

WORLD-GENERATION

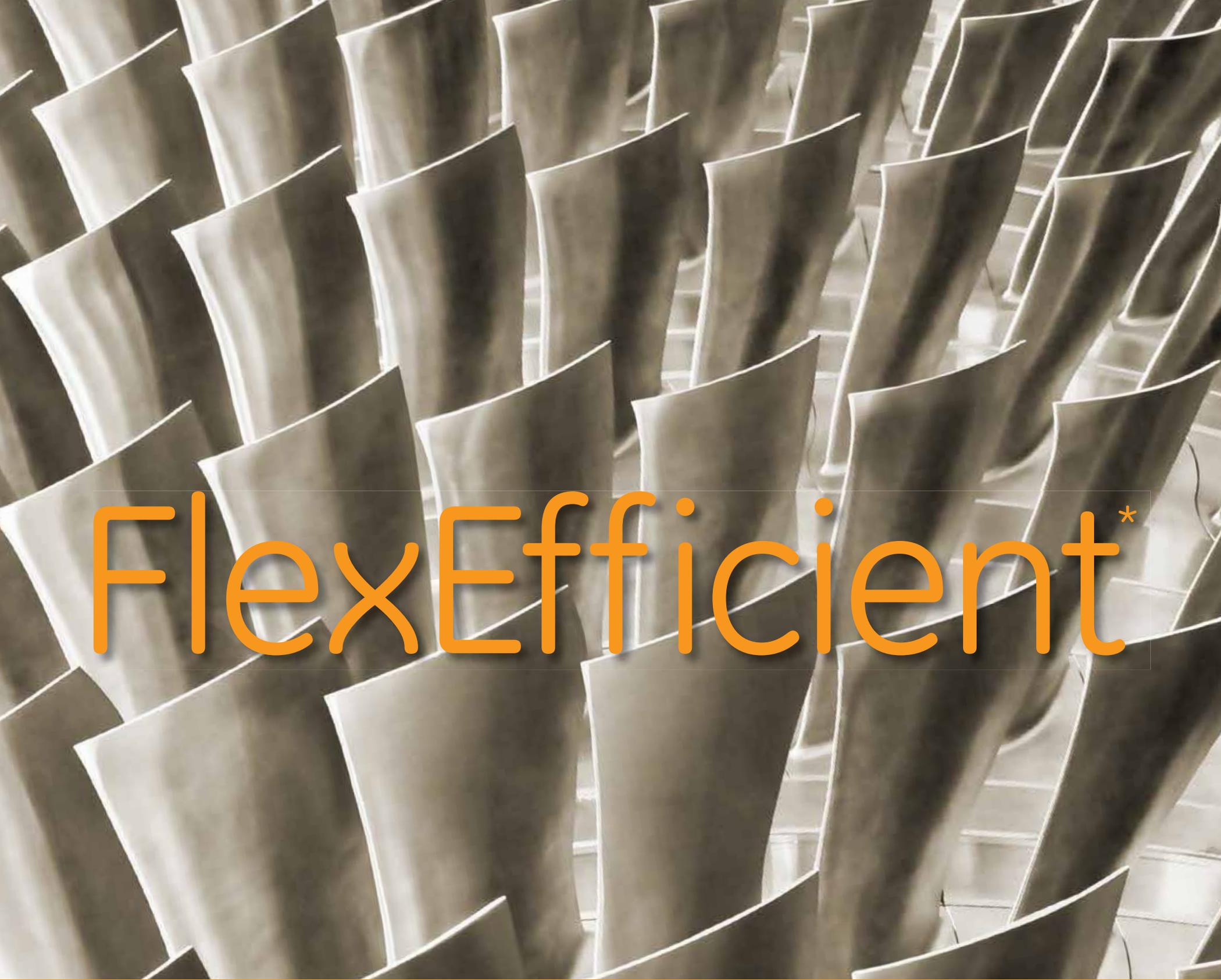
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CLASS OF 2012

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Our 24th Year



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FlexEfficient^{*}

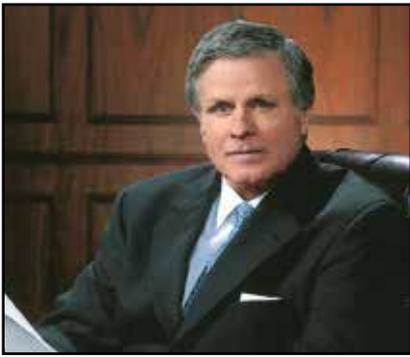
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2012 is an election year and a leap year! Campaigning to be elected is not much different from a publication campaigning to be selected. It's based solely on making comparisons of the candidates and the publications. World-Gen invites comparison of its editorial platform starting with the Class of 2012, our thirteenth Class of the millennium.

Toby Seay, president of Bechtel Power's Communication and Transmission business line, says changes are coming for transmission on page 4. The biggest demand now is for upgrading existing transmission lines. He is looking with interest to potential wind farms along the Atlantic coast as well as off the coast of Britain.

Paul Browning, CEO of GE's Thermal Products said the world's energy mix has changed over the past decade on page 5. He believes that the greater use of renewable energy, in combination with natural gas, is the future of power generation. GE has invested more than \$500 million to develop its FlexEfficiency technology.

KeyBanc has 13 projects underway, and is handling eight transactions – primarily in wind and solar energy with potential output of 1,119 MW. On page 6, Andy Redinger projects a potential source of new financing could be real estate investment trust (REIT) capital.

Siemens Energy has over 7,000 employees in Latin America, nearly 1,000 working in Energy Services, Tim Frace shares on page 7. The strategy of regionalization puts the Energy Service teams in all key countries to go one-on-one with their customers and be in a position to offer other Siemens global competencies.

With more than one million power products installed, Steve Levy of Advanced Energy on page 8 is developing and field-testing technologies focused on lowering the barriers to adopting solar energy on North American utility grids.

Hitachi Power Systems America signed a licensing agreement for design and supply of fabric filter technology developed by Balcke Durr. Robert Nicolo explains Hitachi's market participation on page 9.

Google invested nearly a billion dollars in a renewable energy portfolio of 1.7 gw's, Rick Needham tells us on page 10. He hopes to inspire other companies and investors to participate in the clean energy revolution and together explore other possibilities.

RES Americas has been active in North America since 1997 working on more than 4,800 megawatts of renewable energy projects, Susan Reilly said on page 11. Its 360 employees provide technical expertise in wind and solar, transmission and construction.

PIC's focus on teamwork ensures that their working environments are as safe as they can be, Dirk Rountree said on page 12. PIC's six complementary service lines can manage an entire project lifecycle by bundling services.

Following acquisitions of Energy ReCommerce and Act Solar, Power-One offers a holistic portfolio of products and solutions. Paolo Casini sees the main objective is to meet customer needs by providing panel-to-grid system solution, on page 13.

Zurich Energy offers more than 70 risk management services and 17 online tools to help mitigate losses and reduce both operational and financial risks to meet all the needs of alternative energy producers and manufacturers, Jeanne Jankowski, CEO says on page 14.

John LeFebvre of Suntech believes there is a strong immediate opportunity for solar and natural gas to work together, particularly as a bridging solution away from coal. On page 15, he anticipates new or steady solar policy support from many states.

Solar power is the fastest growing energy resource in the U.S., and its once high price tag is falling rapidly, Julia Hamm, president of SEPA, points out on page 16. Electric utilities signed power purchase agreements for less than 10 cents per kilowatt-hour.

Marvin Fertel on page 17 tells of two major imperatives at the Nuclear Energy Institute: to maintain and increase the asset value of 104 operating plants and second to ensure that we maintain and grow the capability to build new nuclear plants.

Ron Kenedi of LDK Solar said on page 17 that the cost of electricity is constantly going up – 3% to 8% annually, while solar costs are moving downward. The important point is where they merge.

It would behoove the industry to pursue a diversified fuel portfolio strategically to ensure we mitigate reliability risk and provide the best technological stability possible, Dave Dunning of Fluor said on page 18.

NERC is an international, independent, not-for-profit organization, whose mission is to ensure the reliability of the bulk power system in North America, CEO Gerry Cauley says on page 19.

OKLAHOMA Governor Mary Fallin unveiled her First Energy Plan on page 20. Her agenda is built around the belief that we must continue to improve, not replace, traditional energy sources.

Charles Dauber sees three key growing energy markets AETI is targeting for products and turnkey solutions in 2012 on page 21. North American shale plays, global energy, and utility-scale solar are markets AETI has served.

The energy industry is in a transformational state, Brian Huey says on page 22. Sprint collaborates with companies to embed wireless technology into solutions that automate meters and monitor distribution lines so that utilities can be more efficient.

Dick Flanagan

TOBY SEAY



President, Communications & Transmission
Global Business Unit
Siemens

CAREER BACKGROUND

Toby Seay is president of Bechtel Power's Communications and Transmission business line and a senior vice president of Bechtel Power Corporation.

Seay's path to his present position began when he was a boy in Denver, where his father owned a two-way radio business. He followed his father into the industry, then onto McCaw Communications, and subsequently to McCaw's new owner, AT&T Wireless Services. From the mid-1980s through the 1990s, Seay traveled the United States for AT&T Wireless, building cell towers. He was responsible for the company's multi-billion-dollar GSM (global standard for mobile communications) construction program.

In 2003, Seay moved to Ericsson, the Swedish equipment manufacturer, where, as executive vice president and general manager, he oversaw sales, project management, and project development. He managed Ericsson's work with Cingular Wireless, including the initial development and deployment of the first networks in the United States to employ WCDMA/HSDPA (wideband code division multiple access/high-speed downlink packet access). His efforts were instrumental in helping spread Ericsson's cutting-edge technology throughout the United States.

Seay joined Bechtel in 2006 as manager of Business Development and Marketing for the Communications organization. He later became responsible for global strategy and project award negotiations. In 2008, he became president of Communications, then a standalone major business segment and a Bechtel Global Business Unit (GBU) as Bechtel Power is today.

MOVING COMMUNICATIONS INTO BECHTEL'S POWER BUSINESS

In 2009 the Communications GBU became part of Bechtel's Power GBU, a change that made sense for a number of reasons and that strengthened both organizations. Given the cyclical nature of the Communications business, Seay recognized that Communications and Power could complement each other, making bet-

ter use of resources and creating additional opportunities for their employees. While Communications may be very busy in one business cycle installing new technology on towers and rooftops, a quiet period usually follows as new technology is being developed. Making Communications and Power part of the same GBU would enable both organizations to more easily share resources as activities ebb and flow.

Moreover, synergies could be realized by each organization drawing on the skills and methods of the other. For example, a typical Bechtel Power project tends to put thousands of employees "behind a single fence" working together, with only a handful of individuals interacting regularly with the customer, suppliers, or public officials. The situation is typically reversed in a Communications project—the vast majority of personnel deal with landlords, tenants, zoning commissions, and other public officials on a daily basis; only a few employees principally interact among themselves. Power projects could learn from Communications' experience working with the public and outside parties, while Communications stood to benefit from Power's experience with supply, technical complexity, and management of large internal organizations.

Another factor cited by Seay in the decision to combine Communications with Power centers on the fact that Power already had a business segment focused on transmission—the upgrading and construction of high-tension transmission lines. Like communications, transmission involves a long-distance routing function. While the transmission work executed by the Power GBU is a relatively small portion of its business portfolio—after all, most of the electric grid in the United States was completed decades ago—Power's heavy involvement in constructing power generation facilities has always included constructing both the switching stations at the plants as well as the tie lines leading to the grid. To help upgrade its work in this sector, it was only logical that Bechtel seek to bring the skill sets it had developed in the communications market to its transmission business.

Seay notes that other similarities between Transmission and Communications point to effective teaming. "When my Communications people go to a jobsite, it is typically the office of a local landowner, or a farm—to install equipment on a roof top or a cell tower. He or she might visit 20 sites a month. It's the same with Transmission; the sites are farms or rural rights-of-way, and many interactions take place in offices face-to-face with stakeholders. In both cases, Bechtel wants to be a good steward of the property in question, and in both cases there might be site acquisition issues to resolve. Transmission jobs are a lot like cell phone tower jobs in that multiple public stakeholders are involved."

Finally, Seay notes the similarities in the complexity—the logistics—involved in work executed by both Power and

Communications. Both businesses require large quantities of materials to be purchased and delivered to the right place at the right time. "The complexity of the communications business generally lies in its logistical aspects," Seay says. "Building a single cell tower is not difficult, but building a thousand cell towers is a different story. At the same time, we must meet or exceed a myriad of safety, quality, and engineering standards. Through years of dealing with the complex logistics and dealing with the public, we in Communications had built up a skill set that we thought would work well with the Power GBU's civil and electrical engineering expertise and procurement capabilities."

LINKING WITH POWER'S TRANSMISSION BUSINESS

With the Communications and Transmission business line having been formed within Bechtel Power, Seay has concentrated on marketing and strategy. "We began to see the transmission business as more of a network business than a power business. You don't build a single tower or a single substation without impacting the whole network. Transmission is a distributed model, very much like wireless communications. And you are working in a live environment, working on live assets. Moreover, a large array of civil and electrical skills is needed, and these are skills that our combined Communications and Power workforce possesses."

The view of the transmission business as more of a network business also relates to Bechtel Power's increasing involvement with renewable forms of energy such as solar and wind. Solar and wind farms will need connection to the grid, resulting in additional demand for new or upgraded transmission lines. Electricity generated by solar and wind will be distributed differently than electricity produced by traditional power generation plants: connections will need to be made to transmission networks in a way that will drive new investment and upgrades to the existing grid.

According to Seay, Bechtel has recognized for some time that changes are coming for transmission. For one thing, the electric grid has been undercapitalized for decades and will need upgrading. Also, the increasing interest in renewable power and the need to retire older plants will lead to shifts in demand across regions of the United States. "Although transmission has not been a large market for us, many of our past customers will have to increase capital investments in transmission," Seay says.

THE TRANSMISSION MARKET—NOW AND IN THE FUTURE

As previously noted, Bechtel has not been heavily involved in transmission work in this country for several decades. However, the market may be picking up owing to the need for upgrades to accommodate growing demand and shifts in demand among regions, tie-in sources of

renewable power, and efforts to counter physical and cyber threats. Accordingly, Seay sees Bechtel returning to the transmission business in a big way. He points to Bechtel's depth of experience in working on switchyards and tie lines and its expertise in managing logistics. "Put these capabilities together with the skill sets we have from Communications and we have a winning proposition," he says.

"Permitting is especially difficult when a power line crosses state lines or moves from one grid region to another. There is really no government body effectively dealing with this," Seay comments. "But here again, the Communications people can help. They have been dealing with permitting for decades and can work with the people, companies, and public bodies that control the permitting process."

The biggest demand now is for upgrading existing transmission lines rather than building new ones, Seay indicates. Currently, the Communications and Transmission organization is working on an \$800 million project in Alberta, Canada, upgrading a transmission line. The project specification includes the construction of nine brownfield and three greenfield substations over 150 km of existing right-of-way and 50 km of new right-of-way. "I believe there are significant amounts of this kind of work coming along," says Seay. "You take down the old wooden towers and put up steel. Some companies have historically performed this work themselves, but they are seeing their transmission work grow tenfold and need assistance in scaling up. That's when they come to us for help. We can assist with our engineering capabilities, leveraging our supply chain for materials and equipment, and providing the construction resources."

Seay points to another project in Alberta involving construction of a new 500-km transmission line between Edmonton and Calgary. Bechtel is performing the engineering, assisting with the right-of-way work, and handling the construction. "We believe we will be in Alberta for some time to come and in other Canadian provinces as well," he says. "There seems to be a strong demand for upgrading the infrastructure and adding transmission lines."

There is also work for Seay's Communications and Transmission business line in Chile. The project principally involves constructing transmission lines from the coast extending as far as 200 km to mines in the mountains. He expects a good market for this type of transmission work over an extended period, with demand expanding into Peru, where mines are also under development. "Wherever demand for electricity is growing—in such places as this in South America and in Canada with its tar sands—we expect a need for transmission line work."

Seay also has an eye on offshore wind farms. He notes that Bechtel has expertise in executing such efforts, having performed offshore work for oil and gas projects. "We believe that offshore electric

(continued page 11)

PAUL F. BROWNING



President & CEO,
Thermal Products
GE Energy

NATURAL GAS AND RENEWABLES: POWERFUL TEAMMATES

There is no doubt that renewable energy will make an increasingly important contribution to the power grids of the future. Not only does it produce cleaner power, it is becoming more affordable as technology advancements and economies of scale provide cost reduction and improved performance.

Of course, there is currently a drawback to renewable energy - intermittency. When the sun isn't shining or the wind isn't blowing, we need other sources of electrical power to meet grid requirements.

NATURAL GAS IS LOGICAL CHOICE

For three reasons, the logical choice is natural gas, believes Paul Browning, president and CEO-Thermal Products for GE Energy.

"First, new discoveries in the U.S. and around the world are increasing the abundance of natural gas and reducing its cost," said Browning. "Unconventional gas is now expected to enable the U.S., the world's largest consumer of natural gas, to be self-sufficient for decades. This really is a game-changer for the U.S., and unconventional gas is being developed in other parts of the world as well."

He continues: "Second is the fact that natural gas power plants are highly flexible. These plants can fire up quickly and adjust their output rapidly. That makes natural gas an ideal partner for intermittent wind and solar. There may be a time in the future when renewable resources don't need fossil fuel backup, but we're not there yet. And the problem gets more and more acute as adoption of renewables increases.

"Third, it is well known that natural gas is a cleaner source of power compared to other fossil fuels, such as coal and oil. And in combination with renewable power sources, natural gas looks even better."

So, natural gas offers a unique combination of cost, flexibility and environmental friendliness that makes it the perfect partner for renewable.

However, until recently, the most flexible gas-fired power plants had poor fuel efficiency, and the most fuel-efficient plants had poor flexibility. With yesterday's technology, as more and more renewables came on line, power grid operators were forced to put more and more inefficient, gas-fired power plants on line as well, to provide the power on demand that was needed to offset the intermittency of wind and solar.

ACCORDING TO BROWNING, THINGS HAVE CHANGED.

"At GE, we realized that we needed gas-fired power plants that combine world class fuel efficiency with world class flexibility. In other words, the power plant of the future has to function like the jet engine of today, providing flexible power, low emissions and high fuel efficiency in one product. So, we borrowed technology from our Aviation business, combined it with our proven and industry leading F-class and H-class power generation technology, and invested more than \$500 million to develop a power plant with the flexibility to take full advantage of natural gas and renewables, without sacrificing fuel efficiency," he said.

TECHNOLOGY IMPROVES

"The result is a new technology we call FlexEfficiency*. And as countries around the world approach critical junctures in our conversation about creating our energy future, we believe this is a significant breakthrough."

FlexEfficiency isn't just an exciting new concept - it is a reality. In 2011, GE announced the first two "real world" applications of this new technology.

FRANCE DEVELOPS

GE and Electricite de France (EDF), one of the world's largest utilities, have announced plans to jointly develop and showcase the first FlexEfficiency 50 power plant to be connected to a national grid. The announcement is the latest development in a 40-year strategic relationship between GE and EDF.

And this is a truly large-scale power plant. The new combined-cycle plant, to be located at Bouchain, an existing EDF power plant site in northern France, will produce 510 megawatts of electricity, enough for 600,000 French households. The plant is expected to achieve greater than 61 percent efficiency at base load, which will conserve natural gas and reduce the production of greenhouse gases. Its operating flexibility will enable the plant to respond quickly to fluctuations in grid demand, facilitating greater use of solar and wind. The EDF power plant will integrate natural gas and renewables through the French electrical grid.

TURKEY TEAMS

In Turkey, GE is teaming with

MetCap Energy Investments to build a power plant that will integrate natural gas, solar and wind in one power plant.

The world's first Integrated Renewables Combined-Cycle (IRCC) Power Plant, based on our new FlexEfficiency technology, is planned for Karaman, Turkey and is expected to begin producing power in 2016.

The project will include a FlexEfficiency 50 power plant — plus 22 megawatts of GE wind turbines and 50 megawatts of eSolar concentrated solar thermal tower technology, all seamlessly integrated by a GE plant control system with a single push button start.

This technology is capable of reaching record fuel efficiency, and will have zero-liquid discharge, low emissions and a rapid-response start capability.

"This landmark project will set a new global standard for the efficient integration of natural gas and renewable energy. It will enable the Turkish grid to use more wind, solar and natural gas, helping to meet the growing demand for cleaner, affordable and reliable power generation." Browning said. "And a few months after our announcement of this project, GE and MetCap received approval from the Turkish government to nearly double the output of the IRCC plant, from 570 to 1,080 megawatts - enough clean electricity for more than 1.2 million Turkish households.

MORE TO COME

"In addition to the projects in Turkey and France, we are developing partnerships around the world to help us bring FlexEfficiency to global customers.

We have reached an agreement with Harbin Electric Co. Ltd. of China to bring FlexEfficiency technology to China, where natural gas-powered district heating applications will offer a cleaner alternative to coal.

We also have reached an agreement with Toshiba Corporation to bring FlexEfficiency technology to Japan, where highly efficient natural gas is critically important. And we see many more opportunities," Browning said.

"Around the world, nations like China, Japan, Turkey and France are looking for solutions that combine economic progress with environmental sustainability. The world's energy mix has changed over the past decade, and we recognize the need for technology that delivers the necessary combination of flexibility and efficiency to meet a wide range of challenges. As our FlexEfficiency launch demonstrates, we believe that the greater use of renewable energy, in combination with natural gas, is the future of power generation," Browning concluded.

GE's advanced power generation technology has been selected for a project near Marble Falls that will replace an aging, less efficient power plant with a flexible, higher efficiency combined-cycle power plant. When the plant begins commercial operation in the summer of 2014, it will be the first combined-cycle plant in the Electric Reliability Council of Texas

(ERCOT) region that meets the latest Environmental Protection Agency (EPA) Greenhouse Gas regulations.

GE will supply two Frame 7FA Gas Turbine-Generators in a two-on-one combined-cycle plant to Fluor Corporation. GE's manufacturing work will involve more than 8,000 employees. The Lower Colorado River Authority (LCRA), a public utility, will own and operate the new 540-megawatt facility.

"Our advanced 7FA Gas Turbine technology is more efficient, has fewer emissions and offers greater operating flexibility than previous technologies," said Paul Browning, president and CEO—Thermal Products for GE Energy. "It is an excellent match for LCRA's requirements for a project that will bring numerous energy, environmental and economic benefits to the region."

Browning added, "There are many opportunities in the U.S. today similar to the LCRA project to replace older plants, both gas-fired and coal-fired. With our 7FA technology, we are well positioned to help customers cut CO2 emissions by as much as 50 percent."

Responding to the diverse challenges of today's world—such as integrating ever-growing levels of intermittent renewable energy into the grid—energy developers are looking to build gas-fired power plants that combine high levels of operating flexibility with fuel efficiency. The GE Frame 7FA Gas Turbine offers expanded operational flexibility with fast start capability, high ramping rates and extended emissions-compliant turndown, enabling power plant operators to satisfy both their energy production and environmental goals. "

ABOUT PAUL BROWNING

Paul Browning is the president & CEO of thermal products for GE Energy, overseeing GE's Heavy Duty Gas Turbine, SteamTurbine, Generator and Controls, and Gasification product lines. The global Thermal Products team leads the product management function responsible for design, manufacturing, and installation of large scale electricity generating equipment.

Prior to his current position, Paul was most recently with Caterpillar Corp., as managing director, Caterpillar Motoren, based in Kiel, Germany. He was responsible for a global business in Caterpillar's Marine & Petroleum Power division. Previously, Paul was the vice president, Turbomachinery Products in Caterpillar's Solar Turbines division. Within that division, he worked in commercial, manufacturing, and technical roles.

Paul began his professional career as a research engineer for eight years at the GE Research Center in Niskayuna, NY. This included a role as a program manager for GE Power Systems after receiving his B.S. degree in Metallurgical Engineering and Materials Science from Carnegie Mellon University and an M.S. in Materials Engineering from Rensselaer Polytechnic Institute.

ANDY REDINGER



Managing Director
KeyBanc Capital Markets

KEYBANC'S UTILITY, POWER AND RENEWABLE ENERGY TEAM LOOKS LONG TERM

KeyBanc's Utility, Power and Renewable Energy Group approaches new projects and opportunities with the long haul in mind. Andy Redinger, who manages KeyBanc Capital Markets (KBCM) North American Utility, Power and Renewable Energy Practice, says his team is very focused on winning over the long-term.

"We want to develop deep relationships with our clients, providing them with both our capital and services over time." Describing his unit's business model as the basic block and tackle gear needed to hoist a project from early design to full productivity, Redinger says the goal is simple. "We want to add value and be a meaningful partner."

KEYBANC FINANCING GROWS

With those strategic attitudes, Redinger and his team of 10 financial pros have established KeyBanc as one of the top U.S.-based banks operating in the North American utility power and renewable energy industries. In the last nine years, Redinger's KBCM unit has raised over \$82 billion in debt/equity financing for clients, and advised utilities engaged in merger and acquisition deals valued at \$3 billion.

This scale of activity has propelled KBCM to a leadership position among financial institutions specializing in investment banking services to some of North America's largest utility and renewable energy companies. Relying on his more than 20 years of experience in the energy field, Redinger has overseen the development of KBCM's utility, power and renewable energy practice. KeyBanc's Utility Power and Renewable Energy Practice group has committed over \$5 billion to utility and renewable energy companies.

"We have successfully advised numerous utility and renewable energy companies in raising private capital, acquisitions and divestiture assignments," Redinger says, "and we've financed over

3.0 GW of renewable energy projects." At the end of 2011, KeyBanc Capital Market's Utility Power and Renewable Energy group counts 45 investor-owned utilities in its portfolio that rely on its capital construction and private placement financing services.

WIND POWER PROJECTS

In the renewable sector of the energy industry, KeyBanc is one of the nation's leading providers of financing for wind power projects, having funded over 3,000 MW of wind development with \$1 billion since 2007. Currently KeyBanc has 13 projects underway, and is handling eight transactions – primarily in wind and solar energy with potential output of 1,119 MW. "We are also engaged in advisory work with investors and producers in the biomass and geothermal segment," notes Redinger. But wind and solar represent about 98 percent of the Renewable Energy Group's efforts.

Natural gas, however, has created a formidable obstacle for the renewables market, Redinger points out. "The tremendous reserves of natural gas from shale that no one expected," he says, "has slowed down the development of renewable energy." He describes the situation further, saying low natural gas prices have caused a decline in power purchase agreement (PPA) pricing and challenged overall traditional equity returns. He suggests the natural gas bonanza will likely cause the industry to reshape its strategies in the face of the challenge – especially if the Treasury Department's cash-grant program and the Department of Energy's loan guarantee program are not extended.

PIONEERING NEW INSTRUMENTS

Redinger's team is already out front in that pioneering effort to design new instruments and products to raise capital to finance future projects. "One potential source of new financing could be real estate investment trust (REIT) capital," says Redinger, explaining that REITs were created by Congress in 1960 to make large-scale, income producing real estate accessible to all investors. Until recently REIT financing programs were not available for investment in energy assets.

IRS private letter rulings in 2010, however, appear to have eased that restriction, and the Federal Energy Regulatory Commission has approved the concept as well. By late 2010, several major players in energy development, production and finance formed the Electric Infrastructure Alliance of America (EIAA) and the Gas Infrastructure Alliance of America (GIAA) to establish REITs to development investment opportunities in the power generation industry. By early 2011 the alliances had raised \$2.1 billion to develop and acquire electricity and gas transmission and distribution assets.

While the EIAA is not targeting wind power assets for involvement in REIT financing, other groups are taking a hard

look at the concept as an alternative source of financing for wind power ventures. Among them is KeyBanc's Capital Markets North American Utility, Power and Renewable Energy Practice.

PROCEDURAL BARRIERS

But there are a couple of procedural barriers limiting the way a REIT can operate in the power generation business. The IRS private letter rulings still maintain power generation equipment does not qualify for REIT capital. Another hurdle is the stipulation that a REIT cannot operate any of the assets of the wind power operation – a separate entity would have to run and be responsible for all operations and maintenance.

But Redinger and his team are developing solutions. Regarding the IRS rules that restrict REITs from capitalizing power generation equipment, he has this to say: "While this would appear to be a fatal flaw for the REIT model as it pertains to wind assets, there are mechanisms to structure around the issue by including only real property assets and not power generation technology in a REIT." The structure Redinger's team has in mind for dealing with the situation involves dividing the project into two entities. The power generation component would be responsible for the nacelle, generator and the blades. The REIT component would create a sale-leaseback on the rest of the project.

Redinger admits that what form REITs might ultimately take as a financing tool for wind energy projects has yet to be determined. "It is unlikely that REITs represent a universal solution for all future wind projects," he points out, "however, they may provide an additional tool that can be used to fill up the capital stack." What can be said about KeyBanc's Renewable Energy Group, however, is that it is determined to be a key architect in designing ways to create new sources of capital for renewable energy.

Addendum: EIAA members include Hunt Power, Marubeni Corp., John Hancock Life Insurance, TIAA-GREF, OPTrust Private Markets; Some information is sourced from the article *The Role of REITs in Wind Power Finance* by Dan Brown and Andy Redinger, North American Windpower®, May 2011.

WIND FINANCING IS TRICKY

Merchant wind power projects have been slow to develop in the U.S. as financial institutions generally have been hesitant to provide the necessary funding leverage. But that could change. Several factors – such as expectations for rising electricity prices in the near term, promulgation of stricter carbon regulations as well as the possibility of carbon legislation and implementation of a National Renewable Electricity Standard (RES) – could all work to hasten wind power's arrival as a mainstream energy source to serve spot electricity markets.

An RES is more likely to emerge as part of the U.S. energy landscape than carbon legislation – which never seemed to have regained its momentum after Congress

stopped it in its tracks in 2009. "This standard would be particularly helpful to developers in areas of the country where there is limited, if any, Renewable Portfolio Standards (RPS)," notes Key Banc's Andy Redinger.

An RES could complement or supersede existing Renewable Portfolio Standards (RPS) that provide Renewable Energy Certificates (REC) to qualified generation sources. Nevertheless, in the wind market, lenders typically prefer PPA-backed opportunities. Banks willing to lend to merchant projects are likely to provide less leverage than they would to a PPA- endeavor.

ABOUT ANDREW REDINGER

Andrew Redinger, Managing Director – Group Head, KeyBanc Capital Markets (KBCM), joined KeyBanc in 1997. He has more than 20 years of energy experience, providing specialized investment banking services to some of North America's largest utility and renewable energy companies. Under his leadership, KBCM has built a national utility, power and renewable energy practice, committed over \$5 billion of KBCM's balance sheet to utility and renewable energy clients. Additionally, he has successfully advised utility and renewable energy companies in raising private capital, completed numerous acquisitions and divestiture assignments and structured and financed over 3.0 GW of renewable energy projects. Redinger received his B.S. degree in economics from Purdue University, and earned an MBA in finance from Loyola University, Chicago.

ABOUT KEYBANC CAPITAL MARKETS

KeyBanc Capital Markets has approximately 440 employees primarily in investment banking and capital markets in five core areas – Energy, Industrial, Consumer, Diversified Industries and Real Estate. KeyBanc Capital Markets has approximately 27 equity research analysts who currently publish research on over 450 companies. The firm has approximately \$27 billion of outstanding credit commitments of which almost \$1 billion currently are directly committed to the independent oil & gas sector.

KeyBanc Capital Markets is a trade name under which corporate and investment banking products and services of KeyCorp and its subsidiaries, KeyBanc Capital Markets Inc., Member NYSE/FINRA/SIPC, and KeyBank National Association ("KeyBank N.A."), are marketed. Securities products and services are offered by KeyBanc Capital Markets Inc. and its licensed securities representatives, who may also be employees of KeyBank N.A. Banking products and services, are offered by KeyBank N.A.

KeyCorp traces its roots back more than 160 years ago and is headquartered in Cleveland, Ohio. One of the nation's largest bank-based financial services companies, Key has assets of approximately \$89 billion. Key provides deposit, lending, cash management and investment services to individuals and small businesses in 14 states under the name of KeyBank N.A.

TIM FRACE



Vice President, Latin America
Siemens Energy Service

WORLD-GEN: WHAT ARE THE TOP GROWTH AREAS IN LATIN AMERICA IN THE NEXT 10 YEARS?

Tim Frace: The past decade has brought macroeconomic stability and strong growth in Latin America. That being said, the growth rates vary widely at different times across the region due to geopolitical and other influences. The challenge as a service supplier in Latin America is to be able to adjust your business model to compensate for market volatility.

In some countries, Energy Service will see a healthy growth rate driven by the installation of new Siemens equipment. Venezuela, for example, has the largest confirmed oil reserves in the world outside of the Middle East, and the second largest proven natural gas reserves in the Western Hemisphere behind the U.S. making the country a top prospect for sustainable growth, especially in the Oil and Gas sector. In addition, a significant number of our large gas turbines will be installed to power the country's grid over the next several years.

Brazil is among the three largest emerging economies in the world, and the discovery of massive, pre-salt oil reserves is making it an extremely attractive market for investors in the Oil and Gas sector. Although power generation in Brazil is dominated by hydro power, we are also seeing an opportunity for our renewables portfolio as highlighted by the recent award to Siemens Energy to deliver 63 SWT-2.3MW wind turbines in Brazil.

In Peru, Chile, and Colombia we have seen steady economic growth and stability resulting in an increase in international investment, and thus we are optimistic for our service growth in these countries.

Over the long-term, the richness of natural resources and increasing demand for power makes Latin America a market with significant growth potential. It will be critically important that countries in the region continually optimize the mix of various energy sources while minimizing the carbon footprint. At Siemens Energy, we are in a unique position to support this growth with specialized and qualified resources located throughout the region.

WORLD-GEN: SPEAKING OF YOUR PRESENCE IN LATIN AMERICA, PLEASE TALK ABOUT YOUR STRATEGY OF REGIONALIZING SERVICE THERE.....

Tim Frace: Regionalization is one of the keys to growing our business. Our strategy is simple...be closer to our customers so we can know their needs and address them quickly and expertly. We now have local managers in all key countries who are empowered with local resources to respond quickly to customers. Our local teams live and breathe the markets they serve putting us in a better position to discern new market trends, improve our understanding of customers' needs and strengthen our capacity to provide a level of service that meets or exceeds our customers' expectations.

I should also mention that by being close to the customer, we are often provided a view across the entire spectrum of our customers operations and can bring to bear other Siemens global competencies in areas such as water treatment, building technologies, industrial automation, and transmission and distribution just to name a few.

WORLD-GEN: WHAT LED TO THE DECISION TO MOVE THE ENERGY SERVICE LATIN AMERICA HEADQUARTERS TO COLOMBIA?

Tim Frace: The decision to move the Latin America regional headquarters to Bogota was based on a number of factors. Colombia is geographically at the center of Latin America, which makes it possible to reduce travel time. Colombia also has a stable political and legal system with a growing economy and a vibrant business climate. The security situation has improved dramatically over recent years making it a safe environment for employees and their families. Bogota has excellent universities and resources to satisfy our future resource needs for qualified personnel.

WORLD-GEN: IT'S ONE THING TO HAVE A PRESENCE, HOW ARE YOU LEARNING MORE ABOUT YOUR CUSTOMERS' NEEDS?

Tim Frace: The customer is at the center of everything we do. Meeting one-on-one with our customers on a regular basis is critical. With this in mind we have also implemented a series of measures to track our performance against our customer's expectations.

One tool involves an executive scorecard system we use to measure our partnership and alliance commitment with the customer. The key performance indicators are established jointly with the customer, so we are focused on those items that are most critical to their business plan. This is an effective tool as it helps us know the activities we do around outage planning, health and safety, project execution, and product performance are adding value to our customers.

We also have established a regiment-

ed communication platform between the different disciplines within Siemens and the customer. The platform is a procedure-driven process that includes mandatory meetings with preset formats throughout the year, thus facilitating direct communication between sales, field service, procurement, engineering, marketing, and project management colleagues with the customer. Since the protocol requires for full documentation and disclosure of all activities, we can be sure that each open item is addressed in a timely manner, which is key to excellent operational performance and customer satisfaction.

WORLD-GEN: WHERE HAVE YOU HISTORICALLY BEEN SUCCESSFUL AND WHAT ARE YOU DOING NOW TO CONTINUE THAT SUCCESS?

Tim Frace: What we do well is leverage our global competencies to offer our customers the best solutions that meet their unique operational requirements. One of our success stories over the last five years in Latin America has been our ability to enter into partnerships with our regional customers through Long Term Maintenance Programs (LTP). This began with our large Independent Power Producers (IPP) and utility power plant customers and the success of these programs helped open up opportunities with our customers in the Oil & Gas and Renewables industries. These long-term relationships with customers allow us to gain comprehensive knowledge of their operational objectives and respond quickly and appropriately through our dedicated program manager and remote monitoring that comes with the program. We have been extremely successful in implementing these programs with our customers in Argentina and Peru, as well as with IPPs and private companies throughout the region. One obstacle we have run into is with the large state owned utilities in many countries are generally prohibited by law from entering into long-term agreements, which are normally for a minimum term of six years or longer. Therefore, Siemens has had to be flexible in adapting our products to meet market needs.

WORLD-GEN: TELL US MORE ABOUT YOUR PRESENCE IN LATIN AMERICA. HOW MANY EMPLOYEES DO YOU HAVE IN THE REGION, NUMBER OF MANUFACTURING CENTERS, AND NUMBER OF SERVICE FACILITIES, ETC.?

Tim Frace: Siemens Energy currently has around 7,000 employees in Latin America, including over 900 employees working in Service. In Energy Service, we have four shop repair centers and eight field service centers. These are all strategically located across the region. In addition, Siemens Energy in Latin America also has a steam turbine manufacturing facility in Brazil and power transmission & distribution manufacturing facilities in Bogota,

Colombia; Jundiai, Brazil; and Guanajuato & Queretaro in Mexico, where we manufacture power transformers, medium voltage and low voltage equipment.

WORLD-GEN: HOW AND FROM WHERE ARE YOU RECRUITING EMPLOYEES?

Tim Frace: In the last five years, Energy Service has made significant changes to address Latin America as a growth region. In 2007, we restructured our Service organization and established Latin America as a separate service region. We made a corporate commitment to regionalize resources and our service model looks entirely different today. Not only do we have the people in place, but we now have the organizational processes in place to insure a steady pipeline of highly qualified regional talent to meet our future needs. The Siemens brand in Latin America is well known and highly regarded. We are able to recruit some of the best and brightest candidates in the region by working closely with universities. Our focus now is in recognizing early career potentials and placing them in development programs to maximize their professional growth. We have hired approximately 300 people over the last five years in 13 countries across Latin America in a number of disciplines including technical implementation, business development, finance, and sales and marketing.

WORLD-GEN: DO YOU HAVE A RECENT SUCCESS STORY TO SHARE?

Tim Frace: Since I measure success based on customer satisfaction, a recent story to share is in Peru. The customer wanted to close the cycle on its simple cycle gas turbines to improve the overall efficiency and plant output. This was a technological challenge because the three SGT6-5000Fgas turbine units did not have the same exhaust energy due to internal flow path configurations. The solution we came up with was the first-ever upgrade in Latin America that incorporated a new Row 4 blade design and single piece exhaust (SPEX). The upgrade was installed by a team of regional field service personnel four days ahead of schedule. Most importantly, the unit has demonstrated exemplary performance since returning to service with an increase of 15.47 MW to the gas turbine, exceeding the expected performance levels. This order and its execution is a great example that I personally like since it exemplifies Siemens strengths not only as a world wide technology leader, but also in our regional capabilities. Most importantly, it demonstrates that we are focused on serving our local customers needs.

ABOUT TIM FRACE

Tim Frace became head of the Service Division's Latin American business in 2011. He is responsible for Service Fossil, Oil & Gas and Industrial Applications Service, Service Renewables and TurboCare.

STEVE LEVY



Vice President, Advanced Energy

Since 1981, Advanced Energy has provided the highest value power conversion and energy management solutions to customers throughout the world and has proven to be a bankable partner for PV investments. "PV installation owners and developers can count on the high performance and reliability of our Solaron® and PV Powered™ inverters, as well as our dependable warranties and comprehensive SiteGuard® Operations and Maintenance (O&M) services. We have more than a million power conversion products and 500 megawatts of PV inverters installed," said Steve Levy, vice president of sales and marketing for the company's solar energy business. "We empower customers to secure more solar projects and increase their earnings by enabling them to offer PV systems owners a lower levelized cost of energy (LCOE) and improved peace of mind their PV systems will deliver on long-term productions goals."

Before construction, AE Solar Energy provides industry-leading applications engineering and project management expertise. During construction, AE Solar Energy offers project management, installation services, and training. Post-construction, SiteGuard ensures optimal whole-site performance year after year.

UNLOCKING LCOE

Levelized Cost of Energy (LCOE) analysis considers costs distributed over the project lifetime, providing a highly accurate financial picture that system operators prefer over older, simpler methods of calculating cost-per-watt. Cost-per-watt calculations ignore mission-critical factors like reliability, service, power quality, and efficiency. As a result, the true return on investment could be substantially different than otherwise anticipated. LCOE calculates the true cost of energy produced measured in cents per kilowatt hour, considering performance, system costs, and ongoing O&M.

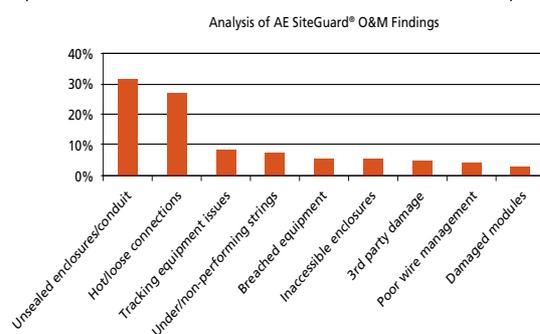
"Available worldwide, our services are customized to match customer requirements and cover everything from inverters to PV modules, electrical systems, tracking systems, and regular reporting. SiteGuard con-

tracts are available in single and multi-year terms up to 20 years," Levy pointed out.

"The innovation, performance, and reliability of our inverter product line represent a fundamental shift to LCOE, ensuring our customers achieve the lowest costs of producing energy over the entire project lifecycle."

SITEGUARD WHOLE-SITE O&M

"Whether a site is 5 MW or 500 MW, we provide long-term system service support solutions to ensure the PV system operates at peak efficiency" Levy proclaimed. "We support more than 500,000 mission-critical equipment units worldwide." AE currently has over 300 MW's of PV under operations and maintenance contracts.



The chart summarizes the breakdown of non-conformance counts identified at SiteGuard-contracted sites over the past one to two years. Benchmarking the installations and informing the project team of the most common site problems and failures can help prevent similar occurrences, prevent system downtime, and ultimately lower overall Levelized Cost of Energy (LCOE).

AE Solar Energy's commercial and utility-scale inverters feature the PV Powered and Solaron brands with power ranges from 35 kW to 2 MW. The AE inverter line up offers exceptional choice of systems architectures, integrated features, and innovative BoS solutions to improve uptime and reduce installed and system lifecycle costs. The company continues to innovate and develop new inverter products, including a 500kW inverter, shipping in Q1 2012 that will dominate the commercial space and a next generation 1MW inverter that will provide industry leading LCOE and grid stability, slated to ship late in 2012.

PV Powered inverters offer industry leading reliability, performance and innovation, combined into one fully integrated system that delivers financial gains at every turn. With segment leading California Energy Commission (CEC) efficiency and labor saving features and options like integrated data monitoring hardware make them the easiest to install and commission inverters. The CEC is the leading North American agency to review, compile and approve inverters for commercial use.

Solaron inverters are engineered with the goal of reducing BoS costs beyond the inverter. Double effective voltages with standard cabling and switchgear reduce upfront system expense and cut line losses. Parallel connections to MV transformers reduce transformer complex-

ity and costs. The remote PV Tie options can deliver up to 40 percent savings in large-diameter copper cables and overall installation costs.

The AE PowerStation is factory assembled, pre-tested, and suitable for all climates, with or without an enclosure. The all-on-one-skid design enables utility-scale PV project stakeholders to reduce overall project costs resulting from one-time engineering, material, and field labor expenditures. Its compact footprint allows standard freight which saves transportation costs. Utility-scale Solaron inverters, used in the PowerStation to create 1 to 2MW integrated skids, are desert-ready for dependable performance in the most extreme conditions, without requiring any ancillary cooling systems and energy losses (100percent power at 50°C/122°F).

ZACHRY SELECTS AE

In May of 2011, Advanced Energy's Solaron PV inverters and SafeGuard operations and maintenance service program were selected to power a 150-megawatt project located in Arizona. The project was awarded by Zachry Industrial. "The project, slated to be completed in 2013, will be one of the largest photovoltaic solar installations in North America with a planned output capacity that is currently larger than any solar PV project installed worldwide," Levy explained.

The Zachry project will utilize Advanced Energy's Solaron 500 High Efficiency (HE) PV inverters. The Solaron 500 HE line has achieved a 98percent CEC efficiency rating, a record breaking efficiency rating for any inverter in this power class. "By improving peak energy efficiency to 98.7percent and weighted efficiency to 98percent, three percentage points higher than comparable solar PV inverters, our new Solaron 500 HE inverters can generate more value for project developers, owners, and financiers," Levy underscored.

RENEWABLE OPERATIONS CENTER (ROC)

Solaron inverters feature advanced IDS and internal digital controls that allow operators to stream data to virtually any SCADA system. On-board storage can also record and archive years of data. Solaron IDS automatically collects and stores a wide range of inverter-specific data for remote monitoring and advanced performance insight. It connects to third party data services like SunEdison SEEDS®, Draker Labs Sentalis, and DECK Monitoring, provides Modbus mapping to utility-mandated or custom SCADA systems and enables an IO interface to plant controllers. "We put comprehensive information at our customers' fingertips with access to environmental data, PV fleet performance, and energy output, while performing round-the-clock monitoring and performance verification from our global Renewables Operation Center," Levy shared.

SUMMARY

"We are constantly looking for new ways to apply our extensive knowledge to advance the industry," Levy said in closing. "Currently through our Solar Electric Grid Integration System (SEGIS) stage-three contract, funded by the US Department of Energy Solar Energy Technologies Program and administered by Sandia National Laboratories, we are developing and field-testing technologies focused on lowering the barriers to adopting solar energy on North American utility grids."

With more than one million power products installed, Advanced Energy offers the expertise to help customers design a stable PV system that will deliver clean power while maximizing efficiencies and profits, anticipate potential issues, and create designs that will prevent these issues from impacting production.

ADVANCED ENERGY'S CERTIFICATIONS AND AWARDS:

- ISO 9001 certified since 1994
- ISO 14001
- NRTL/C
- UL1741
- IEEE 1547 and 1547.1
- CSA C22.2 No. 107.1-01
- National Electric Code 2008 Edition Article 690.

CORPORATE COMPLIANCE

We are committed to protecting the environment affected by our products, and to complying with applicable laws and regulations. In doing this, we will proceed with appropriate care to ensure we continue to meet our quality, reliability, and cost-competiveness goals.

ABOUT STEVE LEVY

Steve Levy is Vice President of Americas Sales for Advanced Energy Renewables. Mr. Levy has more than 25 years of experience in executive leadership positions spanning high-tech industry to alternative energy markets.

Previously, Mr. Levy served in leadership roles with companies across the Aerospace and Defense markets, and with clean energy companies, most recently, Satcon. While at Satcon, Mr. Levy managed that company's Government Division along with designing and implementing their wholesale distribution program. Prior to Satcon, Mr. Levy was with Northrop Grumman where he managed distributed teams of both Business Development and Engineering in support of Military and S&L programs from the Midwest to Australia. Mr. Levy provided singular focus on the Pacific Rim where NGC was deployed under contract. Prior to NGC, Mr. Levy held similar roles with EMC, Oracle, Tandem and Storage Technology, along with three early phase companies in the Silicon Valley.

Mr. Levy holds a degree in Management from California State University.

ROBERT NICOLO



Director AQCS
Hitachi Power Systems America

WORLD-GEN: HOW IS HITACHI POWER SYSTEMS AMERICA HELPING UTILITIES COMPLY WITH EPA'S MERCURY AND AIR TOXICS STANDARDS?

Robert Nicolo: Hitachi has recognized the need to expand our air quality product line to assist our customers in achieving compliance with the recent finalization of the EPA MATS regulations. We now have a complete suite of technologies that will enable utilities to confidently comply with meeting the mercury, HCL and particulate matter limits set forth for existing units. We have licensed a superior fabric filter technology that has a proven track record, and coupled with our award winning SCR and catalyst technologies, HPSA can now give our customers certainty of outcome for their compliance needs.

WORLD-GEN: EXPLAIN HOW THIS TECHNOLOGY WORKS.

Robert Nicolo: The fabric filter is a key component in the ability to comply with the Mercury and Air Toxics Standards (MATS). With the fabric filter's ability to control particulate matter, coupled with the mercury oxidation capabilities of our patented TRAC® catalyst and the addition of sorbents for HCL capture, this arrangement can result in a multi-pollutant approach that can meet the new MATS emission requirement. Our TRAC® catalyst will reduce, and may eliminate, the need to inject costly carbons by oxidizing mercury for collection in the fabric filter.

WORLD-GEN: WILL FABRIC FILTERS BE IN HIGH DEMAND OVER THE NEXT FEW YEARS?

Robert Nicolo: Yes, we believe that the fabric filter technology will play a key role in the ability to meet the requirements of MATS. We have already seen a large demand for fabric filters from some of the largest utility fleets in the U.S. This is a viable, proven and cost effective method to meet MATS.

WORLD-GEN: DO UNITS WITH ELECTRO-STATIC PRECIPITATORS (ESPS) ALSO NEED TO INSTALL FABRIC FILTERS?

Robert Nicolo: That depends on several factors, including the fuels that are being used and the current configurations of the unit. Many ESPs were originally undersized, and in some instances are in poor condition due to utilization of higher sulfur coals, resulting in corrosion issues. However, some utilities that are fortunate enough to have sufficiently sized ESPs that are in good condition may be able to upgrade them to achieve the new PM limits, provided they have an existing FGD

and SCR. Other units with aging or undersized ESPs that cannot afford the outage time for upgrades are considering the fabric filter as a lower cost solution due to the ability to install them independently with a short outage for tie in. Additionally, units without FGD can gain the benefits of adding Triple Action Catalyst (TRAC®) or sorbents to meet the mercury and HCL emissions with the fabric filter.

WORLD-GEN: PLEASE SHARE FGD AND SCR SYSTEMS HITACHI HAS INSTALLED.

Robert Nicolo: Minnesota Power Boswell Unit 3 350 MW FGD, and SCR Ameren Coffeen - 1 X 360 MW and 1 X

590 MW Wet FGD systems
Ameren Duck Creek 465 MW Wet FGD
Ameren Sioux 2 X 535 MW Wet FGD
Seminole Electric 2 X 750 MW SCR
Duke Cliffside Unit 6 900 MW SCR
PSE&G Hudson 600 MW SCR
East Kentucky 250 MW SCR
LG&E Trimble County #2 750 MW SCR
Multiple Utilities including Southern Co. and AEP Catalyst supply fleet contracts

ABOUT ROBERT NICOLO

Mr. Nicolo has 30 years of power and air pollution control experience on a wide variety of fossil generation projects world-

(continued on page 11)

Power Generation Products Environmental Control Solutions After Market Services



Looking for solutions to reduce mercury, particulate matter, SO₂ and SO₃ emissions?

With over 30 years experience and many successful projects around the world, Hitachi is an industry leader in Air Quality Control Systems. Hitachi's proven technologies include Fabric Filter*, SCR Systems and Catalyst, and Wet Flue Gas Desulfurization.

Hitachi Air Quality Control Systems will significantly reduce emissions to comply with the recent U-MACT regulations and minimize capital investment and operating costs while increasing reliability and turndown.

Ask Hitachi about its total environmental solutions.

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HITACHI
Inspire the Next

RICK NEEDHAM



Director, Green Business Operations
Google

Google is investing in a clean energy future with a nearly billion dollar renewable energy portfolio of 1.7 GW's. "A clean energy future means running our buildings as efficiently as possible, piloting new clean energy technologies and committing to long-term power purchase agreements that actually green today's energy grid," Rick Needham, Director, Green Business Operations said. Several of the projects deploy newer technologies at large scale for the first time, dramatically impacting their ability to grow, get financed, and drive down costs."

PV IN CALIFORNIA

Google invested \$94 million in a portfolio of four solar photovoltaic projects totaling 88 MW, being built by Recurrent Energy near Sacramento.

The company invested alongside KKR and Recurrent. "We're excited to be joining global investment firm KKR on their first renewable energy investment in the US," Needham shared.

The energy produced by these projects is already contracted for 20 years with the Sacramento Municipal Utility District (SMUD), the first projects to be built under their feed-in tariff program (FIT).

HOMEOWNER FINANCING

Google invested \$75 million to create an initial fund with Clean Power Finance that will help up to 3,000 homeowners go solar. Purchasing a solar system is a major home improvement, but the upfront cost has historically been one of the biggest barriers for homeowners. "That's where Clean Power Finance comes in. They've developed an open platform that connects installers with investors (like Google) to provide financing to homeowners," Needham explained.

Solar installers sign up with Clean Power Finance to build the system, the investor owns it (in this case, Google) and homeowners pay a monthly payment for the system, at a price that's often less than paying for energy from the grid.

Google installed a 1.6 MW's rooftop solar installation at the Googleplex in 2007.

Google invested \$280 million in a SolarCity fund to help provide innovative financing for residential solar projects.

SolarCity, a full service solar systems provider, can offer up to 8,000 additional customers the option to go solar through a solar lease or power purchase agreements.

Investors like Google purchase the system up front and, in return, receive a portion of lease payments from the homeowner along with SolarCity.

SolarCity has completed or is currently building out more than 15,000 residential solar systems, the most of any company in the US.

BRIGHTSOURCE

"In 2008, we invested \$10 million in startup company Brightsource via Google.org. We subsequently invested another \$168 million into their first utility-scale solar project called Ivanpah, in California's Mojave Desert," Needham noted.

Ivanpah will produce 392 MW's of solar power once it is up and running in 2013, and is expected to supply both Pacific Gas and Electric and Southern California Edison with energy equivalent to that used in 140,000 homes.

The Ivanpah Power Tower will be approximately 450 feet tall and will use 173,000 heliostats, each with two mirrors. The project is being constructed by Bechtel. Construction began in October 2010 and is projected to finish in 2013.

The Ivanpah project will also be financed by NRG with loan guarantees provided by the US Department of Energy.

PEACE GARDEN WIND FARMS

Google's first investment in a utility-scale renewable energy project was \$38.8 million in two wind farms in North Dakota that generate 169.5 MW's of power.

The projects were built by NextEra Energy Resources which uses advanced wind turbine technology and monitoring and control systems to provide one of the lowest cost sources of renewable energy in existence today. "We were excited to make this investment because it marked both the first production tax credit deal done since the financial crisis of 2008 and also the first entry of a non-energy corporate investor into tax equity financing, a form of financing that was tightly constrained since 2008 and was thereby preventing good projects from getting built," Needham claimed.

ALTA WIND ENERGY CENTER

Google invested a total of \$157 million in two projects totaling 270 MW's at the Alta Wind Energy, a wind installation center being built by Terra-Gen Power in several phases to generate a combined 1,550 MW's of power.

The project will also use some of the first transmission lines of Tehachapi Renewable Transmission being developed specifically to transport renewable energy.

The power will be delivered to Southern California Edison under long term agreements. The Alta projects also employ an innovative financial structure called a leveraged lease.

Under the leveraged lease, Google and Citi are purchasing the Alta IV project and will lease it back to Terra-Gen who will manage and operate the wind projects under long-term agreements.

SHEPHERDS FLAT WIND FARM

Google invested approximately \$100 million in the Shepherds Flat Wind Farm currently under construction near Arlington, OR and when completed in 2012 will produce 845 MW's of energy. The electricity produced at Shepherds Flat will be sold under long term agreements to Southern California Edison.

The developer is Caithness Energy and GE which is an early investor in Shepherds Flat as well as the turbine manufacturer and operations and maintenance supplier. The co-investors are Sumitomo Corporation of America, a subsidiary of Sumitomo Corporation and Tyr Energy, a subsidiary of ITOCHU.

GOOGLE IN GERMANY

In 2011, Google made its first international investment of €3.5 million (approximately \$5 million) for a 49 percent equity stake in the project in a recently completed solar facility in Brandenburg, Germany. More than 70 percent of the solar modules used in the project were produced by German manufacturers.

AWC OFFSHORE

Google invested a 41.7 percent equity stake in the Atlantic Wind Connection. AWC will build a superhighway transmission infrastructure to stretch 350 miles along the coast from New Jersey to Virginia to connect up to 7,000 MW's of offshore wind power.

The AWC project is led by Trans-Elect and is financed by Google, Good Energies and Marubeni. "We are investing 37.5% of the equity in this initial development stage, with the goal of obtaining all the necessary approvals to finance and begin constructing the line. Although the development stage requires only a small part of the total estimated project budget, it represents a critical stage for the project," Needham said. "The mid-Atlantic region is ideally suited for offshore wind. It offers more than 60,000 MW's of offshore wind potential in relatively shallow waters that extend miles out to sea.

We believe in investing in projects that make good business sense and further the development of renewable energy. We're willing to take calculated risks on early stage ideas and projects that can have dramatic impacts while offering attractive returns.

This willingness to be ahead of the industry and invest in large scale innovative projects is core to our success as a company."

We are looking forward to a clean energy future. Based on our work to green our operations and the investments we've made, we also know that clean energy can be good business.

We hope to inspire other companies and investors to participate in the clean energy revolution and together explore what's possible."

Google's data center team has been working on a project to bring its facilities to even higher standards for environmental management and workforce safety.

All US owned and operated data centers have received ISO 14001 and OHSAS 18001 certification.

Google's the first major Internet services company to gain external certification for those high standards in its five US data centers.

Today, most of Google's data centers have emergency backup generators on hand to keep things up and running in case of a power outage. To reduce the environmental impact of these generators, Google minimized the amount of run time and need for maintenance, and worked with the oil and generator manufacturers to extend the lifetime between oil changes. This has reduced oil consumption by 67 percent.

ABOUT RICK NEEDHAM

Rick Needham is Director of the Energy & Sustainability team at Google, where he has worked since 2008. This team has spearheaded a variety of projects including investing in large scale renewable energy projects.

Rick currently sits on the board of the Atlantic Wind Connection (AWC), a project company developing an offshore transmission backbone off the Mid Atlantic coast to enable 7,000MW of offshore wind.

Prior to joining Google, Rick was a business development executive and Project Manager at DEKA Research & Development Corp.

While at DEKA he led the business development efforts around clean energy and managed several technology development projects in clean energy, medical products, and robotics including the development of an advanced upper prosthetic arm currently in trials with the Veterans Administration and featured on 60 Minutes.

Prior to DEKA, Rick worked at Bain & Company, a global business consulting firm, and served for eight years as a nuclear submarine officer in the U.S. Navy.

Rick holds a BS in Aerospace Engineering from the US Naval Academy, an MS in Aeronautics and Astronautics from MIT where he attended as a Draper Fellow, and an MBA from the Harvard Business School.

SUSAN REILLY



President
Renewable Energy Systems

Susan Reilly is President and CEO of Renewable Energy Systems Americas Inc. (RES Americas) and RES Canada. An energy industry veteran, Susan is an economics graduate and qualified as a Chartered Accountant in the UK.

Her career began in corporate investment, banking, and venture capital. Susan joined the energy industry in 1995, initially in a strategy role for the UK energy utility Scottish Power, shortly after the company was privatized. The company was heavily weighted in coal and nuclear, and her initial focus was to diversify into other fuels like gas and wind. Scottish Power's wind business became the largest wind business in the UK, was ultimately acquired by Iberdrola of Spain, and now forms part of Iberdrola Renovables, the largest global wind company. Susan joined RES in 2010 to continue focusing on renewable energy investment.

ABOUT RES AMERICAS

RES Americas is part of the RES Group of companies, a wholly-owned subsidiary of RES Limited (RES) of the United Kingdom. RES Group employs over 1,000 people worldwide dedicated to the development, construction and operation of renewable energy projects.

RES Group was founded in 1982 and is affiliated with the Sir Robert McAlpine Group, a family-owned civil engineering and construction company in business for more than 140 years with over 1,700 employees.

RES Group's head office is located in London, England. Internationally, RES Group has offices in England, Scotland, France, Scandinavia, Turkey, South Africa, Australia, the U.S., and Canada. RES Group's wind energy experience has been gained through its involvement in over 108 successful wind farm projects totaling almost 6,000 megawatts on four continents.

RES Americas is headquartered in Broomfield, Colorado with regional offices in Austin, Texas; Portland, Oregon; and Minneapolis, Minnesota and has approximately 360 employees.

WIND ENERGY

RES Americas has been active in North America since 1997 and during this time has either developed and/or constructed more than 4,800 megawatts of renewable energy projects, which represents approximately 10% of the operating wind farms in the U.S. RES Americas is a leader in the renewable energy industry, with in-house expertise ranging from resource analysis, development, site design, procurement, engineering, and construction, through to operations. The company builds wind projects it has self-developed, as well as projects developed by other companies.

SOLAR ENERGY

RES Americas is also involved in solar energy projects and has recently completed one of the largest solar PV plants in the U.S., the 30 megawatt Webberville Solar facility near Austin, Texas. This project will provide enough clean energy to power 5,000 homes.

IN-HOUSE TECHNICAL CAPABILITY

One of RES Americas' greatest strengths is its technical expertise. The company has all the required skills in-house to streamline the development process and create value while addressing siting issues and constructability.

The wind and solar data analysis activities include installing meteorological towers, calibrating anemometers and maintaining quality control of the data collected including long-term climate estimates.

TRANSMISSION

RES Americas develops and constructs transmission lines for its renewable projects as well as for other parties including utilities. It has constructed or has under construction more than 500 miles of transmission lines. These include both single-circuit and double-circuit lines up to 345kV.

The range of transmission services RES Americas offers spans cost analysis, permitting, design drawings, VAR support, harmonic study and mitigation, and ultimately, construction.

The company specializes in the development, permitting, engineering, materials procurement and construction of transmission lines and substations. Its internal development and permitting groups have extensive experience in bringing projects to construction and assisting with compliance through the construction phase.

The in-house engineering team, in combination with the extensive national and international network of suppliers, contractors and subcontractors, and engineering consultants, gives RES Americas the ability to provide its clients with "one-stop-shop" service, as well as construction-only services.

The construction teams are highly experienced and located throughout the

country working on various projects. RES Americas' project management has a proven track record of bringing large projects to completion on time with no cost overruns.

RES EARTH AND CABLE

In 2010, RES Americas enhanced its internal construction capabilities with the creation of RES Earth and Cable, through the acquisition of a contractor specializing in construction techniques associated with the construction of wind energy and utilities projects.

RES Earth and Cable owns and operates the heavy equipment and specialized machinery used to build roads, install underground cabling and cranepads, and to perform foundation excavation and backfilling. Owning this fleet of equipment gives the company direct control over the processes in the field, which in turn improves its already impressive safety record, refines and further develops its long standing history of high quality, and allows it to offer lower cost projects to its clients.

CONSTRUCTION SERVICES

The experienced team of field personnel brings knowledge of all types of conditions and the ability to be successful in the most difficult of project scenarios. RES Earth and Cable provides construction services to third-party clients as well as performing work on RES Americas projects, and increases the competitiveness of RES Americas' Balance of Plant (BOP) proposals.

This supports RES Americas' mission of contributing to a sustainable energy future through the development and construction of utility-scale renewable energy projects that are sensitive to both the environment and the communities in which it serves. RES Earth and Cable has constructed more than 2,700 megawatts of renewable energy projects.

RES CANADA

Renewable Energy Systems Canada Inc. (RES Canada) is also part of the RES Group of companies. RES Canada has been active in Canada since 2003 and its head office is located in Montreal, Quebec with project offices in Ontario.

RES Canada constructs wind and solar energy projects, serving as a third party construction partner for over 60% of its portfolio. RES Canada offers its clients and partners fully integrated expertise in all aspects of project development, wind resource measurement and analysis, permitting, financial modeling, turbine selection, electrical design, civil engineering, finance, construction, operations and maintenance.

In 2011, RES Canada completed two significant wind farms in Ontario for Enbridge. These projects, which total nearly 200 megawatts, will generate energy sufficient to power 66,000 homes.

ROBERT NICOLO

CONTINUED FROM PAGE 9

wide. He is responsible for all of the air quality control products for Hitachi Power Systems America, including CO2 capture technologies and projects using all types of flue gas treatment systems including desulfurization (FGD) and selective catalytic reduction (SCR) systems. Previously, he was Bechtel's Air Quality Control Systems Manager and the technical specialist responsible for their air quality control systems employed on their projects. He worked for Combustion Engineering and Noell Inc, in design, startup and servicing of numerous AQCS applications worldwide.

ABOUT HITACHI POWER SYSTEMS AMERICA

Hitachi Power Systems America, Ltd., is a leading supplier of equipment and services for the Power Generation Market including Fossil, Nuclear, and Hydro facilities. Products include advanced Pulverized Coal Boilers, HRSG's, Steam, Gas and Hydro Turbines and Generators, Substation Equipment and Air Quality Control Systems for new plants and retrofit applications. As a Single-Point Supplier, we offer total solution services including operation and plant assessments, engineering studies, performance optimization, emissions improvement, equipment replacement and upgrades, spare parts and coal to gas conversions.

TOBY SEAY

CONTINUED FROM PAGE 4

generation is going to become more sophisticated," he says. "Rather than running individual tie lines from wind farms off shore, we expect several wind farms will capitalize on the efficiency of creating a network of substations off the coast with a single tie line running to a major substation on shore that ties to the grid." Seay is looking with interest to potential wind farms along the Atlantic coast as well as off the coast of Britain. He believes that in four or five years, Bechtel will be involved in offshore wind and transmission projects worldwide.

"Accordingly, we are building up our capacity and scaling up responsibly," Seay says. "We believe the market will continue to develop for us both in the United States and abroad over the next 24 months as people come to understand what Bechtel has to offer in the transmission business. Our capacity continues to increase as more companies look to the next level—either by building up their internal capability or engaging an EPC contractor like Bechtel. As companies face an increasing need for EPC services, they come to recognize the value of the kind of capabilities Bechtel offers."

DIRK ROUNTREE



Executive VP & General Counsel
PIC Group, Inc.

Dirk Rountree is Executive Vice President and General Counsel of PIC Group, a global power generation service provider. In this position, Rountree leads the company's Legal & Compliance, Human Resources, Risk Management & Insurance, Safety, and Quality departments. Rountree has over 25 years of legal and business operations experience working in top corporations and law firms, including over 10 years of wide-ranging power generation experience at PIC.

"I definitely wear many hats at PIC," laughs Rountree, "but I enjoy every minute of it. We are in a growing, dynamic industry and every day brings a fresh set of challenges. Thanks to the great people I work with and their outstanding capabilities, PIC has carved out its own successful place in the field of power generation. I see my main job as keeping everyone that works with us safe, so we can continue to provide the level of service for which we have become known. I truly believe that PIC is the best company to work for in the power industry, and that's my legal opinion."

Prior to joining PIC, Rountree was Managing Attorney at GE Contractual Services, a division of GE Energy. There, he served as lead counsel for domestic and international power generation projects ranging in value from \$50 million to over \$2 billion. Rountree holds a Bachelor of Science degree in Risk Management & Insurance from Florida State University and received his Juris Doctorate from the University of Tennessee, where he was Executive Editor of the Tennessee Law Review.

FOCUS ON SAFETY

As the officer in charge of PIC's Safety department, Rountree explains how PIC has taken a non-traditional approach to its safety programs.

"Safety is a popular topic in the power generation industry. The traditional approach relies on only a few individuals to carry the full weight of their organization's safety programs. At PIC, we don't appoint that responsibility to just one or two people. Safe work habits are integrated into the daily lives of all employees – from the field to top management. Everyone is

empowered to make changes and is accountable for their actions."

PIC was founded in 1988 as a contract staffing and consulting firm. It quickly gained the reputation as a reliable source for highly-skilled professionals in the power and petrochemical industries. Today, PIC focuses on the unique needs of power generation facilities worldwide, with a service portfolio that spans the entire project lifecycle. PIC's services include installation, full scope turbine and boiler outage, integrated plant start-up and com-

missioning, operations and maintenance, and technical project support.

Though its capabilities have grown, PIC's commitment to its customers and its employees has remained the same – to be The Best Of The Best®. "The Best Of The Best® has become more than just a slogan at PIC; it's part of our culture," says Rountree. The first of 10 founding principles, this trademarked statement means that all employees must strive to constantly evaluate their actions and always look for a better way. This is especially important

when approaching safety.

"PIC's people are our greatest asset. For over 20 years, PIC's commitment to achieving zero injuries, zero incidents and zero harm to the environment has yielded some of the safest and healthiest working conditions in the industry," adds Rountree.

As shown by the various safety excellence awards it continues to receive, PIC has long been recognized as a safety leader. Here are just a few of the accolades PIC has recently been presented with:

(continued on page 14)

24

Years Experience

Founded in 1988

"The Best Of The Best®"

READY TO MANAGE
YOUR NEXT
POWER PROJECT.



Founded in 1988, PIC has been a leader in the power generation industry for over 20 years. We are experts at managing multi-faceted projects including start-up and commissioning, operations and maintenance, installation, turbine outages, mechanical services and technical services. Combine these capabilities with our responsive approach and global resources, and it's easy to see why those who know choose PIC.

www.picworld.com

PAOLO CASINI



Vice President, Renewable Energy Solutions
Power-One, Inc.

Power-One is a leading provider of renewable energy and energy-efficient power conversion and power management solutions and is the world's second largest designer and manufacturer of photovoltaic inverters. Its renewable energy products enable the industry's highest yielding conversion of power from solar arrays for use by utilities, commercial enterprises and homes. Power-One has a 40 year history as the leader in high efficiency and high density power supply products for a variety of industries including Renewable Energy, Servers Storage & Networking, Industrial and Network Power Systems. The company is headquartered in Camarillo, CA and has global sales offices, manufacturing, and R&D operations in Asia, Europe, and the Americas. Power-One is traded on NASDAQ under the ticker symbol PWER.

Following the 2011 acquisitions of Energy ReCommerce and Act Solar, two leading providers of lifecycle management software for renewable energy assets, Power-One now offers a holistic portfolio of products, services and solutions.

PANEL TO GRID SOLUTIONS

"Our main objective is to meet our customer needs by providing a complete panel-to-grid system solution", said Paolo Casini, Vice President, Product Marketing at Power-One. "We are excited to present the new AURORA Vision services that provide greater system control and yield for our customers. The AURORA Vision products and services are designed to maximize uptime, increase the return on investment and thereby give operators the necessary peace of mind." The AURORA Vision portfolio consists of three components - software, hardware and accessories.

Power-One's AURORA Vision software features a full range of functionalities to maximize system energy output while minimizing costs, including system fault management, diagnostics, asset tracking, performance index, and alerting services. It provides highly interactive and real-time access to key performance data and operations metrics giving plant managers the information needed to optimize operational decisions. The field-tested, scalable and secure

architecture supports over 10 million plant operations transactions per day.

The hardware component of AURORA Vision offers equipment designed to capture and transfer data and environmental information. A key product is the AURORA Universal System, a high-performance data management platform which is installed at the PV plant. The system is available for both residential and industrial installations and also offers revenue-grade metering and smart grid integration. AURORA Universal interoperates with AURORA Vision and

multi-vendor balance-of-system equipment including inverters, string combiners, meters and environmental systems. Moreover, the system delivers accurate and reliable data in a high-frequency.

Power-One's AURORA Vision newest accessories include AURORA Smart Combiners for 8, 12 and 16 strings and AURORA Environmental Units which measure temperature, irradiance, wind speed and other environmental conditions.

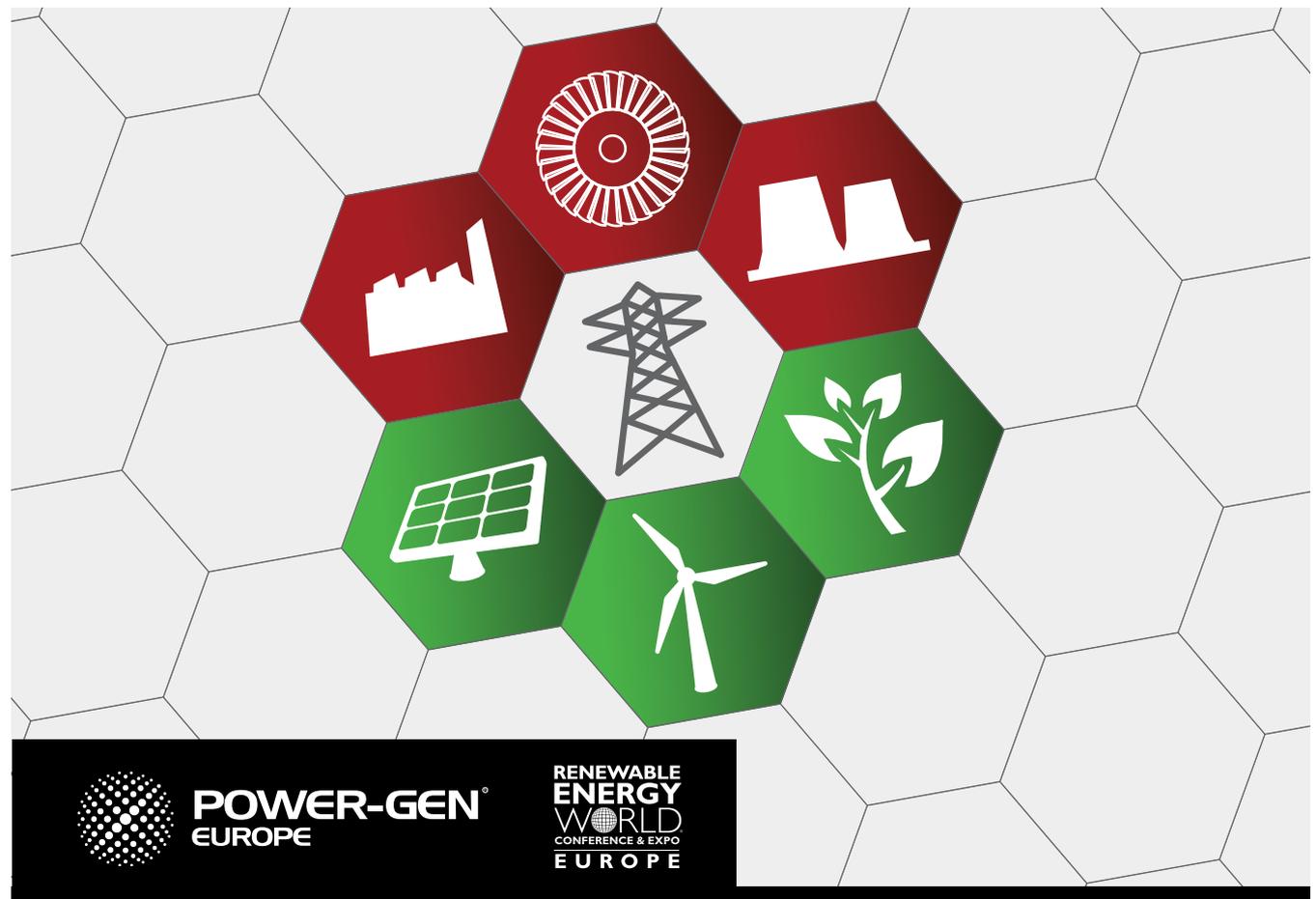
In addition to presenting the new AURORA Vision, Power-One launched the

new AURORA MICRO-0.3 micro-inverter as well as its DC/DC power optimizer and the AURORA ULTRA-1400, the largest inverter currently available with an output of up to 1.4 MW's during 2011.

ALTERNATIVE TO STRING INVERTERS

With the AURORA MICRO-0.3 inverter, Power-One introduced an alternative to the traditional string inverters. The AURORA OPTI-0.3 power

(continued on page 18)



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JEANNE JANKOWSKI



Head of Global Energy
Zurich

WORLD-GEN: WHAT WILL THE ENERGY INDUSTRY OF THE FUTURE LOOK LIKE?

Jeanne Jankowski: We are on the cusp of an exciting and revolutionary energy future. Steadily increasing global demand is driving innovation, including new technologies for more efficient production of conventional oil and gas energy resources as well as exciting, new alternative renewable energy possibilities. In the U.S., there has been a resurgence of oil and gas production. Clearly, a major reshuffling of the global energy marketplace is underway, with profound implications for our economic future.

WORLD-GEN: WHAT ARE SOME OF THOSE IMPLICATIONS?

Jeanne Jankowski: The changing energy outlook also means an inevitable expansion of risk. The business has always faced a variety of inherent risks, but these are changing as new technologies lead exploration and production farther out to sea and into deeper waters. New recovery techniques are breathing new life into mature oil fields and enabling the extraction of supplies from previously inaccessible shale deposits. And new alternative energy technologies are coming online, promising more environmentally friendly, low-carbon sources of power.

However, in addition to the traditional risks faced by the industry, from property damage and worker health and safety to environmental liability, new production techniques and renewable technologies are expanding the range of risks faced by the industry. Managing these risks effectively begins with a clearer understanding of what they are and how they can be addressed.

WORLD-GEN: IS THERE A HIGH DEMAND FOR RENEWABLE ALTERNATIVE ENERGY POSSIBILITIES TODAY OR DO YOU FORESEE THAT MORE DEMAND WILL COME IN THE FUTURE AND WHAT ARE THE IMPLICATIONS?

Jeanne Jankowski: The simple answer about demand is yes to both ques-

tions. More than \$200 billion was invested on wind, solar and biofuels in 2010, and we see this spending continue to grow exponentially as the world demands more non-fossil fuel sources.

Companies operating in the alternative energy industry face unique risk issues. For example, moving critical equipment and materials from alternative energy manufacturers to remote sites requires ocean and inland marine transit solutions that can navigate fast-moving risks and the changing regulatory and security environment.

The erection of a wind farm or solar energy panels requires a holistic construction risk management program from an experienced insurer. Federal laws in the U.S., such as investment tax credits and carbon credits can affect how a company operates. To meet all the needs of alternative energy producers and manufacturers, Zurich Energy offers more than 70 risk management services and 17 online tools to help mitigate losses and reduce both operational and financial risks.

WORLD-GEN: WHAT SETS ZURICH APART AS AN ENERGY INSURANCE PROVIDER?

Jeanne Jankowski: Energy companies operate in an intensely complex and competitive environment where the demand for increasingly better products, services and prices requires almost flawless performance. To support energy companies in meeting their business objectives, Zurich Energy has developed a robust combination of people, products and services:

We have 28 Energy Casualty underwriters with deep industry experience located across seven regional offices in the United States. Globally, Zurich has more than 65 Energy operators to address the property and casualty needs of companies worldwide and more than 1,000 risk engineers, with 64 of them dedicated to the Energy industry.

In terms of products, Zurich offers robust primary casualty solutions that include core coverages for General Liability, Worker's Comp, Auto and a vigorous set of pollution liability endorsements and contractors pollution liability. In addition, we offer strong excess casualty solutions. Finally, we offer custom risk control programs that address the risk control needs of the most complex energy customers and pull from state-of-the-art risk control services to drive down loss cost and enhance results.

Finally, because the energy field is truly a global business, having a business relationship with an insurance company that has a global reach like Zurich is an important strategic advantage.

WORLD-GEN: WHAT SORT OF SERVICES DO THE RISK ENGINEERS PROVIDE?

Jeanne Jankowski: Zurich Energy Risk Engineers understand the challenges of today's world by providing real and valuable insights into the management and

communication of strategic risks such as supply chain breakdown, loss of customers, damage to brand equity, low employee morale, and failure to meet legal and regulatory requirements. They closely monitor specific loss trends, emerging risk issues, and best practices used across the industry. Through Zurich's global network of risk engineers, we can leverage cross-industry experience that will help a company better analyze losses, evaluate exposures, assess controls, identify gaps and develop customized solutions.

At every point along the production, manufacturing or distribution process, Zurich Energy Risk Engineers provide specialized insights to address your most complex risk management challenges. Each year, Zurich completes more than 1,000 risk assessment and consulting projects annually by energy specialists who average more than 20 years of industry experience.

WORLD-GEN: ZURICH RECENTLY TRANSFERRED ITS ENERGY CASUALTY BUSINESS TO ITS GLOBAL COOPERATE ENERGY UNIT. WHY WAS THIS MOVE MADE?

Jeanne Jankowski: Zurich's aim is to create a unified face to the market that brings our customers Energy industry knowledge, experience and expertise. This move ensures better coordination across the globe for what is a predominantly global customer segment. My responsibilities include oversight of Exploration & Production, Onshore Property, Domestic, Excess and the International Program from Zurich Casualty, with a key focus on Oil and Gas, Mining, Power Generation and Alternative Energy.

World-Gen: Can you tell us a little bit more about how the International Program from Zurich works? It's fairly new. Why did Zurich create it?

Jeanne Jankowski: In a world of multinational, high-risk energy operations, the International Program from Zurich (IPZ) offers a solution to the challenges created by global programs. While Zurich Global Energy has successfully managed international accounts for many years, the introduction of IPZ has been a boon for us.

Managing risks associated with global energy operations can be demanding. Risk managers need to account for market conditions and varying insurance regulations in each country where there are exposures. These challenges can be overwhelming without the assistance of an experienced insurance carrier who has local knowledge in the countries where the customer has operations.

Zurich's success with IPZ can be attributed to several factors: its ease of administration, streamlined efficiencies and Zurich's global experience.

ABOUT JEANNE JANKOWSKI

Jeanne Jankowski is head of Energy for Global Corporate in North America. She is responsible for Exploration &

Production, Onshore Property, Domestic, Excess and IPZ Casualty, with a key focus on Oil and Gas, Mining, Power Generation and Alternative Energy. Jankowski joined Zurich in 2004 and most recently served as head of Energy, Property for GCiNA. Prior to joining Zurich, she held a number of executive leadership roles with American International Group and Travelers Insurance. Jankowski holds a bachelor's degree from St. Mary's College, Notre Dame, Ind. She also studied abroad with New York University's program in Madrid, Spain and completed the Management for Executives program at Rice University in Houston, Texas.

DIRK ROUNTREE CONTINUED FROM PAGE 12

- Occupational Excellence Achievement Award (from the National Safety Council)
- Georgia Department of Labor Award of Excellence
- Kentucky Governor's Safety and Health Award
- Barrick's Award of Merit for Zero Lost Time Accidents

"We could not have won any of these awards without the dedicated efforts of all of our employees, both in the field and in our offices. My goal is to continue this pattern of excellence by maintaining our concentration on safety as we move forward."

BENEFITS OF TEAMWORK

According to Rountree, PIC's focus on teamwork ensures that their working environments are as safe as they can be, but that is not the only arena in which PIC employees are skilled at working together.

"By coordinating their efforts, our six complementary service lines can manage an entire project lifecycle or provide expert services at any point along the way," says Rountree.

Bundling services has become an increasingly popular trend in many industries. Instead of dealing with multiple companies, customers find one to fit all of their needs. In the power generation industry, PIC was one of the first to offer this type of service.

"PIC's service lines grew organically in response to our clients' needs. Our staff has amassed years of collective experience in the commissioning, start-up, operation, maintenance and repair of power plants and other industrial facilities.

This allows PIC to draw upon internal and external resources to design and deliver optimum solutions.

The key advantage to our customers is the ability to work with one, trusted partner.

This saves time and money – both of which are always appreciated."

JOHN LEFEBVRE



President, Suntech America

STATE OF THE U.S. SOLAR INDUSTRY

The United States solar industry experienced significant growth in 2011, and is now in the running with China, Italy, and Germany to be one of the top three solar markets globally in 2012. As anticipated, US market demand was particularly strong in Q4 2011, driven largely by the expiry of the US Treasury's 1603 cash grant program on December 31, 2011. Project developers were eager to secure module supply and get to work before the New Year. That brings us to 2012, which could see approximately 2.5GW of new solar installations. As encouraging as 2011 was for solar in the US, continued success in 2012 will not be without challenges.

AWAITING TRADE DECISIONS

Most importantly, the market awaits a decision from the US Department of Commerce and the U.S. International Trade Commission to determine whether or not it will impose duties on imports of solar cells and modules from China. Suntech has fully cooperated with the DOC and ITC process, and as a global company listed on the NYSE, we remain confident in our position and will continue to substantiate our strict adherence to fair international trade practices. Whatever decision is reached, we will fully leverage our global supply chains and do everything in our power to ensure business as usual for our customers.

What's clear, however, is that this spiraling solar trade war is already having a negative impact on the U.S. solar industry. This major distraction is a jobs program for lawyers and lobbyists. The industry must refocus on our most important goal: to make solar affordable for the mass market. After decades of incremental innovation throughout the global supply chain, solar is starting to compete against many traditional power generation assets. This should be a time of celebration and rapid growth.

PRESSURE ON SOLAR COST

Unfortunately, the imposition of trade barriers would act like a tax and raise the price of solar electricity for American consumers, reducing demand for solar and limiting job growth. It's important to remember that the U.S. is a net exporter of

solar products to China by hundreds of millions of dollars. Trade wars are job killers, and Suntech is opposed to trade barriers at any point in the global solar ecosystem.

The specter of rising solar electricity prices comes at inopportune time for the industry, as short-term dips in both electricity demand and natural gas prices could lure policymakers into a false sense of energy security. Although some believe that new natural gas extraction technologies could undermine solar's value proposition, I disagree. Global electricity demand is projected to triple in the 21st century, and even if we did just uncover another "100 years" of gas supply in the U.S., we cannot satisfy new demand with fossils alone in this century or the next. I believe there is a strong immediate opportunity for solar and natural gas to work together, particularly as a bridging solution away from coal. But without cost effective renewables, we are still confronted with the same long-term energy and environmental challenges.

STATE SOLAR POLICIES

There are many states that understand the costs of pushing this problem to future generations. This year, we anticipate new or steady solar policy support from many states, including California, New Jersey, Arizona, Colorado, Illinois, Rhode Island, Ohio, and New York, and we're working with a number of great downstream partners in those regions. Texas remains a wild card, and if policy makers decide to recognize and embrace solar's new value proposition, then solar, too, will be bigger in Texas. With a few common-sense policies over the next two years, particularly focused at tackling the state's peak power shortages and water concerns, Texas could quickly become one of the world's largest solar markets. And we'll continue to help defend the federal ITC, push for another 1603 extension, and protect solar policy priorities in other states.

We remain confident that competitive solar markets, if unimpeded, will make solar electricity competitive against most traditional forms of electricity generation. Nobody said the transition to a more sustainable global energy economy would be easy, or that we wouldn't encounter resistance. But we remain confident about solar's growth in 2012 and beyond.

ABOUT JOHN LEFEBVRE

John Lefebvre became President of Suntech America in September 2011. Mr. Lefebvre previously served as Vice President of Sales and Business Development at SolarCity, a full-service solar provider for homeowners, businesses and government organizations in the U.S. Mr. Lefebvre began his career in the aerospace division of GE before transitioning to the semiconductor equipment industry. At Lam Research and Mattson Technology, Mr. Lefebvre held senior management and product development positions working across Asia, Europe, and the U.S. Mr. Lefebvre received an M.B.A. from the University of British Columbia.

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JULIA HAMM



President
Solar Electric Power Association

This year marks the 20th anniversary of the Solar Electric Power Association – 20 years of helping utilities engage with solar. To say a whole lot has changed in the growth of solar in those 20 years would be an understatement.

In the early 1980s, a major market for solar photovoltaic (PV) cells was still calculators and watches. By 2000, the installed solar PV generation capacity in the U.S. totaled less than 50 MW, and was comprised mostly of customer-owned rooftop systems. Despite a Department of Energy demonstration program managed by SEPA that added 7 MW of utility-connected PV, it was still a time of slow growth with somewhat adversarial relations between utilities and the solar industry.

By the mid 2000s, the solar market began to grow aggressively due to a combination of state government mandates, federal tax policy and the entrepreneurial spirit of the solar industry. Third party developers brought new scale and activity to the commercial market by offering no-cost solar to large customers, essentially selling “solar kilowatt-hours” on performance contracts instead of “solar kilowatts.”

UTILITIES DO SOLAR PPA'S

By 2010, utilities had become major buyers of solar energy through power purchase agreements (PPAs) to meet state renewable portfolio requirements. Utility-owned solar grew by 300 percent between 2009 and 2010 with announced plans to build more than 800 MW of solar in the next few years.

Utility-owned solar was not alone in its growth. Overall grid-connected solar grew by more than 100 percent in each of the past two years – and in the middle of a recession, no less. This year, also marks the first time that more than 1GW of solar will be added in a 12-month period, bringing the cumulative total of solar in the U.S. to nearly 4 GW.

Solar power is the fastest growing energy resource in the U.S., and its once high price tag is falling rapidly, with a 25 percent drop in the installed cost of larger PV projects in just the past 18 months. This year, electric utilities have signed power

purchase agreements for less than 10 cents per kilowatt-hour in some areas – an amazing number for an industry that was greater than 20 cents per KWH a few years ago.

COMPLEX RULES

The rapid growth of solar brings with it a host of challenging issues for the utility business. The rules and procedures governing everything from solar incentive programs, net metering and interconnection are often complex and sometimes conten-

tious. In states with strong policies encouraging solar development, the impact of unplanned and randomly placed distributed generation connecting to utility lines is a major concern for engineers and operations staff. Another big challenge is possible revenue erosion and equitable cost recovery in the face of more net metering-based solar – all challenges never thought of 20 years ago.

The good news is that the utilities and the solar industry are meeting and dealing successfully with these challenges.

While lower costs and policies have driven the fast expansion of solar in the U.S., utilities are implementing creative business models to sustain, and improve upon, the recent growth.

Julia Hamm is the president and CEO of the Solar Electric Power Association (SEPA). Prior to leading SEPA, she was a senior associate at ICF International. She holds a Bachelor of Science in Business Management from Cornell University.

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MARVIN FERTEL



*President & CEO
Nuclear Energy Institute*

At NEI and across the nuclear energy industry, we have two major imperatives.

Our first imperative: To maintain and increase the asset value of our 104 operating plants – which means operating them at world-class levels of safety and reliability – and to create new earnings potential by building new nuclear capacity when business conditions support new construction.

Our second imperative is to ensure that we maintain and grow the capability to build new nuclear power plants in the future, and that we maintain U.S. leadership in this technology. Since we won't build large numbers of new nuclear plants in America in the near-term, that means we must capture a significant share of a growing world market.

SUSTAINED SAFETY RECORD

For 10-plus years, the U.S. fleet has operated at sustained high levels of reliability and safety. Last year was no exception. Capacity factors year over year range from the high-80s to the low-90s. We estimate last year's average capacity factor was a shade under 89 percent. Output was down slightly from 2010 – hardly surprising since we had 11 more refueling outages in 2011 than the year before.

The industry also continues to invest in the long-term safety and reliability of our reactors. The license renewal process continues to move smoothly.

Some power uprates have been deferred until market conditions improve.

PLANT INVESTMENT

We don't have 2011 data yet, but the industry invested \$7 billion in capital in the plants in 2010. On a per gigawatt basis, that's the highest in the world, and approximately twice France, for example. Seventy percent of our capex was to replace steam generators, vessel heads and other aging equipment, and for power uprates. Remember that we placed 104 plants in service in a relatively short period of time, so we will experience these periodic peaks in capex.

The U.S. approach to reactor safety is based on multiple levels of safety.

Think in terms of three layers of safety: protection, mitigation and emergency response.

The FLEX strategy represents a sig-

nificant expansion of the second layer – our capability to cope with and mitigate the consequences of extreme external events that may exceed a plant's design basis in ways that cannot be predicted.

And here are more encouraging signs for the industry's future.

Last December, NRC certified the AP1000 design. That clears the way for issuance of the construction/operating licenses for the Vogtle 3 and 4 and Summer 2 and 3 projects in Georgia and South Carolina and the start of safety-related construction.

In addition to the AP1000 design certification and the licenses for Vogtle and Summer, other designs and license applications are making their way through the NRC process. The 10 other COLS being reviewed at NRC represent 16 reactors.

LONG-TERM FUNDAMENTALS HAVEN'T CHANGED

First, our nation is on course to shut down between 10 and 20 percent of our coal-fired generating capacity in the next several years.

Second, we really don't expect natural gas prices to stay at two dollars per million BTU for the next 40 to 60 years, the lifetime of a new nuclear power plant.

Third, even at one percent annual growth in electricity demand – below historical trends – EIA forecasts a need for 220 gigawatts of new electric capacity by 2035.

Fourth, there is value in fuel and technology diversity.

In the OECD nations, we will not see large-scale construction programs like the 70s and 80s. Developed, highly electrified economies simply do not require that kind of rapid expansion. Developing economies like China and India are another matter, and nuclear construction in the non-OECD nations is booming.

U.S. industry is well-positioned. American companies have among the most advanced and innovative technologies and designs – whether the advanced passive-safety designs for large reactors or the small modular reactors now being developed, which may be particularly appropriate for developing economies. Foreign governments and companies recognize this.

U.S. companies and government agencies can also offer training to achieve operational excellence.

ABOUT MARVIN FERTEL

Marv Fertel is President and CEO of the Nuclear Energy Institute.

He has worked in executive positions with Ebasco, Management Analysis Company, and Tenera. In 1990, he joined the US Council for Energy Awareness as VP of Technical Programs. With the formation of NEI in 1994, he became VP of Nuclear Economics and Fuel Supply.

In 2003, he was named Senior VP and Chief Nuclear Officer. Mr. Fertel holds a BS degree in civil engineering from Northeastern University in Boston, and an MS in civil engineering from the Polytechnic Institute of Technology in New York.

RON KENEDI



*President
LDK SolarTech USA*

"Solar will continue to grow in the U.S. and we are going to have more and more electricity supplied by solar systems," said Ron Kenedi. He has reason to be optimistic, having worked in the solar industry and helped grow it for more than 30 years.

Throughout his career, Kenedi has served as an industry spokesperson. He is a former board member of the Solar Alliance and the Solar Energy Industry Association and is a current board member of Westinghouse Solar.

Kenedi began in 1980 selling solar kits to retail and wholesale customers through a mail-order catalog, the first in the US photovoltaic industry. He also established a wholesale network of resellers and started a training program designed to educate resellers and end-users. He sold this business to Photocomm which eventually was acquired by Coors Corp. in 1996, then Kyocera in 1999. For the short time he was at Kyocera Solar Inc. his responsibilities included sales, marketing logistics and engineering where sales leaped to \$55 million and Kyocera Solar moved to the number two market position in the US.

In 2000 Kenedi joined Japanese manufacturer Sharp Electronics to create its US solar operation and by 2004, as vice president of Sharp SESG, achieved the number one position in the US solar market. He departed Sharp in 2011 and started his own consulting company, but LDK Solar's invitation to start up and build its US subsidiary drew him back to the corporate world.

LDK SOLARTECH BEGINS

Sunnyvale, California-based LDK SolarTech USA began operating on July 1, 2011, its mission to grow LDK Solar's market share in North and South America. It immediately began shipping modules to customers and its warehouses in Southern California.

The parent company, LDK Solar, headquartered in Xinyu City, Jiangxi Province, China, started up in 2005 and built the largest silicon refining plant in that country. It has expanded its product lines to cells and modules and is now one of the top vertically integrated manufacturers of photovoltaic products in the world. Kenedi said that this vertical integration

gives LDK control of the cost and quality of each step of its manufacturing process.

Kenedi said that LDK SolarTech is already serving customers in residential, commercial and utility-scale markets through its sales to integrators and distributors. One integrator, Advanced Solar Products, installed LDK SolarTech's first, and currently largest, US-based system of 60,000 modules generating 14 MW at the McGraw-Hill campus in East Windsor, New Jersey. The \$60 million to develop and install the system came from NJR Clean Energy Ventures, a subsidiary of New Jersey Resources. Construction on the project began in July and is expected to be fully operational by this spring.

LDK DISTRIBUTES

LDK SolarTech's primary, although not exclusive, distributor is Focused Energy, located in Santa Fe, New Mexico.

Kenedi said some customers have come with him from Kyocera and Sharp. "They know any company I am with is honorable," he said, but it takes time to reengage. Each of the companies has its own strengths, "and once we explain the strength of our company and they meet our executives ... and [we demonstrate] that we are making constant improvements" to the quality of our products they become quite comfortable with us, he said.

Noting that LDK SolarTech had been in business just seven months when this conversation took place, Kenedi explained that sales cycles are long: the company has quoted many jobs that will eventually turn into actual sales. It is too early to talk about the company's market share given that it has been active for just five months and the numbers for 2011 are not yet in. Kenedi is optimistic – "We've sold a lot of product and customers see us as a top-tier provider," he said.

COMPLEX MARKET AHEAD

Looking to the future, Kenedi said the market is complex. It has lived through a 45% growth rate, and the demand side is strong. A lot of customers want solar systems, from refrigerated warehouses with large roofs to utilities who want to produce green power.

The cash grant program has ended, and the debate at the national level continues on tax credits. Kenedi stays out of the debate, but noted that every energy source in the US. is incentivized at some level. "There is no mystery why people are paying \$12.00/gallon for gas in the UK, while we are paying under \$4.00," he said. Many of the incentives that nuclear, coal and natural gas industries get hold consumer prices down, he added.

Solar is quickly approaching grid parity with conventionally produced electricity, Kenedi said, but it will take a little more time. "Solar system costs have gone down 35% to 40% while demand has risen." But the price drop cannot continue at this trajectory," he said and predicted the present trend will flatten.

DAVE DUNNING



President
Fluor Power

Power generation owners that strive to make well informed decisions regarding capital and operating expenditures continue to be handicapped by uncertainty.

Today's global power market is not operating under normal historic circumstances whether viewed through the lens of legislative certainty, the downturn in demand, or the recent impacts of the global nuclear market. Owners must, nevertheless, make decisions in the interest of their ratepayers and consumers that are based on delivering projects with reasonable certainty.

This certainty, at least in part, comes through the confidence an owner can have regarding a project's price and schedule.

"This is one of the strengths of the engineering, procurement, construction (EPC) approach offered through a proven open-book contracting basis," said Dave Dunning, president of Fluor Corporation's Power Group. "Working with owners to properly define the project scope allows us to deliver competitive pricing and schedule to the projects we perform."

The industry has not addressed new baseload capacity needs of the market in quite a while nor has it adequately addressed project retirements to effectively upgrade the reliability and efficiency of the grid system. Most of the economic and technological comparisons that owners evaluate today weigh everything against natural gas. With gas trading well below \$3mm/Btu, few fuels can compete economically unless they are subsidized in some fashion. To date, there has not been an anticipated "dash-to-gas" that may otherwise have been expected. In the U.S., environmental regulation compliance delays for aged fossil-fueled units have pushed decisions around new capacity further into the future.

FUEL DIVERSITY KEY FOR CLEAN ENERGY FUTURE AND GRID STABILITY

"It would behoove the industry greatly to pursue a diversified fuel portfolio strategically to ensure we mitigate reliability risk and provide the best technological stability possible," Dunning said. "This diversified approach would tap into plentiful supplies of fossil fuels retrofitted with existing proven carbon capture technolo-

gies as well as recognize the increased need for renewable and nuclear fuel sources that do not contain carbon."

To ensure long-term grid stability while moving toward cleaner fuel sources, a diversified approach to fuel is a must to handle transients that are inherent with renewable fuel sources. To promote this diversity, various forms of incentives have been instituted through government to support industries such as solar, wind, biomass and nuclear. These incentives—whether in the form of mid-level tariffs, cash grants or investment tax credits—all support the capital expenditures necessary to drive these projects forward.

However, as owners look a bit deeper into the best alternatives for new megawatt production, it is difficult to ignore current natural gas pricing. This evaluation is always more about the future price of fuel when making such decisions than about the present price to ensure some predictability over a life-cycle basis. Gas fuels will also be an optimal economic consideration where owners elect to retire existing facilities that are aged and inefficient. Plant retirements will likely be part of the evaluation process that will take place as compliance laws drive tighter standards for the future performance of existing fleets.

One example of this type of replacement in the U.S. market is at the Lower Colorado River Authority's (LCRA) Ferguson Replacement Project in Texas. The Fluor-led EPC project includes a new 540 MW combined cycle facility that replaces an existing 37-year-old gas-fired unit that is much less efficient.

Another example of fuel diversity, Dunning said, is participation in the renewables market. Fluor recently completed construction of Iberdrola Renewables' Copper Crossing solar photovoltaic (PV) facility in Arizona and is the EPC and operations and maintenance (O&M) contractor for LS Power's 125 megawatt Arlington Valley Solar Energy II PV facility, also in Arizona.

Outside the U.S., Fluor "continues to see opportunities in the solar market space in areas within western Europe, the Middle East, India and South Africa," Dunning said.

Dunning said Fluor's experience and its strong balance sheet assists owners to provide certainty needed to finance renewable projects, while helping to mitigate owner risk.

WHAT ABOUT NUCLEAR?

Fluor firmly believes that new nuclear power units will continue to be a focus in the global market over the long term to achieve a clean energy future. "It is a baseload power generation fuel with no carbon emissions," Dunning said. "One of the realities of this market segment is the age factor of existing units. Many have had license extensions, and the inevitable prospect of retiring units will leave a large need for new replacement capacity in the 2025 to 2030 timeframe," he said. Outside of the U.S., Fluor continues to see robust nuclear opportunities for large-scale units.

In addition, the emergence of small

modular reactor (SMR) technology will allow prospective owners the flexibility to evaluate the nuclear play on a smaller footprint with its accompanying lower capital expenditure benefits. In late 2011, Fluor made a strategic investment in NuScale Power and its passively-safe technology designed in 45 MW modules that can be bundled up to 12 modules. This technology should represent a global solution to customers in the regulated, unregulated and government sectors.

COAL-FIRED PLANTS CONTINUE TO BE LARGEST POWER FUEL SOURCE

In the U.S., about 40 percent of the daily baseload capacity is represented by coal-fueled facilities. However, unless or until the U.S. passes legislation to put a price on carbon dioxide in the U.S. market, owners will struggle to actively pursue and build new coal-fired capacity. But markets such as China, portions of Southeast Asia, India, Turkey, Africa and others continue to invest heavily in solid-fueled facilities.

"Coal can provide a clean energy response when supercritical and ultra-supercritical technologies are proposed together with back-end air quality control systems," said Fluor's Dunning. "The scale of these units, when coupled with the long-term reliability of coal's price point make these units a great value for baseload capacity needs."

Fluor's Econamine FG Plus, a patented, amine-based carbon dioxide capture technology, has been licensed for nearly 30 applications over the past 20 years in the refining and power marketplace. It is currently being employed on a slip stream of a coal-fired power plant in Germany to capture carbon dioxide.

With the global economic downturn of 2008 came a reduction in electricity demand and a focus on the conservation of electric power in many markets. The U.S. market has weathered a three-year period where little new capacity has been brought online. Emerging nations are presenting increased needs for generation to electrify areas that have seen a shortage of power for some time. To address these needs and comply with the assumption that a diversified fuel portfolio is warranted to achieve a clean energy future while continuing to focus on grid stability, all of the aforementioned technologies need to play a vital role for a clean energy future.

Dave Dunning serves as president of Fluor's Power Group and has global responsibility for the company's engineering, procurement, construction, and operations and maintenance business in the fossil-fueled, plant betterment, nuclear generation and renewables industries.

Dunning previously served in executive sales and marketing roles at Fluor.

He earned his B.S. degree from East Stroudsburg University in Pennsylvania.

PAOLO CASINI

CONTINUED FROM PAGE 13

optimizer, can be deployed on selected modules to minimize the effects of shading, increasing the energy output of a string.

"We offer something new to Power-One customers with these two products," said Paolo Casini. "Both micro-inverters and power optimizers were designed to help our customers make the most out of installations which have to cope with difficult conditions like partial or temporary shading or significant panel mismatching."

Power-One introduced AURORA ULTRA-1400 central inverter with an output power of up to 1.4 MW's, designed for large commercial and utility-grade installations. Industry-leading power conversion efficiencies of up to 98.7 percent combined with an extra wide input voltage range and multiple MPPT channels optimize energy harvesting across a wide array of operating conditions. The rugged outdoor IP65 enclosure with passive liquid cooling is suitable for desert and other harsh environments. Since its modular structure is made of front accessible and extractible subassemblies, installation and maintenance procedures are simplified. The new product is compliant to IEEE 1547, BDEW (German Federal Association for Energy and Water) and FERC 661 (Federal Energy Regulatory Commission).

"Our modular central inverter, designed for large commercial and utility applications, increases uptime and energy harvesting through a reduction in downtime caused by the failure at the inverter level or the photovoltaic field as well as a significant reduction of the cost of BOS," said Paolo Casini. "This eliminates plant shutdown, reduces repair time and consequently offers financial benefits in terms of production."

ABOUT PAOLO CASINI

Paolo Casini has been Global Vice President of Product Marketing and Business Development Management at Power-One Renewable Energy Solutions since April 2010. He is responsible for the business development, sales and marketing strategy of Power-One's inverter products as well as the business strategy development for the Renewable Energy Division.

Paolo Casini joined Power-One in 1993 as a Electronic Design Engineer. Since then, he has held various positions and spent three years in the US as Project Coordinator. After joining the International Sales and Marketing Department, he was promoted to Marketing Director of the Renewable Energy Division in 2006.

Paolo Casini started his professional career in the R&D department at Olivetti in 1992, where he designed switching mode power supplies.

One year prior to that, Paolo Casini graduated in electronic engineering at the Università di Pisa in Pisa, Italy. The topic of his graduation thesis was on "semi-resonant power converters for small power application".

GERRY CAULEY



*President,
North American Electric Reliability Corp.*

NERC is an international, independent, not-for-profit organization, whose mission is to ensure the reliability of the bulk power system in North America. NERC was founded in 1968 by representatives of the electric utility industry, for the purpose of developing and promoting voluntary compliance with rules and protocols for the reliable operation of the bulk power electric transmission systems of North America.

NERC provides electricity to 334 million people with a total electricity demand of 830 gigawatts, has 211,000 miles of high-voltage transmission line, and represents more than \$1 trillion (US) worth of assets.

WORLD-GEN: WHAT IS NERC'S ROLE IN THE INDUSTRY?

Gerry Cauley: NERC's mission is to improve the reliability and security of the bulk power system in the United States, Canada and part of Mexico.

NERC develops and enforces Reliability Standards; monitors the bulk power system; assesses adequacy annually via a 10-year forecast and winter and summer forecasts; audits owners, operators, and users for preparedness; and educates and trains industry personnel.

WORLD-GEN: HAS NERC'S ROLE CHANGED OVER THE YEARS?

Gerry Cauley: Historically, NERC connected the various industry participants through a voluntary council. That changed with the passage of the U.S. Energy Policy Act of 2005, which called for the creation of an international "electricity reliability organization". "EPAc" marked a fundamental shift in electricity regulation in the U.S. NERC is itself now an industry participant with a much larger role in improving and maintaining reliability, including the ability to enforce compliance with mandatory Reliability Standards.

WORLD-GEN: WHAT IS NERC DOING TO ASSUME ITS NEW ROLE?

Gerry Cauley: Many aspects of NERC's traditional operations provided a

solid foundation upon which to build the new NERC. These included its governance by an independent board of trustees, an open and balanced standards development process, an effective program of monitoring and enforcing compliance with standards, technical excellence, an established ability to oversee regional reliability programs, and a philosophy of including stakeholders in regular operations and decision-making.

In its application to FERC to be named the "electricity reliability organization", NERC defined its proposed structure, governance and operational procedures. NERC also defined the respective authorities and responsibilities of NERC, the regional entities and the bulk power system owners, operators and users within the jurisdiction of NERC for reliability purposes. The application also included NERC's bylaws, rules of procedure, regional delegation agreements, and a transition plan.

WORLD-GEN: WHAT ARE THE REGIONAL ENTITIES?

Gerry Cauley: NERC works closely with eight regional reliability organizations, whose members come from all segments of the electric industry: investor-owned utilities; federal power agencies; rural electric cooperatives; state, municipal and provincial utilities; independent power producers; power marketers; and end-use customers. The Regional Entities have delegated authorities and responsibilities, as approved by FERC, to enforce NERC and regional reliability standards, and perform other standards-related functions assigned by NERC.

The Regional Entities have non-statutory roles, which include working with their own members to forecast electricity demand, coordinate operations, share information, and plan for emergencies, in their respective regions of North America.

WORLD-GEN: WHO ARE THE MEMBERS OF NERC?

Gerry Cauley: Before, eight Regional Entities were the sole members and owners of NERC. Today, membership is open to all entities with an interest in the reliability of the bulk power system.

WORLD-GEN: WHAT ROLE DO MEMBERS PLAY?

Gerry Cauley: NERC members contribute their expertise with bulk power system planning and operations in many ways, including participation in various NERC committees. (Non-members can also sit on NERC committees.) Through the Member Representatives Committee (MRC), NERC members elect the NERC Board and can amend NERC bylaws. The MRC also provides policy input to the Board.

WORLD-GEN: HOW MANY MEMBERS DOES NERC HAVE AND WHAT'S THE FEE TO JOIN?

Gerry Cauley: More than 500 and membership is free.

WORLD-GEN: WHAT IS THE DIFFERENCE BETWEEN A NERC MEMBER AND A NERC STAKEHOLDER?

Gerry Cauley: NERC members are individuals and entities that chose to join NERC so they can participate in NERC planning and operations through committees, voting privileges and the Member Representatives Committee. "Stakeholders" refers to any party that has a "stake" in what NERC does. Stakeholders include members, governments, all bulk power system participants, employees, and end-use electricity customers.

WORLD-GEN: HOW MANY STAFF DOES NERC HAVE AND WHAT ARE THEIR FUNCTIONS?

Gerry Cauley: By involving bulk power industry experts in its operations and planning, NERC is able to operate with a streamlined staff around 150. Staff members are responsible for the coordination and planning of all NERC functions, and for support functions including Legal, Human Resources, Communications and Administration.

WORLD-GEN: WHO RUNS NERC?

Gerry Cauley: NERC is governed by a Board of Trustees comprised of 10 independent Trustees and the president of NERC. Trustees have expertise in electric operations and reliability; legal, market, financial and regulatory matters; and familiarity with regional system operation issues; and they reflect geographic diversity. Trustees are independent of the industry and must commit to serve the public interest and represent the reliability concerns of the entire North American electric system. Trustees are elected by the Member Representatives Committee and serve for a term of three years.

WORLD-GEN: CAN YOU PROVIDE AN EXAMPLE OF A SHARED BUSINESS PLAN?

Gerry Cauley: Commencing in December 2011, NERC and the eight Regional Entities have been collaborating in the development of a common set of business planning goals, objectives and assumptions for the 2013-2015 period. At the February 2012 meetings of the NERC Member Representatives Committee and Board of Trustees, NERC's President and Chief Executive Officer presented a draft Strategic Plan which was jointly developed by NERC and the Regional Entities.

As part of the implementation of the

Strategic Plan, NERC and the Regional Entities develop a set of common assumptions that are used to guide resource projections over the planning period for each entity and the ERO overall, recognizing there are often unique factors that drive differences in each organization's final determination of its resource needs and budget. The specific resource needs and budget of NERC and each Regional Entity will continue to be publicly posted for review and approved in open session by NERC's Finance and Audit Committee as part of the annual business plan and budget process.

This document represents the first draft of the common business planning assumptions. Efforts have been made to focus on assumptions affecting resource requirements versus specific program area goals, objectives and actions. It will be revised taking into account the provisions of the final Strategic Plan, comments from stakeholders and the ongoing work by NERC and Regional Entity leadership regarding specific goals, objectives and deliverables over the planning period. Updates to the Strategic Plan, as well as associated goals and objectives, will be posted and made available on NERC's website, as well as through the presentation and review of the various drafts of NERC and the Regional Entity 2013 Business Plans and Budgets.

WORLD-GEN: HOW IS NERC FUNDED?

Gerry Cauley: Previously, the Regional Entities funded NERC operations. Today, the U.S. government and Canadian provincial governments have directed NERC to allocate costs to those who benefit from a reliable bulk power system: the end users. NERC allocates its operating costs and those of the Regional Entities to "load-serving entities" those owners, operators and users of the bulk power system responsible for delivering electricity to retail customers – based on how much net energy they need to meet their users' energy requirements. Funds are then collected from these load-serving entities.

ABOUT GERRY CAULEY:

Gerry W. Cauley was named President and Chief Executive Officer of the North American Electric Reliability Corporation (NERC) in November 2009 and assumed the role in January 2010.

Mr. Cauley is responsible for overseeing NERC's mission to ensure the reliability of the North American bulk power system. As President and CEO, Mr. Cauley leads programs affecting over 1900 bulk power system owners, operators, and users, including standards and training, critical infrastructure, risk analysis, compliance monitoring, enforcement, situation awareness, reliability assessment, and government relations. Mr. Cauley also oversees the operation of eight regional entities engaged in implementation of delegated responsibilities.

MARY FALLIN



Governor,
State of Oklahoma

World-Gen was invited to attend the 2011 Governor's Energy Conference where Governor Mary Fallin unveiled the Oklahoma First Energy Plan.

Her agenda is built around the belief that we must continue to improve, not replace, traditional energy sources like oil and natural gas, and that effective energy policy does not rely on federal subsidies or mandates, but instead allows the private sector to grow and flourish.

Governor Fallin is the first woman to be elected Governor of Oklahoma. She served two terms in the Oklahoma House before becoming the first woman and first Republican to be elected Lieutenant Governor of Oklahoma in 1994. In 2006, she was elected to the US Congress.

With 41,600 new jobs created last year, Oklahoma had the 3rd fastest job growth among states, the 6th lowest average unemployment rate and ranks 7th in recovery from the latest recession. Economic incentives like the Quality Jobs Program, helped bring more than 4,800 new jobs to the state. Innovative ideas emerged to further fuel the Oklahoma economy like the Governor's Energy Plan and the Governor's Economic Development Task Force.

MANUFACTURING

Oklahoma's 8.4% manufacturing job growth in 2011 ranks 1st among US states. By the end of 2011, Oklahoma gained back 50% of the manufacturing jobs lost during the latest recession, ranking the state 3rd in the industry's nationwide recovery. Since its inception by the Oklahoma legislature in 1993, the Oklahoma Quality Jobs Program has issued more than 612 contracts to locating, expanding and start-up businesses and has helped bring thousands of jobs to Oklahoma. Quality Jobs allows qualifying establishments creating new quality jobs to receive an incentive to locate or expand in Oklahoma. Administered by the Oklahoma Dept. of Commerce, the program provides quarterly cash payments of up to 5% of new taxable payroll directly to a qualifying company for up to 10 years.

From existing business expansions to

foreign direct investment, Oklahoma has made the case that it is ready and open for business. Major business announcements during 2011 brought companies from all over the world, including global brands like Boeing and Siemens. Six foreign direct investment announcements were made and expected to employ more than 450 with revenues totaling nearly \$30 million. Twelve new business announcements of nearly 1,100 jobs were made in 2011. Forty-eight Oklahoma businesses announced expansions of more than 6,600 jobs during the past year.

UNEMPLOYMENT

Oklahoma's unemployment rate for November 2011 was 6.1%. 0.8 percentage points less than the same time in 2010. Oklahoma's average unemployment rate for 2011 was 5.9% with the 6th lowest average unemployment rate.

Governor Fallin's focus on job growth led to legislative victories significantly improving Oklahoma's business climate. These victories included landmark lawsuit reform legislation, comprehensive workers' compensation reform, the cre-

ation of a governor's closing fund to attract businesses to the state, a one stop shop for business licensing and permits.

Governor Fallin supports the construction of the Keystone XL Pipeline. The pipeline represents an investment that could result in \$1.2 billion in increased business activity in Oklahoma.

Her support of safe hydraulic fracturing is unwavering. Fracking is an essential process to the future of Oklahoma's energy industry.

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CHARLES DAUBER



President & CEO
American Electric Technologies, Inc. (AETI)

AMERICAN ELECTRIC TECHNOLOGIES, INC.

American Electric Technologies, Inc. is a leading global provider of power delivery solutions to the traditional and renewable energy industries. The company has delivered high-performance electrical products, construction and services to the oil and gas and power generation markets for more than 65 years.

AETI's power delivery solutions include ISIS™, the solar industry's first 1 MW 1000 Volt UL 1741-tested solar inverter system, 40KV wind farm switchgear, M&I® power distribution and generator control switchgear, AC and DC variable speed drives, power control rooms, and power management systems. AETI's equipment is certified by the highest domestic and international regulatory standards. The company also provides project management, electrical construction services, and substation electrical services and turnkey packages for our customers.

WORLD-GEN: WHERE IS AETI PLACING ITS STRATEGIC FOCUS IN 2012?

Charles Dauber: There are three key growing energy markets AETI is targeting for our products and turnkey solutions in 2012:

NORTH AMERICAN SHALE PLAYS

AETI's strong history in creating power systems for drilling rigs perfectly positions us in the shale gas and oil exploration market. As a result, our company has realized increased market share for power drilling systems and currently serves many of the top drilling contractors in North America. We see many more opportunities in the future for additional growth in this area. We are also re-doubling our focus on the pipeline market, specifically pipeline compression stations. Once the shale gas or oil has been located, it needs to be converted to electricity, locally, or transported to where it can be utilized. Thus, our power systems are used to power the turbines that compress the gas for transportation down the pipeline to the next station approximately 100 miles away.

GLOBAL ENERGY

One of our corporate missions is to help global energy companies meet their energy demands locally. We have a joint venture operation in China with BOMCO, a division of China National Petroleum Company, which makes the power systems for 90 percent of China's land drilling rigs. AETI has a new operation in Brazil focused on the pre-salt plays where Petrobras is estimated to spend over \$200 billion in the next several years on offshore drilling,

drillships, and offshore production platforms that use the type of power systems AETI makes in our other global markets. It turns out many of our U.S. customers were looking for trusted supplier in Brazil, so we are duplicating our successful U.S. operations in Brazil and using local content and in-country relationships to take advantage of the giant market opportunity there.

UTILITY-SCALE SOLAR

AETI has been in the utility-scale power generation market years. We believe

the best way for renewable energy applications, such as solar power, to achieve what the industry calls "grid parity" with traditional power generation is when utility companies enter the large project scale solar power generation business.

Those businesses know how to truly get up-front costs and operating costs down from their power generating assets.

(continued page 22)

FIELD REPORT

Topic	Project Delivery
Location	China

We are building the EPR™ reactor fleet. Together.

On October 23, the Taishan 1 EPR™ reactor reached a major milestone with the successful dome lifting. This reactor is currently built in China by TNPJVC, a joint venture between China Guangdong Nuclear Power Holding Corporation (CGNPC) and Électricité de France (EDF) for which AREVA is leading the supply for Nuclear Island, Engineering and Procurement. The erection of the dome required several months of preparatory work inside the reactor building, including an 8.3-meter wide heavy equipment hatch created through the inner wall for upcoming heavy component installation as well as installation of the polar crane.

With four EPR™ projects under construction in the world, AREVA has unrivalled experience in the delivery of large-scale nuclear projects, including more than a thousand lessons learned captured from Olkiluoto 3 and Flamanville 3 projects. This book of knowledge as well as the return on experience of AREVA's and EDF's teams are now being fully leveraged on ongoing projects, especially on Flamanville 3 and Taishan, and will be incorporated in all future EPR™ projects.

Find out how utilities are benefiting from series effect for their new build projects thanks to AREVA's leveraged project expertise, fully operational worldwide supply chain and proven ability to build.

Find out why: www.aveva.com/fieldreport

AREVA
forward-looking energy

BRIAN HUEY



*Business Development and Strategy—
Smart Grid and Utilities
SPRINT*

Electric and water utilities are changing the way they operate, investing in automation and wireless communications to make their distribution and management systems smarter. Sprint is playing a key role by providing the wireless infrastructure and collaborating with innovative companies that specialize in enhancing reliability, optimizing service delivery and improving efficiency.

“The energy industry is in a transformational state,” said Brian Huey, Smart Grid and Utilities business development and strategy manager, Sprint. “There is unprecedented convergence of new communications technologies to enable key enterprise applications, the need for greater operational excellence, focus on cost containment, as well as meeting ever-increasing regulatory demands. Although the traditional model of a vertically integrated utility still exists, utility executives must partner with third party application and service providers, diversification of energy supply (base, peak, and renewable), enabling the consumer in making smart energy decisions, and the eminent challenges of supporting electric vehicle transportation in the future. Whether public or private, utility priorities will likely remain the same ... safety, operational excellence and superior customer service, regulatory compliance, however, new enabling technologies for the connected worker and digital utility-of-the-future will be ever present. Lastly, wireless companies and electric utilities, share a symbiotic relationship, which in turn, drives greater collaboration and partnership.”

Sprint collaborates with companies to embed wireless technology into solutions that automate meters and monitor distribution lines so that utilities can be more efficient. In January, Sprint announced agreements with Itron, Inc; Lanner Electronics, Inc.; Power Insight and Silver Spring Networks where these companies will offer Sprint wireless network connectivity in support of their automated products and services. In September 2011, Sprint announced agreements with SmartLabs and Proliphix to make energy management systems available to businesses and consumers.

PUBLIC AND PRIVATE NETWORKS

A debate has been raging for years over whether utilities should continue to invest in privately owned wireless networks or work with a public carrier for their smart grid communications needs. The industry is beginning to recognize the advantages of public wireless networks and how to incorporate them into their communications mix. Utilities are working with Sprint to better understand how they can use the latest network technology and benefit from Sprint’s Network Vision deployment. By working with Sprint, utilities reduce the risks of operating a private network, such as network obsolescence and stranded asset deployment. Sprint and Qualcomm hosted a webinar on the role of Public Cellular in meeting a Utility’s Communication needs. “Sprint and wireless companies can compete effectively with private network options by leveraging the established wireless network, entering into technology commitment agreements and utilizing the declining costs of cellular in utility centric devices”, said Huey. The Nationwide Sprint Network and Sprint 3G network use inherently secure CDMA technology. Sprint offers scalable and flexible network solutions for utilities and application developers in support of Advanced Meter Reading, Distribution Automation, SCADA (supervisory control and data acquisition) and Demand Response.

SPRINT’S SUSTAINABILITY PROGRAM

The announcement today aligns with Sprint’s larger sustainability efforts to reduce its carbon footprint, use renewable energy, create less waste, and sell greener mobile devices. Sprint Buyback gives Sprint customers an instant credit of up to \$275 to return their old or unused mobile devices so that Sprint can responsibly reuse or recycle them. The program was recently named the best buyback program in the industry by Compass Intelligence.

Sprint’s industry-leading role in corporate responsibility and environmental sustainability continues to receive recognition. For the third year in a row, Sprint ranked highest among all U.S. telecom companies on Newsweek’s 2011 Rankings of America’s Greenest Companies at No. 3, up from No. 6 in 2010. Sprint was also ranked highest among the wireless carrier industry on the 2011 Dow Jones Sustainability Index North America. The DJSI North America is based on a rigorous analysis of corporate, economic, environmental and social performance. The index tracks the performance of the top 20 percent of the 600 biggest North American companies in the Dow Jones Global Total Stock Market Index that lead the field in terms of sustainability.

SPRINT EMERGING SOLUTIONS GROUP

“Sprint has a dedicated team to work with utilities to develop smart grid solutions,” said Huey. “To date, Sprint has cer-

tified hundreds of M2M solutions and has millions of devices running on its network today.” With more than a dozen years of experience with M2M, Sprint has been at the forefront of this wireless industry revolution, teaming with and supporting a large and diverse portfolio of innovative companies to create smarter wireless solutions that change the way people work and live. In 2010 Sprint opened the Sprint M2M Collaboration Center in Burlingame, Calif., a hands-on, interactive lab where ideas knowledge and technology unite to produce wirelessly enabled M2M concepts and products. Last year Sprint also introduced the Sprint Command Center, a Web-based portal that allows businesses with Sprint wireless-connected products the ability to manage, activate and de-activate each device.

ABOUT SPRINT

Sprint Nextel served more than 55 million customers at the end of 2011 and is widely recognized for developing, engineering and deploying innovative technologies, including the first wireless 4G service from a national carrier in the United States; offering industry-leading mobile data services, leading prepaid brands including Virgin Mobile USA, Boost Mobile, and Assurance Wireless; instant national and international push-to-talk capabilities; and a global Tier 1 Internet backbone. Newsweek ranked Sprint No. 3 in its 2011 Green Rankings, listing it as one of the nation’s greenest companies, the highest of any telecommunications company.

ABOUT BRIAN HUEY

Brian manages partnerships and ecosystem development in the Smart Grid and electric utilities. He’s a recognized speaker in the wireless enablement of Smart Grid and Energy Management, the industry implications and growth opportunities. His partnerships deliver wireless enablement of AMI, Demand Response, Distribution Automation, energy management applications, micro grid generation and EV Charging. He continues to advance grid intelligence by building connectivity into substation components, in-premise energy controls and is planning for the impact of EV charging on the grid. Brian brings a unique perspective of applying, pulling knowledge from the telecom industry and to discern the opportunities and challenges in Smart Grid. With 16 years of experience in telecommunications spanning wireless and wireline services, Brian has held various roles encompassing strategic planning, product development, ecommerce, sales and engineering. He is recognized as an individual who can bridge complex topics and challenges with real-world business models. He holds an accredited Executive MBA from the University of Missouri, Kansas City and a BSEE from the University of Nevada, Las Vegas.

CHARLES DAUBER

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WORLD-GEN: HOW IS AETI GROWING ITS PRESENCE IN BRAZIL?

Charles Dauber: AETI has had business relationships in Brazil for years. In 2009, we established a joint venture with Five Star Services of Macae to form AETI Brazil. The business launched in 2010 and we established not only our manufacturing, construction and services groups, but have also successfully delivered projects for multiple large multinational drilling contractors operating in Brazil, most of whom we have existing relationships with back in the U.S. or in other international markets. We expect to continue our growth strategy in Brazil and are complementing the country’s labor force by relocating U.S. experts for both the short-term and permanent timeframes. We are excited to bring our years of drilling and offshore experience to Brazil which will help enable their oil and gas market to meet its full potential safely and cost-effectively.

WORLD-GEN: LOOKING FORWARD, WHERE DO YOU SEE AETI IN 10 YEARS? WHAT DO YOU WANT FOR THE COMPANY’S FUTURE?

Charles Dauber: We believe that the global demand for energy will continue to grow, and that no single energy source will be able to satisfy the energy demands for transportation and power generation. Our sole focus on what we call “Empowering Energy” drives our continued focus on enabling safe, reliable energy via our innovative power delivery solutions. We expect to continue our significant domestic growth opportunities and will accelerate that growth with additional international energy solutions and market support. In our lifetime there are few markets more exciting than the energy market and we consider AETI blessed to be in such a strong position for this critical industry.

ABOUT CHARLES DAUBER:

Charles Dauber is AETI’s President and Chief Executive Officer. He joined the executive team of the Houston, TX-based company in April 2007 and was named president and chief executive officer in October 2009.

Prior to joining AETI, he served as the president and CEO of Nevis Networks, a venture capital-backed start-up company in Silicon Valley and held multiple executive roles at Blue Coat Systems including vice president of marketing and product management. Dauber previously was the CEO of a broadband services start-up and served in management roles with Copper Mountain Networks and Teradyne in the U.S. and in Asia Pacific, where he lived for several years. He earned a bachelor of business administration with concentrations in electrical engineering and marketing from The University of Texas at Austin.

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