 2009, the Smart Grid Interoperability Panel (www.sgip.org) has worked closely with industry and government to evaluate, document, and institutionalize standards for the grid. In January, administrative functions will be assumed by SGIP 2.0, Inc. Learn more at www.nema.org/SGIP

The holiday season has begun. Stay Safe with tips from ESFI www.holidaysafety.org

All the efforts of the association’s international operations are directed at ensuring that members get their products into the global marketplace. While domestic annual sales of NEMA-scope products exceed $100 billion, more than $30 billion is exported.

NEMA monitors, analyzes, and advocates on international trade policy, issues, and developments of interest to NEMA members.

Next month we will look at NEMA-scope products and priorities from the perspective of national trade associations in other countries and from commercial service officers.

Electrical Standards & Products Guide lists all NEMA standards and other publications, as well as sales contact information, by product type, for hundreds of electrical manufacturers.

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• transmission and distribution
• transportation
• medical imaging
• safety and security
• and other industries that use electrical equipment in daily operations

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An Overview of U.S. Market for Transmission & Distribution Equipment and Systems

Charles W. Newton, President, Newton-Evans Research Company,

The Newton-Evans Research Company has undertaken studies on virtually every aspect of the U.S. transmission and distribution equipment and systems marketplace over the past 34 years.

This year, the company published more than 90 segment overviews that provide a snapshot of discrete components of T&D spending. These summaries provide information on transmission and distribution infrastructure components as well as automation systems and related equipment.

The data for these reports has been obtained through secondary research, interviews with equipment/systems suppliers, industry consultants, the U.S. Department of Commerce, and from information gathered from more than 200 earlier Newton-Evans survey-based studies.

When coupled with the very large T&D services market components and operations-related communications network investments, T&D-related spending now exceeds $20 billion. Of this amount, perhaps $3 billion can be classified as truly Smart Grid–related, with much of that amount being spent for control and monitoring systems and field instrumentation controllers.

High voltage equipment accounts for more than $5 billion, excluding power transformers. High-voltage (HV) circuit breakers and switchgear, along with substation construction account for the bulk of transmission equipment spending. Gas-insulated HV switchgear is likely to grow in importance.

Medium voltage (MV) equipment sales will likely exceed $3 billion by 2015 or 2016. Major items in this basket of equipment include air-insulated metal-clad switchgear, reclosers, load interrupters, and surge arresters.

Transformers form the single largest component of T&D product revenue, with units ranging from very large power units to pole-top distribution transformers. They accounted for more than $4 billion in annual sales last year.

Protective relay shipments in the U.S. easily exceed one half of a billion dollars annually. Most products shipped are digital units, but a small ongoing market remains for older electro-mechanical units. Motor protection and distribution feeder relays are the largest components in the family of relay products. Drop-in control houses are growing in importance with emphasis on schedule, availability, and cost.

The emerging field of distribution automation, including monitoring and controls for field instruments to help utilities minimize frequency and duration of customer outages, is growing despite a sluggish economy. More than $500 million will be spent in 2012 on distribution automation–related equipment and controls as well as applications software.

Control systems have been a mainstay of the modern electric utility since about 1970, with energy management systems now in operation in all transmission entities in the U.S. and with SCADA systems installed in about 1,850 of the 3,100 or so distribution utilities in the country. As time goes on, we will see more deployments of advanced distribution management systems and outage management. Taken together, the annual value of control-center based systems exceeds $450 million.

Equally important is the role of integrating and automating the electric power HV and MV substations. A few thousand of our more than 64,000 HV/MV substations are now well on their way to full automation. Substation automation-related spending exceeds $600 million per year in the U.S.

Some additional findings include:

- While investor-owned utilities account for more than 70 percent of all customers and revenues in the industry, the 1,800 public utilities and more than 900 electric cooperatives represent a viable and often leading-edge user base for newer technologies, especially for distribution equipment and systems.
- The nation’s more than 700,000 manufacturers and 17.6 million commercial enterprises account for more than 14 percent of all T&D equipment purchased in the $20 billion U.S. marketplace.
- With the inclusion of recent major plant capacity additions to produce large and very large power transformers, it is clear that U.S.-based manufacturing plants can (and do) produce more than 85 percent of the value of all T&D equipment, develop and provide the vast majority of systems and applications software, and implement almost every control and monitoring system used in U.S. electric utilities.
- The nation’s larger manufacturers have recently indicated that they have the wherewithal to produce whatever may be required to advance the development of the Smart Grid. Small firms continue their work on advanced energy technology, with financial assistance garnered from the 2010 American Recovery and Reinvestment Act program and investments from venture capital firms.

Newton-Evans Research is an associate member of NEMA. For information on its Market Summary Series, visit www.newton-evans.com.
Energy-efficiency investment and the weak economy have conspired to slow the demand for electricity and reduce pressure on utilities to add generation. Last year the Energy Information Agency (EIA) estimated that electricity demand would grow 31 percent by 2035. This year, EIA sharply lowered its baseline forecast to 22 percent growth by 2035 citing the impact of global manufacturing competition, a trend toward domestic manufacturing of less energy-intensive consumer goods, and energy efficiency.

Planned investment in generation capacity is expected to exceed demand growth for the next few years according to EIA, in part due to renewable energy projects already underway or approved. State regulations requiring greater reliance on renewable energy sources has sharply increased the need for new transmission lines to reach renewable energy sources such as solar and wind—typically in remote parts of the country far from population centers where electricity demand is highest. Utilities see the need, but face enormous obstacles in meeting the demand for transmission line upgrades.

Actual electric transmission investment by public utilities grew on average by 5.5 percent between 2006 and 2010, totaling nearly $50 billion, adjusting for inflation, according to the Edison Electric Institute (EEI) in its March 2012 survey of investor-owned utilities.

Planned investment for five years (2011 to 2015) is expected to total more than $66 billion in today’s dollars. The pace of increased transmission investment is anticipated to average around 12 percent over the next three years, before declining to current levels by 2015. Investor-owned utilities have announced plans to upgrade 13,000 miles of transmission lines to accommodate renewable energy sources at a cost of $42 billion.

Plans to add 10,500 miles of interstate transmission lines at a cost of $42.5 billion depend on the outcome of numerous hurdles such as siting, permitting, cost allocation, and recovery, according to the EEI survey.†

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**Economic Spotlight**

### Planned Transmission Investment Increases through 2015

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**EBCI Online**

NEMA’s Electroindustry Business Confidence Index (EBCI) for current North American conditions can be found at www.nema.org/Oct12-EBCI.
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