THE GRID A PUBLICATION OF FINLEY ENGINEERING | FALL 2014

WELCOME TO THE GRID

A recent Wall Street Journal article reported that electric energy providers were not seeing the energy sales rebound from the Great Recession as earlier predicted. There are many contributing factors, including more efficient use by consumers as well as improvements in the efficiency of power delivery by the Power Companies.

While there can be a positive impact of delaying expensive generation, there have been few companies able to build a business model around selling less and less of its product. We recognize that our valued business partners are facing an increasingly challenging and changing business landscape.

Environmental, regulatory, and economic pressures are significantly impacting the future of the industry. In addition, technology is advancing at an incredible rate offering both endless possibilities and challenges to manage the tsunami of data that engineering and operations personnel are being required to manage.

We at Finley are working very diligently to stay at the forefront of the industry as we assist you with solutions to the challenges before you. I trust that you will find this issue informative and helpful. Visit our blog for more industry related links and insightful articles. Best wishes and enjoy this edition.

Phil Carroll
Vice President

OSHA Regulation Changes

Significant changes to OSHA regulations 1910.269 and Part 1926 Subpart V went into effect last month, and more are on the way.

29 CFR 1910.269 is the Electric Power Generation, Transmission and Distribution Standard. 29 CFR Part 1926 is the Safety and Health Regulations for Construction, and Subpart V covers construction related to Electric Power Transmission and Distribution.

OSHA has been in the process of revising both of these in order to update them AND make them more consistent with each other.

The one of more interest to utilities is 1910.269. The revised regulations, which (for the most part) took effect July 10, 2014, cover changes to General Training, Host Employers and Contractors, Fall Protection, Minimum Approach Distances and Insulation, Protection from Flames and Electric Arc Hazards, De-Energized T&D Lines and Equipment, Protective Grounding, Underground Electrical Installations, Electrical Protective Equipment, and Foot Protection.

However, some of the new provisions for Fall Protection, Minimum Approach Distances and Insulation, and Protection from Flames and Electric Arc Hazards do not take effect until April 1, 2015.

{continued on next page}

{continued from previous page}

The details, of course, cover multiple pages. At this point, the most authoritative and comprehensive source to access the details on these changes can be found at **www.osha.gov/dsg/power_generation/index.html**. This page provides a bit of information on the changes, but, more importantly, has some important links, these being: Final Rule, News Release, FAQs, Fact Sheet, and Minimum Approach Distance Calculator.

The FAQ page provides additional details on: General Questions, Information-Transfer (Host-Contractor) Questions, Fall Protection Questions, Minimum Approach-Distance Questions, and Arc-Flash Protection Questions.

Another useful link is: **www.dol.gov/find/20140401/2013-29579.pdf** (which contains 1607 pages of "light reading").

Finley Associates Ready to Assist

Recently Finley Engineering made a few changes to better meet the needs of our Energy Industry clients. With the number of requests for proposals, important client visits and multiple projects we field, we moved Mike Socha and Mark Heidecke into primary business development positions within the company.

Mark Heidecke

Mark Heidecke is an experienced Engineering and Survey Manager with 41 years experience in the management of surveying, engineering, mapping, right-of-way acquisition and permitting, environmental analysis, and land planning. His vast experience and professional networking as a Professional Land Surveyor perfectly align him as well to developing business opportunities for Finley Engineering and ensuring client satisfaction.

Mark has extensive experience in telecommunications and electric transmission design and location, environmental studies, right-of-way negotiations, and permitting throughout the United States. During his career, Mark has been responsible for the survey, mapping, right-of-way acquisition, and permitting for over 4,000 miles of transmission line, fiber optic cable, and gas transmission right-of-way. He has been responsible for the retracement and survey of over 5,000 sections of the Public Land Survey ranging from the forested hills of the Ohio Land Company Tracts to the prairie sections of Illinois to the rugged Bitterroot Mountains in Montana to the soggy grass fields of Oregon's Willamette Valley and on to the deserts of the Imperial Valley.

In addition to his work as a Professional Land Surveyor, his responsibilities have included the direction and supervision of a wide variety of survey, engineering, and mapping disciplines including GPS control surveying and geodetic positioning, transmission line right-of-way and route surveys, property line and boundary surveys, topographic surveys, site development and engineering surveys, and construction surveys.

Planning Session Services

Finley Engineering can help you place a new perspective on your electric utility's planning sessions. We assist you by providing the latest information impacting critical decisions and facilitating a deeper dive into developing your roadmap.

We don't charge for our initial planning services because we believe working with your team is equally beneficial to us as it gives us greater insight into what issues our industry partners are grappling with and how we can better serve our clients.

Call Mike Socha, P.E. Director Business Development at 417-262-1070 for more details.

Mike Socha

Mike Socha is a Project Engineer in the Power Division at Finley Engineering with more than 27 years of experience in electrical distribution design, transmission, generation, purchasing, demand side management, contract management, utility pricing, cost-of-service, marketing, Emergency Restoration plans, and cost reduction strategies.

Mike's expertise includes preparation of electric cost of service studies and retail rate review. He's lobbied for electric companies, developed safety awareness plans and relocated electric facilities along with a lengthy list of other successful projects and accomplishments in the industry.

Mike holds an MBA from Rockford College in Rockford, Illinois and a BS degree in Electrical Engineering from Iowa State University in Ames, Iowa.

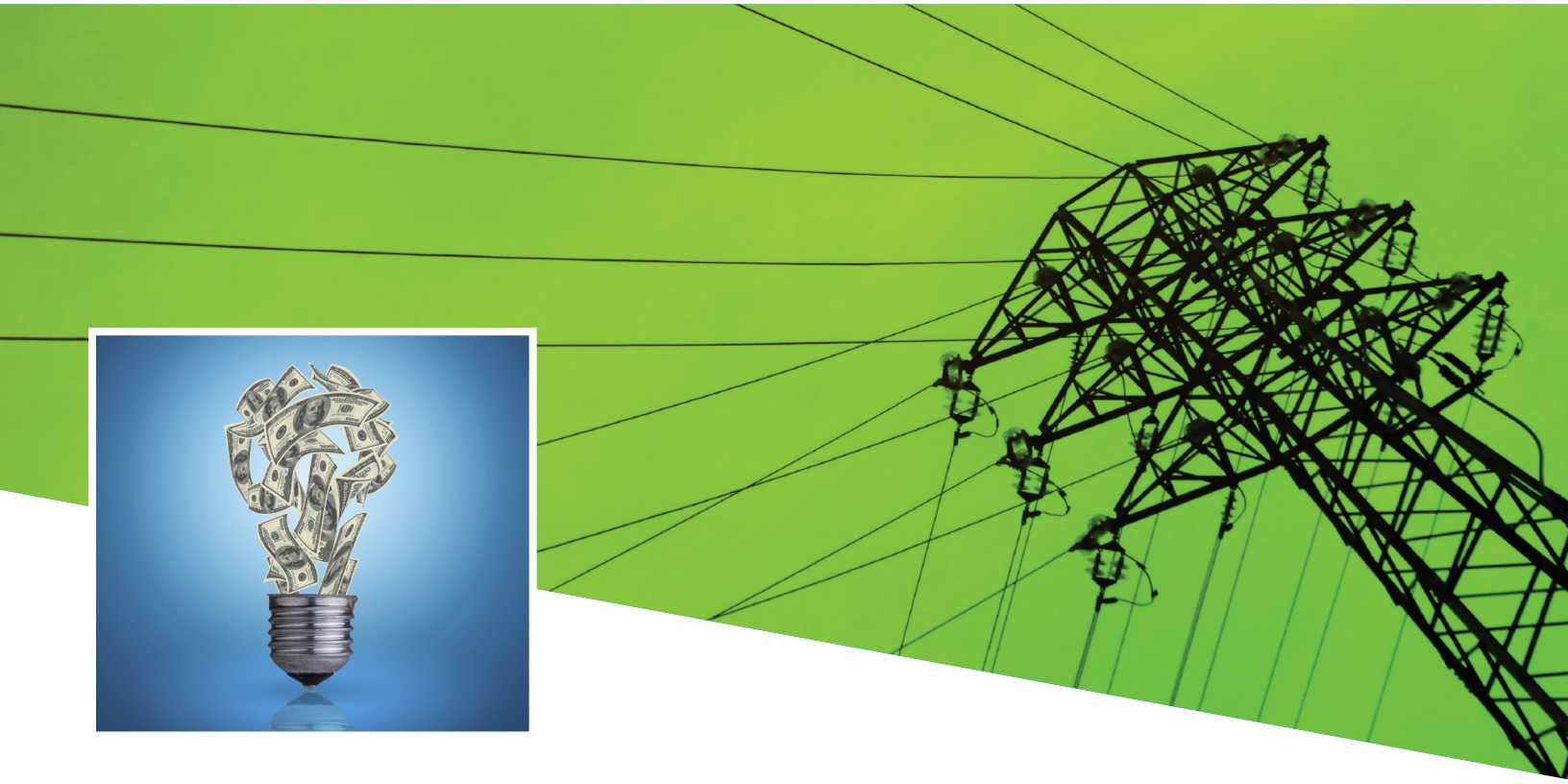
Steve Rawlings

Finley Engineering also welcomes Steve Rawlings to our Energy Engineering team as Operations Manager. As Operations Manager, Steven's focus is to work closely with the Vice President, Segment Managers, Project Engineers, Managers, and the supporting staff to ensure that client expectations are met along with appropriate resources utilization.

Steve brings more than 20 years of experience to the Finley team in areas such as facility management, supervision, quality assurance, resource and project management from a corporate manufacturing environment.

As with Finley's history of success, Steve is also committed to Finley's success through safety, quality, continual training and education, team building, shared resources, and continuous improvement.

To speak with any of these Finley Associates, please feel welcome to call us at 417-682-5531.



The Future of Power Demand

While demand for power has continued to grow over the last 130+ years, some forecasters believe that demand for power in the future, while it won't decrease, certainly will NOT grow as quickly as population and GDP.

There are several reasons for this, many of which are already having an impact. Among these are more efficient residential appliances and light bulbs; more energy-efficient networks, systems and equipment in commercial buildings and industrial facilities; the increased popularity of demand/response programs, primarily in industrial facilities, but gaining traction in commercial buildings, and even, to some extent, in residential settings; and, of course, the increasing popularity of residential, commercial and industrial self-generation (distributed generation, especially rooftop solar).

Of course, much of this has been welcomed, and even promoted, by electric utilities, for two reasons. In the short term, lower demand for electricity helps reduce the demand for peak power generation. In the longer term, the lower demand helps reduce the need for new power plants, which, for various reasons (such as increasing EPA regulations surrounding coal-fired plants, and exorbitant costs and years of red tape in the NRC for nuclear plants), are becoming increasingly difficult to site.

Yet, some are suggesting, while some demand reduction is a good thing, too much reduction is not. It can, and in some instances already is, hurting utilities' bottom lines.

According to the U.S. Energy Information Administration's (EIA) "Annual Energy Outlook 2014" (released May 2014), average energy use per person will decline from 2012 to 2040. It noted that, "(T)he structure and efficiency of the U.S. economy are changing in ways that can lower energy use."

The report noted that, while the U.S. population is expected to increase by 0.7 percent per year from 2012 to 2040, and GDP is expected to increase by 2.4 percent per year, total energy consumption is expected to increase by only 0.4 percent per year. "As a result, energy intensity, measured both as energy use per person and as energy use per dollar of GDP, declines over the projection period," said the report.

Research from Fitch Ratings shows similar trends to those suggested by the EIA, with some of the same reasons. According to a report published by Fitch Ratings, titled "Power Down II: Efficiency Gains Short Circuit kWh Sales," published in October 2013, U.S. electric utilities face an ongoing period of low sales growth that will challenge their traditional operating profiles and force utilities to broaden their product offerings. Even with the economic recovery that has occurred since 2009, according to the report, electricity sales have not increased appreciably. "We have generally thought of demand for electricity as flat, and this is what we have been using in our model," said Glen Grabelsky, managing director, utilities, power & gas, for Fitch Ratings, and an author of the report.

The report noted that electricity efficiency gains, demand-side management programs, and distributed generation are reducing consumer consumption and "cannibalizing" traditional, utility-supplied power.

"The economics of energy efficiency are compelling," said the report. The benchmark levelized cost of electricity used to compare the cost of energy efficiency programs is substantially less than all forms of conventional or renewable power generation. "Efficiency is an effective tool in displacing new power generation, produces peak load shaving, and avoids or at least reduces the highest cost sources of electricity generation," said the report.

Overall, according to the report, low electricity sales growth will pressure unit costs and challenge the economics and benefits of future capital investments and rate design, and need to be restructured, as costs are allocated over a changing customer profile.

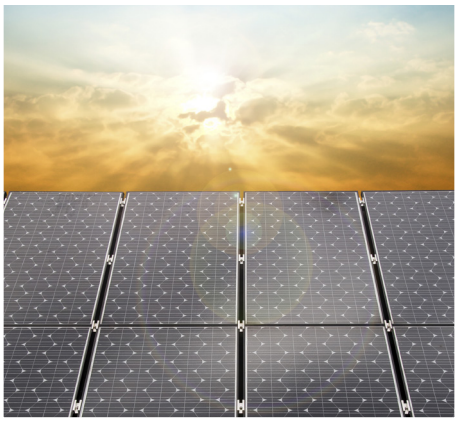
Given the EIA and Fitch Ratings projections, utilities will need to broaden their product offerings to include efficiency, distributed generation, and demand-side management. "We think that the business model utilities are using needs to be adapted to reflect efficiency as a business line," said Grabelsky. "In fact, a number of utilities are starting to offer energy efficiency retrofits in their service areas. Some utilities are also moving a bit into the distributed generation side."

In addition, several utilities are focusing on new ways to generate revenue. One of the most effective is electrification. Examples include: encouraging more residential customers to purchase electric appliances instead of non-electric, encouraging industrial and warehousing customers to purchase and use more electric-powered forklifts than fuel-powered forklifts, and promoting the purchase and use of electric plug-in vehicles.

Finally, utilities need to have serious conversations with their ratepayers around the need to re-look at rate design. These days, commodity energy isn't the only service that utilities offer to their customers, but it is the only one they are paid for. They need to find ways to charge for the other services they provide, such as access to the grid in general for distributed generation customers.

Finley Engineering has multiple locations to serve you. Our Energy Group is based out of Kansas City and Lamar, Missouri. For more information, visit www.fecinc.com.

Considerations for Utility-Scale Solar Projects



According to the Solar Electric Power Association (SEPA), 4.2 GV of solar capacity was installed in the U.S. in 2013, bringing the total cumulative capacity to over 10.5 GW.

Utility-scale photovoltaics (PV) increased from five percent of total annual PV installations in 2008 to 54 percent in 2012. In fact, 2012 was the first year that utility-scale PV composed the largest segment of the U.S. PV market, a position it is likely to retain through at least 2016, when the Investment Tax Credit drops from 30 percent to 10 percent.

Besides the Investment Tax Credit, another reason for the growth in utility-scale PV projects relates to the various state renewable portfolio requirements or goals, for which solar is a very viable option. And another reason for the growth of PV technology in general is the continuing reduction in the cost of PV panels, which have dropped approximately one-third from 2008 to 2012.

In April 2014, SEPA released its seventh annual Utility Solar Rankings report. According to the report, the top ten utilities accounted for 82 percent of all integrated solar capacity in 2013. The top five utilities are: Pacific Gas & Electric (1471 MW), San Diego Gas & Electric (643 MW), Arizona Public Service (417 MW), Southern California Edison (373 MW), and Duke Energy (137 MW). While four of these five are located in the Southwest U.S., large amounts of utility-scale solar are also in place in other parts of the country. In fact, the next five utilities in the rankings are located in Massachusetts/Rhode Island, New Jersey, Hawaii, Georgia, and North Carolina/South Carolina, respectively. In addition, the number one-ranked utility in terms of watts-per-customer is Massachusetts-based Sterling Municipal Light (831 watts per customer).

According to a 204-page report titled, "Utility Scale Solar Power Plants: A Guide for Developers and Investors," published by the International Finance Corporation of the World Bank, there are several important steps utilities need to take if they are considering building solar farms. These are: Project Development, Site Selection, Energy Yield Prediction, Plant Design, Permits and Licensing, Construction, Commissioning, Operations & Maintenance, and Economics & Financial Modeling. Details on all of these are available in the free report at www.ifc.org/hb-solarpowerplants.

And, according to an article in the July 2012 issue of Solar Industry Magazine, titled "Essential Due Diligence Steps for Utility-Scale Photovoltaic Projects," there are eight steps involved: Solar Resource Assessment; Major Component Technology Review; Engineering Review of Electrical Design and Civil Design; Equipment Supply and Site Construction Arrangements; Transmission, Interconnection and Curtailment; Energy Sales Arrangements; Environmental and Permitting Status; and Operations and Maintenance Plans/Budget.

For utilities interested in more information on utility-scale solar projects, there are some other useful sources. These include:

A reference/resource site titled "Photovoltaics for Electricity Providers," maintained by the National Renewable Energy Laboratory (NREL): www.nrel.gov/learning/ep_photovoltaics.html.

The Solar Electric Power Association (SEPA) site: **www.solarelectricpower.org**

The NESC and Resiliency

While utilities have been talking about reliability and redundancy for years, more recently they have begun to talk about resiliency. One reason for the increased interest in resiliency is that large storms seem to be the "new norm," and there is more concern with how resilient a system will be during and right after these storms, rather than simply how reliable or redundant the system is in the absence of storms.

Currently, there is no uniform and universal standard for resiliency that cover all utilities.

The Rural Utilities Service (RUS) has standards for the construction of distribution lines. For this reason, co-ops that are seeking RUS funding build to these standards.

Many other utilities, especially larger ones, have their own design standards that take resiliency into account. For example: "This is how we build vertical construction at this voltage." These standards have been developed based on internal knowledge that these utilities have built up over the years and continue to accumulate over time. However, these are very individualized and are usually created in response to each utility's environment and geographic location, such as what types of strong storms they may experience. In sum, each utility has its own design standards. There is no universal resiliency standard when it comes to issues such as construction, voltages, or equipment.

Smaller utilities that are not large enough to have their own design standards tend to either follow the RUS standards that were designed for co-ops, or occasionally refer to the National Electrical Safety Code (NESC) for guidance in this area, in combination with their own internal knowledge.

Currently, as is evident from its name, the NESC is primarily a safety code. However, the NESC is beginning to see the potential to expand the Code such that it could also become a resiliency code. In fact, the role that NESC plays in utility resiliency is becoming greater every cycle. According to one NESC committee member, some committee members are starting to look at what the NESC should become in the future, and these members believe that the NESC should at least address some parts of the Code that lend themselves to be, maybe not a full, but at least a partial, design code. This could include construction (such as strength and loading of overhead lines due to wind and ice), the way clearances are handled, the way underground is built, etc. While these topics are covered in the NESC from a safety standpoint, some members of the NESC committee believe that these are also resiliency issues and, therefore, some parts of the NESC are already resiliency codes in one form or another. In fact, as noted earlier, some utilities are already using the NESC for resiliency purposes.

Last year, the NESC formally began studying resiliency. One idea that was brought up was the concept of "fracturing" utility systems, such that, instead of a whole system going down after a storm, it could be broken up into a number of small microgrids. There were also discussions on the role that solar, wind, and other distributed generation could play in this, as well as the role of the smart grid to make it all work. So, instead of relying solely on large transmission lines, a utility could rely on itself for a period of time.

Another area of consideration is substations. The current Code focuses on steps that utilities need to take to protect the public from substations (e.g.: specifications for chain link fences) - a safety code. However, it could be expanded to focus on steps that utilities need to take to protect substations from the public (e.g.: vandalism, etc.) - a resiliency code.

Of course, any efforts in the direction of resiliency would need to take individual circumstances into account. A lot of utilities, for example, can say, "We don't have superstorms, our systems are resilient enough, and we don't have bad outages statistics, so why should we be required to build to levels that we don't need?" And, of course, these are valid comments.

Committee members are hoping to have an NESC summit in 2015 to get people together to review the document and decide what it should look like. In so doing, they want the process to be as inclusive as possible. For example, as a way to get the PUCs more active, the NESC has reached out to the National Association of Regulatory Utility Commissioners (NARUC). It has also reached out to the solar and wind organizations.

As many committee members see it, moving in the direction of expanding the NESC from just a safety code to also a resiliency code is important. The danger of the NESC not getting into this space, they believe, is that someone else will - such as an agency of the Federal government, which could possibly impose a universal "one size fits all" resiliency standard on all utilities.

Finley Engineering Company, Inc.
104 E. 11th Street | Lamar, MO 64759

8

THE GRID

A PUBLICATION OF FINLEY ENGINEERING | FALL 2014