

STOP DIVIDEND TAX HIKE

BY DAVID OWENS, EXECUTIVE VICE PRESIDENT,
EDISON ELECTRIC INSTITUTE



The electric utility industry, known for its history of paying a strong dividend, is working alongside a wide variety of associations, organizations, and companies in a national grassroots advocacy coalition—Defend My Dividend (www.DefendMyDividend.org)—to stop a dividend tax hike. We encourage you to join.

Current tax rates on dividend income and long-term capital gains, which now are capped at 15 percent, are set to expire on December 31. The tax rates were temporarily reduced in 2003, when Congress passed the Jobs and Growth Tax Reconciliation Act.

The maximum tax rate on dividend income was cut from almost 40 percent to 15 percent, and taxpayers in the 10- and 15-percent tax brackets had their tax rates on dividend income lowered to zero. The 2003 law also cut the maximum tax rate on capital gains from 20 percent to 15 percent. The tax rates were extended in 2006 and again in 2010.

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HOME SMART ENERGY NETWORKS

BY ANNABELLE LEE, CYBER SECURITY,
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New smart grid technologies provide two-way communications between consumers' premises and utility companies' back-end systems. These new technologies enable both the consumers and the utility companies to work together to better manage household energy consumption. Advanced metering infrastructure (AMI) systems that include home area networks (HANs) are some of these new technologies that are being deployed by utilities.

AMI systems extend current smart meter technology by allowing utilities to send and receive information and commands to/from the home for multiple purposes, including time-of-use pricing information and demand response actions. During peak demand periods, HANs connect a consumer's digital devices, such as computers, televisions, home securi-

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WESTINGHOUSE AP1000 RECEIVES Final Design Certification.



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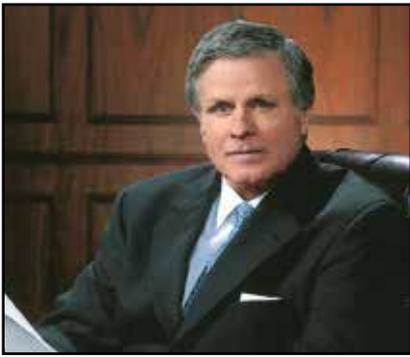
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David Owens of EEI invites us to join a national grassroots advocacy coalition to stop a dividend tax hike on page 1. If current tax rates on dividend income expire on December 31, the tax rate will skyrocket from 15% to as high as 43%. Electric utilities paid out nearly 60% of their earnings in dividends last year. The website to visit is www.DefendMyDividend.org.

Home Area Networks or HANs are vulnerable to cyber attacks, Annabelle Lee writes from EPRI smart grid technology, including smart meters, HANs, and intelligent appliances, securing the communications among the various devices and with a utility is critical.

We're getting a better idea now about which mega-size utility-scale solar projects will get built, Lyn Corum tells us on page 13 in California News. Of the 10 projects totaling over 4,000 MW which filed applications at the California Energy Commission, all were approved for construction. Looking out over the landscape between now and 2020, there appears to be a need requiring additional procurement starting soon. The ISO has preliminarily identified an incremental need of 2,000 MW of new resources in the Los Angeles basin.

Dennis McLaughlin, Class of 2002, shares on page 14 that while policy makers, campaigners and businesses are expected to stretch the truth to put the best light on their agendas, there are a number of irrefutable geological and engineering facts which will be shaping the future of the energy industry for years to come. And that future appears to include an even bigger role for fossil fuels, particularly natural gas. The long-term outlook for the U.S. natural gas industry remains bright concludes the Deloitte's M&A Yearend 2011 Report. Investors are still snapping up unconventional E&P plays, and countries around the world are using U.S. technology to tap their shale oil and gas reserves.

Ball State University had to replace its four coal fired boilers to meet new boiler MACT EPA regulations by March of 2014. Brooke Carrillo says on page 15 that the university received \$45 million from the State of Indiana to fund a geothermal project, to be completed by early 2014. Over 30 US universities have visited the 730 acre campus to learn about the ground-sourced, closed loop technology.

Dan Potash returns to update energy storage on pages 16 and 17. Due to the increasing market penetration of intermittent generation like solar and wind, there is more impetus to develop retail-scale, and utility-scale, energy storage. Energy storage is a hot venture capital destination; in the third quarter of 2011, \$421 million of venture capital went into energy storage out of \$1.1 billion going to clean energy, according to Dow Jones Venture Source.

The market for energy storage applications is north of \$100 billion, for the U.S. over a ten-year time frame, according to a report by Sandia Labs. Wholesale energy storage may not yet be economically viable without subsidies such as a federal tax credit and storage portfolio standards. Under prevailing conditions, and probably for a long time to come, it would be more economical to build a gas-fired power plant instead of storage. Retail is a more interesting storage market than wholesale.

The prospects for passing a federal Clean Energy Standard (CES) or Renewable Energy Standard (RES) in the near term remain extremely low given the current political climate and upcoming election cycle, Brett Blankenship of Wood Mackenzie projects on page 18. If promotion of renewables is desired, political capital is better spent on extending the PTC, which will have a more immediate and tangible impact on renewable energy development. The combination of the declining natural gas prices, environmental policy initiatives and renewable energy policy and incentives indicates that future generating capacity additions will primarily be qualifying clean gas-fired and renewable generators.

Global market uncertainty continued in 2011, resulting in an uneven level of mergers and acquisitions activity in North America and internationally. In these challenging economic times, two things are increasingly important to M&A players: innovation and deal certainty. Torys' M&A lawyers are looking ahead to 2012 and this is what they see in five categories: co-investments; spin offs; government priorities; enforcement and reverse break fees. Torys has offices in New York, Toronto and Calgary.

Business Wire, a Berkshire Hathaway Company, renewed its license agreement with World-Gen to continue providing 24/7 news on www.world-gen.com. PR News also renewed. We are also pleased to announce our advertising renewals are running at nearly 100% for 2012 and we have welcomed new accounts. Advertisers receive a linked banner ad.

(continued page 12)

HITACHI AWARDED

BASKING RIDGE, NJ - Hitachi Power Systems America has been awarded a contract with La Cygne Environmental Partners. La Cygne is a Joint Venture of Kiewit Power Constructors Co. and Sargent & Lundy, to supply air pollution controls equipment for KCP&L.

EMERSON CONTRACTED

MARSHALLTOWN, IO – Westinghouse Electric awarded Emerson Process Management a contract to provide critical control valves to be used in two AP1000® pressurized water reactors at the Alvin W. Vogtle Plant in Georgia. Vogtle units 3 and 4 will be the first new nuclear reactors built in the U.S. in 25 years.

SOLECTRIA ACQUIRES

LAWRENCE, MA - Solectria Renewables, LLC acquired New Power Labs, Inc. New Power Labs, a Massachusetts-based Company, designs and develops string level monitoring products for commercial and utility-scale photovoltaic (PV) arrays.

REPORT TAKES AIM

NEW YORK, NY - Estimates of jobs gained or lost due to environmental regulations require much closer scrutiny than they're given. Very often these claims are made dramatically out of context, based on economic analyses that may not have been meant to support them. These are the main findings of a report released by the Institute for Policy Integrity.

The study discusses how cost-benefit analysis can evaluate the effect of environmental regulation on layoffs and hiring, and criticizes the tendency for jobs impact models to be used in ways that are not helpful in debates over environmental protections. It finds that too often, model results are cited without calling adequate attention to their limitations and assumptions. Different modeling choices can lead to drastically different conclusions.

"Because these models are so sensitive, their results must be communicated properly," said Michael Livermore, Policy Integrity's executive director and lead author of the report. "They do not lend themselves to the kinds of sweeping rhetorical statements you often hear in the political arena. Many times, claims about jobs and regulation find their way into a faulty conventional wisdom far removed from the evidence these analyses provide."

While environmental regulation can lead to layoffs or hiring in specific regions or sectors, in a dynamic economy like America's, the overall effect is difficult to capture. For any particular environmental regulation, these offsetting effects are ambiguous and hard to predict.

To better inform policymaking, model limitations and uncertainty should be acknowledged, and the impacts of regulation on employment must then be weighed against all the other costs and benefits of a rule.

"The effect of a regulation on jobs is important, especially in a downturned economy," said Livermore. "But those effects are likely much smaller than you might think by tuning into the political debate. Rather than staking the utility of a policy solely on this one element, basic economic principles would call for a more holistic view of regulation."

The Institute for Policy Integrity at New York University School of Law is a non-partisan think-tank using economics and law to protect the environment, public health, and consumers.

SEMINOLE FUNDS

BELLEAIR BLUFFS, FL – Seminole Financial Services announced the funding of a construction loan to SunStream Somerset Valley to install solar panel arrays at three YMCA locations in Somerset County, New Jersey. All installations are expected to be completed and placed in service by summer, 2012 under a 15-year power purchase agreement.



SIEMENS

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GE JOINS JP MORGAN

SAN ANGELO, TX - GE Energy Financial Services has joined JP Morgan to jointly invest \$225 million in a partnership that owns the 662.5-megawatt Capricorn Ridge wind farm. A subsidiary of NextEra Energy Resources, LLC remains the majority owner and operator of the project. The wind farm has 342 of GE Energy's 1.5-megawatt machines and 65 of Siemens' 2.3-megawatt machines.

WESTINGHOUSE AWARDED

PITTSBURGH, PA - Westinghouse has been awarded a contract to apply the Underwater Laser Beam Welding process at Progress Energy's Robinson Nuclear Plant in Hartsville, S.C. This will be the first application of the ULBW process, which has been applied previously in Japan, at a U.S. nuclear plant.

ACSI PROJECTS

The American Customer Satisfaction Index (ACSI) released its annual customer satisfaction report on the energy utility industry, based on more than 9,000 surveys collected in the first quarter of 2012. Mild weather this winter has contributed to an uptick in satisfaction with these companies.

Customer satisfaction with energy utilities is continuing its six-year upward

trend and is up 3% to an all-time high score of 76.7. Lower natural gas prices and a mild winter led to overall lower utility bills, which contributes to the high satisfaction scores.

Of the three different categories of utilities included in the ACSI report, cooperatives lead in satisfaction (-1% to 81), followed closely by investor-owned utilities (+3%) and municipal utilities (+4%) who tie at 76.

Pepco, who suffered from a 23% drop last year, has regained its footing and is up 28% to 69.

INDECK DELIVERS

ERIE, PA - Indeck Keystone Energy's technology center has completed the custom engineering and manufacture of one of the largest shop-assembled boilers in the United States. Indeck Keystone Energy delivered the boiler weighing nearly 1,000,000 pounds requiring land and sea movement to the client in the Midwest.

Chris Petcos, Chief Operating Officer said, "Indeck Keystone Energy was selected because of our past history with large custom designed specialty boilers, project management expertise, schedule compliance, competitive price and ability to offer shop assembly of the boiler module."

NRG INVESTS

PRINCETON, NJ - The California Public Utilities Commission entered into an agreement where NRG will build a comprehensive electric vehicle (EV) charging network in California. The investment is approximately \$100 million over the next four years. This fee-based charging network will consist of at least 200 publicly available fast-charging stations.

URS, SCIENTECH TEAM

SAN FRANCISCO, CA - URS Corporation and Scientech, a business unit of Curtiss-Wright Flow Control Company, have reached an agreement to jointly provide seismic, external flood and other external hazard evaluation and PRA (Probabilistic Risk Assessment) services to the U.S. nuclear power sector. The URS/Scientech team can provide utilities with quality solutions to emerging needs and requirements.

SAFT SELECTED

COCKEYSVILLE, MD - Saft announced that its advanced Li-ion energy storage system will support the technology development phase of the U.S. Army's Ground Combat Vehicle (GCV) program. Saft has entered into an agreement to design and build ultra high-power batteries for the vehicle's hybrid electric drive system. The technology development phase of the GCV program is a 24-month program.

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This year, Northeast Utilities suffers a large decline (-21% to 59). The large decline is a result of service delays after outages caused by severe storms.

A few of the highlights include: Sempra Energy and Atmos Energy lead the industry in satisfaction, while Northeast Utilities, Pepco, and PG&E are at the bottom of the industry.

Satisfaction with natural gas is up this year, contributing strongly to an overall industry increase.

MERCOM ON WIND

AUSTIN, TX - Mercom Capital Group released its report on funding and merger and acquisition activity for the wind energy sector for the first quarter of 2012.

Venture capital (VC) funding in the first quarter came in strong with \$240 million going into a record number of 12 deals, compared to just \$12 million going into two deals last quarter. Top VC deals in

the first quarter included a \$183 million raise by Element Power, a global project developer, and a \$20.2 million raise by ReGen Powertech, a turnkey solution provider and wind turbine manufacturer. Other top transactions included an \$18.6 million raise by project developer Leap Green Energy, a \$10 million raise by Apex Wind Energy, a developer of commercial scale wind facilities, and a \$3.5 million raise by Pentalum, a developer of Wind LiDAR for remote wind sensing.

The first quarter marked the stron-

gest M&A activity for the wind sector, in terms of transactions, since Q1 2010 with \$872 million in 11 transactions. As a technology group, wind downstream companies had the most deals with four followed by manufacturers, wind components, service providers and BOS companies.

The top M&A deals were the \$850 million acquisition of Seajacks International, a UK-based offshore Wind Power Service provider, by Marubeni Corporation and Innovation Network Corporation of Japan, the \$12 million acquisition of Fuji Heavy Industries' Wind Turbine Generator Business by Hitachi, and the \$10.2 million acquisition of a 49.9 percent stake in OWEC Tower, an offshore wind turbine foundation designer by KV Ventus.



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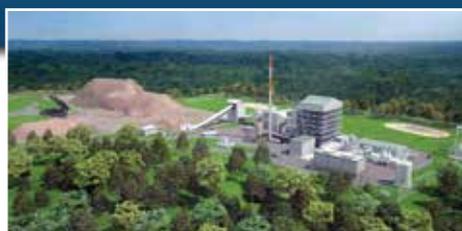
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- Detailed Design Now for a 1.2 MGD Industrial Wastewater Desalination Plant
- Completed Design and Startup of a 300 MW Combined Cycle Repowering Project
- Completed Design and Startup of a Concentrating Solar Thermal Power Tower Project
- Owner's Engineer Now for a 4 x LM6000 Simple Cycle Power Plant
- Various Power Plant Service Projects

Some of Our Management Team



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Lou Gonzales
President / COO



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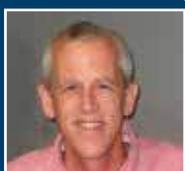
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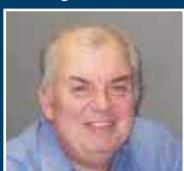
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MERCOM ON SOLAR

AUSTIN, TX - Mercom Capital Group released its report on funding and mergers and acquisition activity for the solar sector during the first quarter of 2012.

Venture Capital funding in the solar sector was off to a slow start in Q1 2012. VC funding for the quarter came to \$329 million in 34 deals, the lowest dollar amount recorded since Q4 2010; however, VC investors were still very active in the sector with a record 34 deals funded, the highest ever recorded in the solar industry.

"While VC's interest in the solar sector remains strong, their appetite for risk appears to be lower as the average VC funding round amount in Q1 was \$10 million, compared to \$18 million in 2011," said Raj Prabhu, Managing Partner at Mercom Capital Group.

"To add to the current over capacity problems, policy changes and lower tariff announcements in some of the largest solar markets, such as Germany and Italy, will all contribute to an uncertain 2012," Prabhu continued. "We can expect a more cautious approach to investing in the solar sector this year."

There was strong M&A activity in the solar sector totaling \$5 billion in 15 transactions, however only four of these transactions disclosed details. The spike in M&A amounts was mainly due to the \$4.7 billion acquisition of Solutia, a performance and specialty chemicals company with products in PV encapsulants, performance films for PV and CSP products and heat transfer fluids for CSP plants, by Eastman Chemicals Company. Other significant M&A transactions included the \$275 million acquisition of Oerlikon Solar, a producer of equipment and turnkey manufacturing lines for thin film amorphous silicon and tandem junction technology, by Tokyo Electron, and Andrem Power's \$274 million acquisition of 3W Power (a holding company of AEG Power Solutions), a provider of power controller for polysilicon production, solar inverters and monitoring and control systems for photovoltaic power plants.

The first quarter of 2012 also saw 11 new cleantech and solar-focused

investment funds announced committing \$5.7 billion. A significant positive event for the solar sector in Q1 was the Initial Public Offering (IPO) of the microinverter company Enphase Energy, which raised \$62 million as part of its offering.

The top five funding deals made up about 60 percent of the total funding in this quarter, led by \$81 million by SolarCity, a pioneer in the solar lease model. Three of the five top companies to receive funding also included MiaSolé, Nanosolar and AQT Solar, all CIGS companies, raising \$94 million in total. Maintaining last year's trend, with half a billion dollars raised in 2011, CIGS companies continued to receive the most amount of VC funding as a technology group.

There were 56 different VC investors that participated in the 34 deals. Venture capital firms that recorded multiple rounds included Black Coral Capital and Firelake Capital Management. The United States continued to be the dominant country for VC investments, accounting for about 80 percent of all VC funding in the first quarter.

SMR FUNDED

JEFFERSON CITY, MO - Westinghouse Electric Company and Ameren Missouri have entered into an agreement to respond collaboratively to the United States Department of Energy (DOE) Funding Opportunity Announcement for developing and licensing the Westinghouse Small Modular Reactor (SMR).

Under the terms of the agreement, Ameren Missouri will become part of and co-chair a Westinghouse-led Utility Participation Group (UPG) made up of Missouri utilities, non-Missouri utilities and industrial firms interested in seeking the DOE funds to develop and license the Westinghouse SMR technology.

Upon securing DOE support, Westinghouse and Ameren Missouri will then work collectively to seek Design Certification of the Westinghouse SMR and a combined construction and operating license with the U.S. NRC for the Westinghouse SMR at Ameren Missouri's Callaway site.

SIEMENS SIGNED

ORLANDO, FL - Siemens Energy has received an onshore wind order in the U.S. following successful completion of its 593.4-megawatt wind projects in Iowa in 2011. MidAmerican Energy is again partnering with Siemens on its 407.1-megawatt wind project expansion in 2012.

Siemens will provide SWT-2.3-108 wind turbines for MidAmerican Energy's recently announced 103.5-MW Vienna wind project; the 200.1-megawatt Eclipse wind project; and the 101.2-megawatt Morning Light wind project. The contract includes a five-year maintenance and warranty agreement.

CPGS INSTALLS

PEORIA, IL - Caterpillar Inc. announced that SMMPA signed an agreement to purchase four G16CM34 natural gas fired generator sets to replace an oil and gas-fired steam plant located in Fairmont, Minnesota. The new Cat® medium speed reciprocating engines will work in conjunction with SMMPA's existing 12 MW of dual-fuel reciprocating engines.

SOLARWORLD INKED

HILLSBORO, OR - The Space and Naval Warfare Systems Command (SPAWAR) complex now hosts 1.3 megawatts of solar panels from SolarWorld.

"For many years, the Department of Defense has been on the leading edge of the federal government's efforts to tap solar technology to reduce energy consumption, promote sustainability and

lower the cost of doing business," said Kevin Kilkelly, president of SolarWorld Americas.

The US Coast Guard has used SolarWorld panels to power tens of thousands of navigational buoys.

SolarWorld solar panels have powered installations at the naval base at Pearl Harbor, the Marine Corps Air Ground Combat Center in California, Buckley Air Force Base in Colorado, and Apra Harbor Naval Base in Guam.

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GE WIND SELECTED

SCHENECTADY, NY - GE will supply 31 of its 1.6-100 wind turbines and 18 of its 2.75-103 wind turbines for the Dufferin Wind Farm, located in Ontario's Melancthon County. The wind farm is being developed by Longyuan Canada Renewables Ltd., a subsidiary of China Long Yuan Power Generation (CLYPG), China's largest wind power developer.

URS TO EPC

SAN FRANCISCO, CA - URS Corporation has been awarded a contract by DTE Energy to provide engineering, procurement and construction services for the installation of a selective catalytic reduction system at its Monroe Power.

The Monroe Power Plant is the fourth largest coal-fired plant in the country.

FLUOR SOLARS

IRVING, TX - Fluor Corporation was awarded a lump-sum engineering, procurement and construction (EPC) contract, as well as a separate contract for ongoing operations and maintenance services for Arlington Valley Solar Energy II, located in Arizona.

"This significant new win for Fluor positions the company as a leader in the

solar power engineering and construction industry," said Dave Dunning, president of Fluor's Power Group. Dunning is a member of the Class of 2012.

STARWOOD EXPANDS

GREENWICH, CT - Starwood Energy acquired a partial ownership interest in the Gainesville Renewable Energy Center from Tyr Energy, Inc. GREC is a 100 MW biomass power plant currently under construction in Gainesville, Florida.

GREC will sell energy, capacity and environmental attributes to the City of Gainesville under a 30 year power purchase agreement.

PIC PROVIDES

ATLANTA, GA - PIC Group has entered into a service agreement with Tonopah Solar Energy LLC, an affiliate of SolarReserve, LLC, to operate and maintain the 110 megawatt Crescent Dunes Solar Energy project currently under construction near Tonopah, Nevada.

The Crescent Dunes Solar Energy Plant will utilize advanced molten-salt solar power tower technology with integrated energy storage to generate clean, reliable and dispatchable solar power on demand - day or night. The Crescent Dunes plant is the first commercial application of this type of technology in the US, and will be the largest facility of its kind in the world.

B & W REALIGNS

CHARLOTTE, NC - The Babcock & Wilcox Company is realigning its commercial nuclear business in response to changing market conditions, growth opportunities and the continuing progress of its small modular reactor (SMR) business.

Babcock & Wilcox Nuclear Energy will comprise all non-SMR commercial nuclear operations. Michael D. Lees is named President of the organization. Lees will also continue to serve as President of Babcock & Wilcox Canada Ltd. headquartered in Cambridge, Ontario.

Babcock & Wilcox Modular Nuclear Energy, Inc. will comprise all operations that relate to the research, development and deployment of B&W's SMR initiative using B&W mPower™ technology. Christofer M. Mowry is named President of B&W MNE. B&W's majority-owned subsidiary, Generation mPower LLC, will report into B&W MNE.

Both Lees and Mowry will report directly to Mary Pat Salomone, Senior Vice President and Chief Operating Officer of B&W.

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PIC EXPANDS

ATLANTA, GA - PIC Group has entered into a full care, custody and control Operations and Maintenance agreement with Oneida Energy for a new biomass gasification project located in Green Bay, Wisconsin.

The waste-to-energy power plant will convert municipal solid waste into electricity using a pyrolysis gasification process. The electricity will be sold to Wisconsin Public Service and will power 3,000 to 4,000 homes.

PIC has signed an exclusive seven year agreement with Oneida Energy to provide O&M services for Oneida Energy's future biomass gasification projects that will utilize the same technology as the Green Bay facility. Oneida Seven Generations Corporation is a tribally and state-chartered corporation organized under the laws of the State of Wisconsin and authorized by the Oneida Tribe of Indians of Wisconsin.

GREEN JET FUEL

DES PLAINES, IL - UOP LLC, a Honeywell company, announced that Honeywell Green Jet Fuel™ will be used for the world's first comprehensive test program using a new biofeedstock specifically designed for biofuel production.

The test flights, to be done in Canada with the National Research Council of Canada and Agrisoma Biosciences Inc., will also feature in-flight collection of emissions by a trailing aircraft, allowing for later evaluation of the Green Jet Fuel's emissions performance. "This is a unique program of test flights, given that we are using a new feedstock to produce the Honeywell Green Jet Fuel, and it will be used in higher ratio than before," said Jim Rekoske, vice president and general manager of the Honeywell UOP's Renewable Energy and Chemicals business unit. "Additionally, the collection of in-flight emission will allow for further verification of the superior environmental performance of Honeywell Green Jet Fuel."

SOLARWORLD INKED

HILLSBORO, OR - Planners of Oregon's transportation infrastructure are charting a course to a cleaner energy future by selecting SolarWorld solar panels to support their multi-modal services. With unobstructed rights-of-way and heavy energy use, transportation agencies are ideal hosts of photovoltaic systems and consumers of the renewable electricity they produce.

Transportation industry officials in 13 countries and 27 states have requested information on a large solar park built on Oregon's Department of Transportation property.

VOGT TO SUPPLY

LOUISVILLE, KY - Vogt Power International has received an order from Siemens AG to supply Heat Recovery Steam Generators (HRSG's) and associated equipment for the Lakeside 2 electric generating facility located in Vineyard, Utah.

Vogt Power will design and deliver two HRSG's with reheat for use behind Siemens SGT6-5000F gas turbines.

WHITE SELECTED

LASALLE COUNTY, IL - White Construction Inc. has been selected by Invenergy to be the EPC contractor for its 20 megawatt Grand Ridge Solar Farm.

"White Construction has installed over 60 megawatts of utility scale solar throughout the United States and Canada," said J.P. Roehm, Senior Vice President of Business Development for White Construction.

CORRECTION

The photo caption for Toby Seay in the Class of 2012 should have read:

President,
Communications & Transmission
Global Business Unit
Bechtel

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www.coal-gen.com

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ALGERIA

Pratt & Whitney Power Systems (PWPS) announced a contract with Compagnie de l'Engineering de l'Electricite et du Gaz (CEEG), a subsidiary of Sonelgaz, to supply eighteen FT8® MOBILEPAC® self-contained gas turbine-powered electric generating units.

BRAZIL

Wärtsilä has signed a 3 year Operation & Maintenance (O&M) agreement with Energética Suape II SA. The O&M agreement is for the 380 MW Suape II power plant, which is equipped with seventeen 20-cylinder Wärtsilä 46F engines.

CANADA

The Canadian Wind Energy Association is pleased that the Ontario Government's review of the Feed-in-Tariff (FIT) program has made a commitment to procure all the energy required to meet its renewable energy targets by 2015.

CANADA

Westinghouse Electric Company announced the formation of Westinghouse Electric Canada, Inc. to better serve its Canadian customers, strengthen its ties with Canadian suppliers, and align itself more appropriately with the regulations and requirements in Canada to meet growing business opportunities there.

The headquarters will be located in Toronto, Ontario.

CHINA

Emerson has installed its Ovation™ expert control system at two new 1,000-MW, ultra-supercritical, coal-fired power-generating units at the Huaneng Qinbei power plant in Henan Province. The Huaneng Qinbei power plant will produce a total of 4,400 MW, playing an important role in generating power that will be transmitted to eastern China.

CHINA

Westinghouse Electric Company, Curtiss-Wright Corporation and the State Nuclear Power and Technology Corporation (SNPTC) of China announced the successful completion of the design, manufacture and qualification of the lead AP1000® Reactor Coolant Pump.

INDIA

AREVA Solar has been awarded a contract by the Indian group Reliance Power Limited to build a 250 megawatt concentrated solar power (CSP) installation which will become the largest in Asia.

The project will help advance India's goal of adding 20,000 MW of solar energy by 2022.

INDONESIA

Emerson will install its Ovation™ expert control system at a new 660-MW, supercritical power plant in Adipala, Indonesia, near the south shore of Cilacap in the Jawa Tengah Province.

Expected to be commissioned in February 2013, this is the first supercritical plant to be built by China National Technical Import and Export Corporation.

IRAQ

ABB won an order from the Ministry of Electricity in Iraq to provide a state-of-the-art power distribution management system.

The solution will incorporate advanced communication technology, with monitoring and control functions, to improve the availability, performance and reliability of power supplies in Baghdad.

ITALY

GE will provide an LM6000-PF Sprint aeroderivative gas turbine and related services to Enipower S.p.A. for its Bolgiano district heating plant in San Donato Milanese, near Milan, Italy.

The McGraw-Hill Companies



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MALAYSIA

Alstom and its consortium partners have signed a contract worth over € billion with Tanjung Bin Energy Issuer Bhd* to provide a 1000 MW supercritical coal-fired power plant at Tanjung Bin, Johor. Alstom will supply all key power generation equipment and will be in charge of the overall engineering, project management and commissioning.

MALAYSIA

Rolls-Royce won an order for gas turbine and compression equipment for the Tapis oil and gas field. The equipment will be utilized by ExxonMobil Exploration and Production Malaysia (EMEPMI) to expand and extend the production of the field.

NEW ZEALAND

EnerNoc will provide automated demand response capacity for Genesis Energy on New Zealand's South Island. New Zealand has committed to making its electricity generation sources 90 percent renewable by 2025. The nation's electricity grid is served largely by hydropower.

PHILIPPINES

PIC Asia Pacific Sdn. Bhd. has entered into a Management and Technical Services agreement with ACES Technical Services Corporation, a subsidiary of Alsons Corporation, for operations and maintenance of the 100 megawatt coal-fired Sarangani power station located in Maasim, Sarangani.

The seven year contract includes mobilization and long term operations and maintenance of the greenfield project scheduled for commercial operations in 2014.

SCOTLAND

Scottish Enterprise has welcomed the decision by Spanish wind turbine manufacturer Gamesa that it has chosen Leith as its preferred location for its new UK manufacturing plant. The company will create around 800 new jobs and invest a further 150 million euro in Scotland.

SPAIN

Aries Ingeniería y Sistemas, a Spanish company with expertise in renewable energy solutions, has formed a partnership with Tianwei Solution, an affiliate of China South Industries Group Corporation to provide EPC (Engineering, Procurement and Construction) services for PV power projects worldwide.

Aries will provide all project management, engineering and construction/commissioning supervision services along with specific balance of plant equipment supply while Tianwei Solutions will provide financial backing and construction/erection services in addition to supplying PV panels and other select equipment.

THAILAND

AREVA and its local partner ENSYS have been selected by U-Thong Bio Power, a Thai independent power producer, for the construction of a biomass power plant located in the Supanburi Province. The total value of the project is \$17 million.

The plant fueled by rice husk and by bagasse, will generate a total output of 9.9 MW electrical power. The project is scheduled for completion end of 2013.

TURKEY

GE will supply 31 of its 1.6-100 wind turbines for Fina Enerji's Tayakadin wind project in Istanbul. The Turkish government plans to increase the country's wind energy production to 20,000 megawatts by the year 2023. Fina Enerji currently has 35 units of GE 2.5-100 wind turbines in operation at two wind power plant sites in Izmir and Hatay provinces for a total capacity of 87.5 megawatts.

UAE

CESI Middle East has been selected by the Arab Fund for Economic and Social Development to undertake a feasibility study to determine the best electric energy and natural gas trade scenario to create a single energy market for 20 Arab Countries.

Zayed Future Energy Prize announced that the Environmental Defense Fund received the \$500,000 second runner-up award in the SME and NGO category.

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WRI NAMES

The World Resources Institute named Dr. Andrew D. Steer as its next president. Steer will take the helm of WRI, as it celebrates its 30th anniversary.



Dr. Andrew D. Steer

PSI APPOINTS

Principal Solar announced the appointment of J. Peter Lynch to its Advisory Board.



J. Peter Lynch

POWER ONE APPOINTS

Power-One announced the appointment of Dave Wojciechowski as Vice President of Renewable Energy Sales for North America. He holds an MBA from Columbia Business School and a dual BS in Chemical Engineering from Clarkson University and BA in Chemistry from SUNY in Potsdam.



Dave Wojciechowski

NYISO SELECTS

The New York Independent System Operator (NYISO) announced the unanimous selection of Anastasia M. Song to its Board of Directors, effective in April 2012.

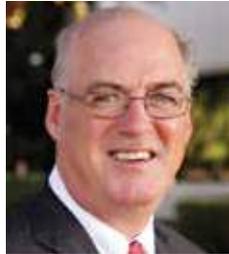


Anastasia M. Song

URS NAMES



Patti Kroen



Marc Tellier

Patti Kroen has been named Northern California Hydropower Practice Leader in the Sacramento office of URS Corporation. She's the current President of the Northwest Hydroelectric Association (NWhA).

Marc Tellier has been named Vice President, Engineering Services, Private Sector Business Development, for the Infrastructure & Environment Division of URS.

INGERSOLL JOINS

Daniel Ingersoll, Ph.D., has joined NuScale Power, LLC as Director of Research Collaborations. Ingersoll joins NuScale from Oak Ridge National Laboratory.



Daniel Ingersoll, Ph.D.

GE NAMES

GE announced that Kevin Cassidy has been named chemical and monitoring solutions general manager of water and process technologies for GE Power & Water.



Kevin Cassidy

PARSONS BRINCKERHOFF NAMES

Guy Templeton has been named President and Chief Operating Officer of the Asia/Australia-Pacific/Southern Africa operating company of Parsons Brinckerhoff. He will be based in Sydney, Australia.



Guy Templeton

SAIG EXPANDS

SAIG Energy, Environment & Infrastructure announced that Matthew Dorogi, Ph.D. joined its Energy Consulting & Engineering operation as director in the Framingham, MA office.



Matthew Dorogi, Ph.D.

DUNN JOINS

Patton Boggs announced that Michael V. Dunn, former Commissioner of the Commodity Futures Trading Commission, has joined the firm as Senior Policy Advisor.



Michael V. Dunn

AEHI ELECTS

Alternate Energy Holdings announced that the company elected Rear Admiral Michael T. Coyle (Ret) and James Ryan Holt to the Board of Directors.

CH2M HILL NAMES

CH2M HILL announced that Samir Davé, P.E. has joined its Water Business Group as a Market Sector Leader to lead strategic planning and business development efforts

BAKER TO JOIN

Matt Baker, a commissioner with the Colorado Public Utilities Commission, will join The William and Flora Hewlett Foundation as an officer in its Environment Program.

THOMAS APPOINTED

GE Energy's Industrial Solutions Business appointed Adrian Thomas as the new regional sales leader for Canada.

PUBLISHER'S LETTER CONTINUED FROM PAGE 3

In our next issue, we will cover Pratt & Whitney's Media Day interviews held on its Hartford, CT campus. Rocketdyne announced that it's being sold by parent, UTC. It also announced the commissioning of a revolutionary commercial scale, dry-solid pump and a new technology for fracking. Power Systems is on track to launch the FT4000 SWIFTPAC in 2013 and will sell the Clipper Wind Business.

Wish Flanagan

2012 MEDIA SCHEDULE

August/September 2012
SOLAR POWER INTERNATIONAL (SPI) GRID WEEK
Closing – July 15th

October/November 2012
POWER-GEN INTERNATIONAL (PGI)
Closing – September 15th

December 2012/January 2013
25TH ANNIVERSARY ISSUE
Closing – November 15th



RESOURCE PLANNING & SOLAR IN FLUX

BY LYN CORUM
CLASS OF 2003



The legacy of the California energy crisis continues to haunt us. In May 2001 Calpine brought its 572-MW combined cycle gas-fired Sutter Energy Center online near Yuba City in northern California just in time to help calm the stressed-out generation market. Now, the California Public Utilities Commission and California Independent System Operator are trying to keep the plant alive.

Sutter has been stranded by procurement mechanisms that were created in 2001 and 2002 and no longer has a contract to sell its power. Calpine will have to shut the plant down if the CPUC and the three major investor-owned utilities don't find a use for its power. It held a contract with the Sacramento Municipal Utility Department until 2005, and has been dispatched by Cal-ISO until this year using a pseudo-tie line.

Sutter was interconnected with the Western Area Power Administration which later joined SMUD outside the ISO's control area. The pseudo tie line arrangement allowed Sutter to continue providing power as needed to the ISO until this year. The ISO has said it will not need Sutter's resources until 2017.

SUTTER AN OUTCAST

Calpine, in comments submitted to the CPUC in its Long Term Power Procurement proceeding earlier this year, said that market revenues for uncontracted existing resources have been declining and that these adverse impacts "are exacerbated by the fact that current procurement policies and practices exclude existing resources from participating in long-term resource solicitations." It calls for fundamental changes to be made to procurement policies and practices.

Calpine also said that the low compensation from current residual market opportunities available to existing resources are "expected to drop even further as a result of excess supply created by increased renewable generation resources

and other procurement policies." Should existing resources such as Sutter shut down, "substantial amounts of new replacement resources will be necessary for reliability and renewable integration needs." And these new replacement resources would be paid for by ratepayers.

The ISO sought a solution when the CPUC was notified by Calpine of its plan to shutter the plant per CPUC Operation and Maintenance Standards for Power Plants. At the same time, Calpine filed a request with the ISO for a "Capacity Procurement Mechanism designation."

This action led to ISO filing a request with the Federal Energy Regulatory Commission in January for a waiver allowing it to procure backstop capacity from Sutter under the CPM. The ISO said Sutter would be needed for operation flexibility in 2017 and beyond in a high load scenario when it will be needed to help integrate renewable resources and phase out older, dirtier plants.

The ISO argued that if Calpine were allowed to retire Sutter in 2012, the plant may not return to commercial operation in future years. If it did so, it would likely need to undergo New Source Review and obtain a new air quality permit, based on Environmental Protection Agency rules, a costly review process and possible additional emissions controls.

The CPUC did not like the idea of FERC potentially taking action on a California problem. It remembered that FERC intervened in the energy crisis when the CPUC did little. So in March it ordered Southern California Edison, San Diego Gas & Electric and Pacific Gas & Electric to negotiate a one-year capacity contract with Calpine. The contract price is to be no more than \$17 million.

PROCUREMENT SOLUTIONS SOUGHT

How did we get to this place where a relatively new clean power plant with a low heat rate is on the verge of shutting down, while 40-year old generating stations with high heat rates continue to generate power and belch dirty smoke into the air?

There are two processes the IOUs must go through to buy generation resources. Both were designed earlier this decade and have not changed. First, the utilities must solicit contracts to cover 112% to 125% of their generation needs for the coming year under an annual Resource Adequacy procurement program. Signed contracts are typically up to five years in length. The CPUC has indicated it intends to revise its resource adequacy program as a result of the Sutter plant controversy.

Second, through the Long Term Procurement Process, the CPUC determines what the generation needs are for the IOUs in ten years. In the current LTPP review process, the CPUC has identified needs for new system resources in 2020

under four different scenarios. It examined only that year, not the intervening years. It released a proposed decision which has attracted a plethora of stakeholder comments, including Calpine's quoted above.

Calpine noted in the CPUC's LTPP proposed decision that there are plants totaling 3,200 MW, all similar to the Sutter Energy Center, which will have no contracts by the end of 2013. There is no process allowing IOUs to consider contracts between five and ten-years in length, Calpine said. Sutter is the only plant so identified at the moment.

In January, the ISO proposed its own solution to the issue of mid-term capacity procurement and earned the wrath of most stakeholders. It proposed implementing multi-phased flexible capacity procurement for up to five years into the future for generators that might otherwise retire. Stakeholders argued this job should be left to the CPUC. The draft proposal will go the ISO's Board of Governors in July.

Looking out over the landscape between now and 2020, there appears to be a need requiring additional procurement starting soon. The ISO has preliminarily identified an incremental need of 2,000 MW of new resources in the Los Angeles basin because of requirements by the State Water Resources Control Board for generating stations located along the coastline to shut down their once-through ocean cooling systems. Some owners may decide to retire the generating stations instead of retrofitting them.

ECONOMICS & TURTLES

We're getting a better idea now about which mega-size utility-scale solar projects will get built and which will wilt in the deadly hot Southern California desert sun. The reasons are mostly economic but one is facing a legal challenge. Of the 10 projects totaling over 4,000 MW which filed applications at the California Energy Commission between 2007 and 2009 and were all approved for construction, only three are actually under construction.

BrightSource's 370-MW Ivanpah concentrating solar thermal project near the border with Nevada is under construction as is Abengoa Solar Inc's 250-MW Mojave Solar project and NextEra's 250-MW Genesis Solar energy project. The latter two utilize parabolic trough technologies.

Solar Millennium, through its US subsidiary Solar Trust of America, proposed building three utility-scale solar projects totaling 1,750 MW and filed applications under review at the CEC. (It also proposed building the 500-MW Amargosa Farm Road solar project in western Nevada.) Just one, the 1,000-MW Blythe project, began construction on two 242-MW plants following a June 2011 groundbreaking ceremony attended by US Secretary of the Interior, Ken Salazar and California Governor Jerry Brown.

A few weeks earlier, the US Department of Energy offered the company a \$2.1 billion loan guarantee. The company later gave up that loan guarantee when it decided to convert its central station solar thermal technology to solar photovoltaics. (Read my Nov/Dec 2011 World-Generation column for more details.)

BUYERS SOUGHT

However, Blythe and its sister projects face a load of challenges. Last year, Solar Millennium declared insolvency, the equivalent of bankruptcy, in a German court. In February, following negotiations that began in October 2011, solarhybrid, another German company, agreed to buy the subsidiary, Solar Trust of America. But in March solarhybrid also declared insolvency in Germany. Solar Millennium's insolvency administrator started looking for investors in Solar Trust but on April 2, because of the loss of financing from solarhybrid, Solar Trust filed for Chapter 11 bankruptcy protection in the US. Buyers for the projects are now being sought.

Solar Trust's other two California projects include the 500-MW Palen project which has won CEC approval but construction has not yet started. Its 250-MW Ridgecrest project, still ostensibly under review at the CEC, is on hold waiting for the CEC ruling on converting the plant to solar PV technology.

My prediction is that Blythe and Palen will find buyers and that Ridgecrest's application will be withdrawn at the CEC and forgotten. It will be surprising if Blythe grows beyond its 484 MW scheduled for completion in 2014. Its current power purchase agreement with Southern California Edison will likely have to be renegotiated with a new owner.

CALICO FACES LAWSUIT

In March, three environmental groups sued the US Department of the Interior over the 850-MW Calico solar project scheduled to start construction in June in the Mojave Desert's Pispah Valley.

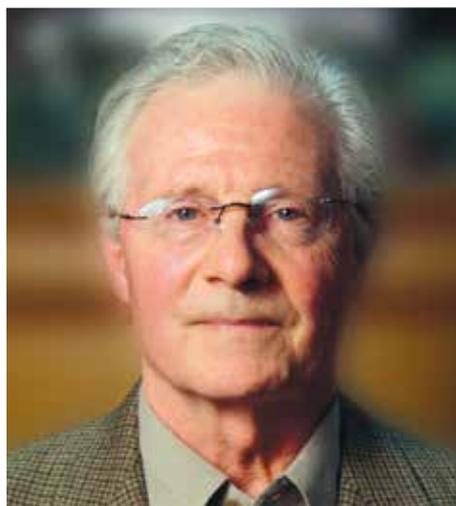
The Defenders of Wildlife, the Natural Resources Defense Council and the Sierra Club had been negotiating for three years with the Bureau of Land Management and Calico's current owner/developer, K-Road Power and Tessera Solar, the former owner. The three groups urged the developers to relocate the project to less environmentally sensitive lands.

According to NRDC, the proposed project covers 4,000 acres of vital wildlife habitat in the Mojave Desert on key desert tortoise habitat that connects several tortoise recovery areas. The groups contend the project would threaten at least six other imperiled animals and plants and would like to see it moved. Calico's future rests on more negotiations in all likelihood.

E & P TECHNOLOGY CHANGING THE DYNAMICS

BY DENNIS
MCLAUGHLIN

CLASS OF 2002



Even as he described oil as “a fuel of the past” during a visit in early March to a truck plant in Mount Holly, North Carolina, President Obama assured Americans that oil production in the U.S. would continue to be a key part of his administration’s energy strategy. Later in the month at a rally on federal land in New Mexico, he told supporters, “Under my administration, America is producing more oil today than at any time in the last eight years.” He punctuated the statement saying, “That’s a fact.”

Many in the energy industry, like the American Petroleum Institute, disagreed. Jack Gerard, API’s CEO, said the nation has vast energy resources that aren’t being fully tapped. He explained most of the oil production is taking place on private and state land. Leases for drilling rights on federal lands have dropped 44 percent in the last four years, and the number of new wells drilled have declined 39 percent. The current oil production figures the President is referring to, say industry spokesmen, actually represent the culmination of exploration, seismic testing, development and operational efforts initiated seven or eight years ago – the amount of time it generally takes to bring a well on stream. The increased production numbers, they conclude, do not reflect the administration’s energy policy.

Administration officials dispute that analysis. During a congressional hearing last year, Democrats cited a report from the Department of the Interior indicating 70 percent of the offshore acres oil companies have leased from the federal government sits idle. “They have the rights to an area of public land the size of Minnesota where they could and should be drilling,” said Congressman Ed Markey (D-Massachusetts), “but instead [oil companies] are coming back and asking Congress to allow drill rigs off our beaches up and down the East Coast.” The API

agrees with Interior’s assessment of the untapped acreage, but it argues that oil companies aren’t drilling on those tracts because there simply isn’t any oil to be found.

While policy makers, campaigners and businesses are expected to stretch the truth to put the best light on their agendas, there are a number of irrefutable geological and engineering facts which will be shaping the future of the energy industry for years to come. And that future appears to include an even bigger role for fossil fuels. Particularly natural gas.

GEOLOGY

First of all, oil and natural gas are plentiful. Just because alarmists warn petroleum resources have peaked or environmentalists don’t like hydrocarbons doesn’t mean they’re scarce. Meteorologist Roy W. Spenser, Ph.D., a research scientist at the University of Alabama Huntsville and a Senior Scientist for Climate Studies at NASA’s Marshall Space Flight Center, quipped at a recent Kansas City conference – attended by many from the ethanol industry – that the earth has been turning matter into fossil fuel for 400 million years. But humans have only been using petroleum for a little more than a century. So he isn’t counting on cataclysmic shortfalls any time soon.

In an odd prelude to his March denunciation of fossil fuels as outdated, President Obama declared in the State of the Union address that the U.S. has “a supply of natural gas that can last Americans nearly 100 years, and my administration will take every possible action to safely develop this energy.” He also mentioned “experts believe this will support more than 600,000 jobs by the end of the decade.”

This news probably didn’t cheer the Green lobby, but the President is probably more right than he realizes. Three primary analytic and informational energy organizations are optimistic. The Energy Information Administration (EIA) estimates the U.S. has 2,543 trillion cubic feet (Tcf) of “technically recoverable” natural gas which includes undiscovered, unproved and unconventional reserves. The National Petroleum Council (NPC) refines its figure at 1,451 Tcf, increasing it to 1,900 Tcf by 2107. The Potential Gas Committee comes in with an estimate of 2,970 Tcf.

In its Mergers & Acquisitions Yearend 2011 Report, DeLoitte & Touche, LLP, projects the growth of U.S. exploration and production (E&P) bodes positive for the long-term prosperity of energy markets worldwide. “The potential exists over the long term for substantial changes in traditional world energy markets, as customer countries become producers,” says Gary Adams, Vice Chairman, U.S. Oil and Gas for Deloitte.

Jed Shreve, Principal of Deloitte’s

Financial Advisory Service, expects the U.S. oil and gas industry will invest up to \$210 billion to respond to rising volumes of energy production. That kind of investment will require the participation of large companies with deep pockets, and “will attract investment dollars especially from private equity firms.” But the strong growth prospects mean plenty of opportunities for smaller companies, too. “While consolidation and big deals will take place, a lot of activity will continue on a smaller scale since smaller companies can often move faster than larger companies,” adds Jim Dillavou, Partner, Deloitte & Touche LLP.

ENGINEERING

Although the number of merger and acquisition deals in the domestic E&P segment of the oil and gas industry fell to 158 transactions from 189 in 2010, the value of deal activity in the second half of 2011 increased significantly. Steady oil prices provided the value-boost and support for M&A transactions. “But, the biggest driver of investment,” says Adams, “continues to be the enabling technology events that have unlocked the potential of shale.” He explains that advances in horizontal drilling and hydraulic fracturing have made recovery of shale reserves much more economical.

Technology has also sparked a surge in M&A activity among oilfield service companies which not only want to acquire technical assets but also covet the engineering talent and know-how that comes along with the targeted firms. The total value of the transactions in this segment rose to \$14.1 billion in the second half of 2011, from \$12.6 billion for the same period in 2010. Most of the acquisitions were in the \$50-600 million range.

“A number of service companies with strong technologies are building out their product offerings in drilling and hydraulic fracturing, and filling in aspects of their service offerings to provide a more integrated package,” says Jason Spann, Partner, Deloitte Tax LLP.

Deloitte’s Mergers & Acquisitions Yearend 2011 Report believes smaller companies with new technology for horizontal drilling will remain in demand. The fundamental outlook for oilfield services companies remains bright. By the same token, however, as demand for natural gas, shale oil and conventional and unconventional petroleum products increases – as alternative sources (wind, solar, algae et al) of energy continue to prove they’re not ready for prime time – the E&P segment of the energy industry will have to depend on companies with large-scale financial capabilities.

Says Trevear Thomas, Principle, Deloitte Consulting LLP: “Continued focus of the E&P segment on deepwater and shale reserves tends to favor the larger oil-

field services players – who have deep pockets.”

The innovative E&P technology developed to exploit abundant fossil fuel resources in the shale basins and gas plays in the U.S. is also changing the oil and gas industry around the world. American engineering ingenuity has inspired a flurry of activity in other countries which until now were content to import their energy supplies. Nations like Poland long dependent on their eastern neighbors for meet energy demand are beginning to develop their own vast shale resources.

As these countries begin to capture their own energy resources, the U.S. engineering and technology industry stands to reap an economic windfall. “Technological innovation within the industry continues to bear fruit for the U.S. economy,” says Adams, in the Deloitte Yearend 2011 Report. Rising U.S. natural gas production is responsible for increased production of ethane, propane and other natural gas liquids. The increasing domestic production of ethane is creating low-cost feedstock for U.S. petrochemical producers. “This has resulted in a new competitive advantage for an important U.S. industry,” Adams notes, “and is yet another byproduct of the technology events that have taken place in the energy industry over the last few years.”

With all booms, though, there usually is a dark side, and natural gas is not exempt. Prices have fallen steeply in the last several months. The Wall Street Journal (April 11, 2011) calls the situation a shock wave that could intensify this summer “because the country is running out of room to store the glut of natural gas, which could drive gas prices down to sustained lows not seen in decades.” Cheap gas is stealing power-generation markets from the coal industry, and railroads whose single largest revenue stream comes from transporting coal are feeling the pain. The economics for building nuclear power plants and wind and solar installations is getting shaky. Electricity consumers, of course, are the likely near-term winners.

But the long-term outlook for the U.S. natural gas industry remains bright, concludes the Deloitte’s M&A Yearend 2011 Report. Investors are still snapping up unconventional E&P plays, and countries around the world are using U.S. technology to tap their shale oil and gas reserves. “The leverage of horizontal drilling and hydraulic fracturing techniques for natural gas is spreading to oil,” explains Dillavou. He goes on to say natural gas drillers are also shifting to emphasize liquids production because of the price differential – liquid-rich areas of shale are showing huge growth in activity.

These technology innovations, Gary Adams concludes, “could spawn a revolution in the industry, with lasting, long-term effects.”

IN PURSUIT OF GREEN ENERGY

BY BROOKE CARRILLO



Ball State University, in east central Indiana, knew something had to be done to replace its four aging coal fired boilers, which had been heating the 731-acre campus for more than 60 years. In addition, the university was growing in physical size and was facing even more stringent emission standards promulgated by the EPA.

The university, like many other fossil fuel burning operations, needs to meet new boiler MACT EPA regulations by March of 2014, or shut down their coal fired boilers. The university could continue to burn a fossil fuel by installing expensive emission control equipment or find other means to heat and cool their buildings. The solution: school officials decided to use the earth's ability to maintain a nearly constant temperature to heat and cool its 47 buildings.

Protecting the environment was a clear solution to Ball State. Support from the president and board of trustees has led to the construction of the nation's largest geothermal heating and cooling system of its kind. This decision would ultimately cut the university's carbon footprint nearly in half by eliminating approximately 80,000 tons of carbon emissions.

"After considering all of the alternatives available to Ball State, geothermal was an obvious resolution," said Jim Lowe, director of engineering, construction and operations at Ball State University.

Even though the initial cost estimate of the geothermal project was greater than the cost to replace old coal fired boilers with new coal fired boilers, the long-term return on investment makes the project economically the right decision, Lowe added.

Paul Chodak, President of Indiana Michigan Power, the utility which supplies energy to Ball State, offered that they are also excited about the program.

"The energy industry is changing and to see our customers being innovative is something that we are excited about and want to support," Chodak said. "At I&M, we're currently diversifying our power

sources, and welcome customer's efforts to help make the grid more efficient."

Geothermal technology is already a proven solution for residential and commercial heating and cooling needs. But large-scale projects of this nature had not been attempted to date.

Charting unfamiliar territory, leaders at Ball State began the undertaking of this project by purchasing the American-made, large heat pump chillers required to heat and cool the buildings. In May, 2009, the university took the project further by beginning to drill half of the 3,600 bore-

holes needed to support the system.

The university received \$45 million from the state of Indiana and \$5 million from the federal government to fund the project. With an estimate of nearly \$80 million to complete the entire project, the university

(continued on page 20)

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ENERGY STORAGE UPDATE

BY DANIEL POTASH



Due to the increasing market penetration of intermittent generation like solar and wind, there is more impetus to develop retail-scale, and utility-scale, energy storage. Energy storage is a hot venture capital destination; in the third quarter of 2011, \$421 million of venture capital went into energy storage out of \$1.1 billion going to clean energy, according to Dow Jones VentureSource. Storage-friendly state and federal laws and new regulations are being implemented.

But there are glitches: Beacon Power Corp.'s 20 MW flywheel project in NY shredded apart into a "cotton candy" of carbon fiber. The Iowa State Energy Park (IESP), \$400 million, 270 MW, Compressed Air Energy Project had to be abandoned because the geology turned out faulty. Nonetheless, the market for storage is promising, and the technologies are magical – growing carbon nanotubes for example. This article will provide an overview of status and prospects for energy storage, and some caveats.

FLEXIBILITY OF POWER GENERATION

Energy storage is mostly discussed in the context of intermittent renewable energy. But almost all power generation technologies are not very flexible at wide-ranging levels of productions. Most power generating technologies operate best in a steady state environment. Nuclear can't be easily ramped up or down, but all turbines and reciprocating engines have a certain optimal operating range for efficiency, due to fuel, temperature, emissions, and other constraints.

Hydroelectric power would seem to offer good technical flexibility, and indeed the technology is well-suited to energy regulation ("frequency response"). However, water flow is usually strictly governed by non-power considerations, such as agricultural releases, flood control, drinking water supply, and fish and wildlife regulations. Wind and solar are of course not suited to changing the input levels. Wind and solar, like nuclear

and hydro, involve virtually 100% fixed cost, so in general there is always an incentive to run, or, stated better, there is always a disincentive to not run.

Energy storage would be very helpful in optimizing generation resources, and in matching supply and demand instantaneously across the network. Besides accommodating generation, there are other values of storage: reliability, offset against various kinds of power reserves, and deferral of transmission cost. Transmission engineers get very excited about deferring the cost of new lines and substations.

STORAGE VALUE PROPOSITION

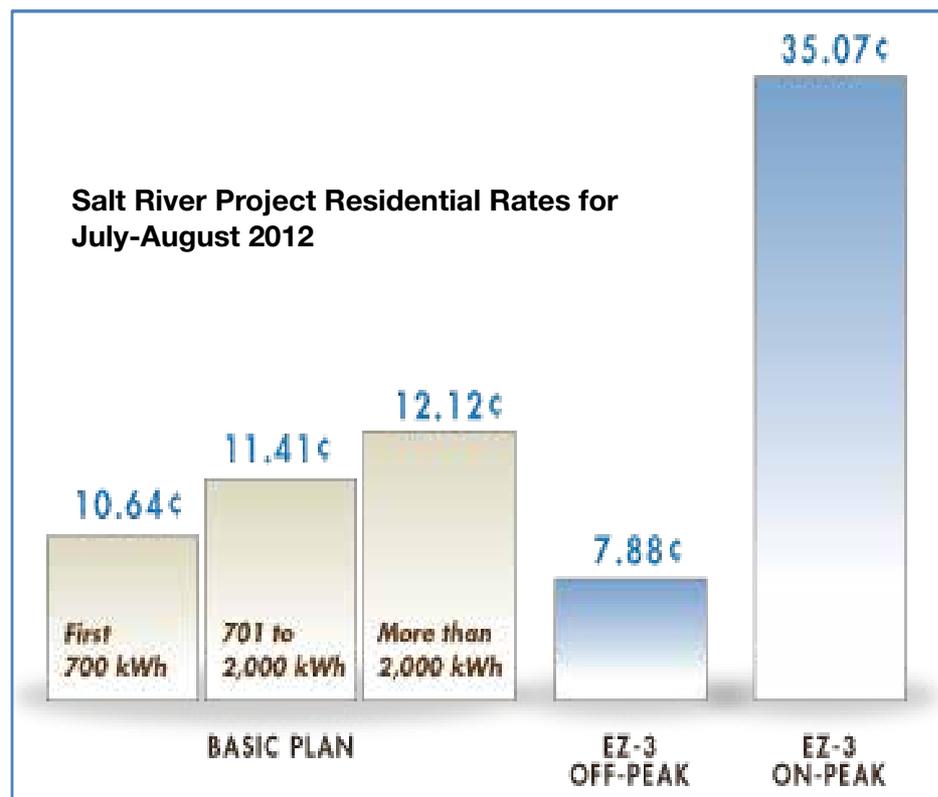
Qualitatively, the energy storage is reasonable. Quantitatively, the value of storage is not well-enough captured in wholesale pricing. That is why reform is needed, such as fair pricing of ancillary services (frequency regulation, voltage support, ramping up and down, etc.). Another pricing problem for storage is that energy prices are generally falling, and the wholesale price spread between peak and off-peak power is small. One way to better justify energy storage is by increasing the price for carbon emissions. There is a good case for residential energy storage, given the high differential between and non-peak residential rates in some jurisdictions.

Either in retail or wholesale, storage is based on the price difference between on-peak and off-peak. Wholesale power prices are low, as shown in the sample taken April 2012, in the Pacific Northwest. It is from the excellent service of Energy NewsData (www.newsdata.com/).

EXAMPLE OF WHOLESALE POWER PRICES

Note that: 1) power prices are low, 2-3 cents per kWh on-peak, and a penny off-peak on average, 2) the spread between peak and off-peak is narrow, and 3) prices became negative in one market (BPA region). Sometimes generators find it

EXAMPLE OF RETAIL POWER PRICES



more economical to pay the buyer to take their power rather than ramp down a nuke or a coal plant.

Retail prices are of course higher than wholesale, and the spread between off-peak and on-peak is higher. Consider an example from Salt River Project. SRP's basic rate plan starts at 10.64 cents/kWh and rises to 12.12 cents/kWh. If, however, a customer changes to time of use ("EZ-3") rate plan, they get off-peak power at 7.88 cents and on-peak power at a whopping 35.07 cents.

MARKET FOR ENERGY STORAGE APPLICATIONS

The market for energy storage applications is north of \$100 billion, for the U.S. over a ten-year time frame, according to a

report by Sandia Labs: "Energy Storage for the Electricity Grid: Benefits and Market Potential Assessment Guide," published February 2010. The report very well lays out the distinction between the value of the application of energy storage, and the market size of the application. The top market for energy storage is "Time-of-use energy cost management," which relates to end-users and retail pricing. The retail market in this space should be worth \$79 billion. The promise of this market can be seen by looking at retail prices such as SRP's EZ-3 time of use plan.

Another good market according to Sandia is "electric energy time-shift," which relates to wholesale pricing. That market is projected to be \$10 billion. Sandia identifies a promising storage market for "Renewables capacity firming," which is using storage used to smooth out the

Western Price Survey, Mid-Week: April 23 - 25, 2012, Energy NewsData

Hub	Highest Peak \$/MWh	Lowest Off-peak \$/MWh	Max Spread \$/MWh
Alberta Pool (C\$)	30.98	10.62	20.36
Mid-Columbia	17.50	(0.95)	18.45
COB	18.50	1.50	17.00
NP 15*	26.25	n/a	n/a
SP 15*	28.50	16.90	11.60
Palo Verde	23.00	12.75	10.25

TOP FIVE MARKETS FOR ENERGY STORAGE APPLICATIONS

Market Ranking	Application for Energy Storage	Value of Application \$/kW	U.S. 10-year Market Size \$ millions
1	Time-of-use Energy Cost Management	1226	78,743
2	Renewables Capacity Firming	915	29,909
3	Load Following	1000	29,467
4	Demand Charge Management	582	18,695
5	Renewables Energy Time-shift	389	11,455

fluctuations in renewable energy. This market should be worth \$29 billion, and should help offset additional generation that would otherwise be needed to support wind and solar as they increase market share.

The Sandia is excellent and it may be found at: <http://www.sandia.gov/ess/>.

ECONOMICS OF STORAGE VERSUS PEAKER

Renowned venture capital investor

Vinod Khosla gave the keynote address to the Electricity Storage Association annual meeting in 2011. He may not be invited back anytime soon, since he suggested that building a simple gas-fired peaking power plant would be more economical than today's crop of energy storage technologies. Below is some analysis to see if Mr. Khosla is correct.

The economics of storage revolve around three factors: 1) the capital cost of

energy storage, as measured in dollars per kWh, and 2) "round-trip efficiency," which is measured as the percentage of energy-out versus energy-in, and 3) the price difference of on-peak and off-peak. Economics of batteries suggest a price point today of around \$400 per kWh, and 80% round-trip efficiency. It was assumed that 20 MW of storage would be used for 5 hours per day.

As compared with installing energy, storage one might build a gas-fired peaking plant. Benchmarks from recent projects indicate a capital cost of around \$750/kW for simple cycle generation and a heat rate of 9,983 BTU/kWh (Siemens SGT-600). Burner-tip gas cost is now around \$2.5 per MMBTU. O&M and G&A are assumed to total 2 cents per kWh. This gives a production price of 4.50 cents per kWh.

Since I am a card-carrying tree-hugger, I added a penny per kWh to the operating cost of the gas-fired peaker, to account for carbon. The peaker then comes in at a total cost of 5.50 cents per kWh. Storage is assumed to buy power at the same 4.50 cents per kWh, though it may be the case that storage can buy power at even lower prices.

Based on the Northwest statistics above, I used 2 cents/kWh as the spread between off-peak and on-peak. The resulting analysis indicates that the peaker is more economical than storage.

Even if power acquisition cost is zero, the peaker is the better alternative.

PROJECTED COST OF STORAGE VERSUS GAS-FIRED PEAKER

The peaker offers a cost of 3.83 cents per kWh versus the storage at 12.00 cents per kWh. Other value of storage is voltage support, reliability, but they are either hard to price, or the value is not high, on a stand-alone basis.

If a power plant offers some ability to do load following, they also offer cheap

energy, so the costs are amortized over more energy "products."

Not that he needs any more successes, Vinod Khosla stands vindicated.

In the sensitivity analysis, I looked at the results if natural gas prices were to rise, and if the cost of storage were to come down. It was assumed that even if natural gas prices were to rise, storage would be still able to buy power at the same 4.50 cents per kWh.

Under these conditions, if the cost of storage were to come down to \$100 per kWh, then storage would prevail easily over the peaker. If natural gas prices were to rise substantially, from \$2 per MMBTU to \$8 per MMBTU then storage beats the peaker if the cost of storage drops modestly, and if storage can still access cheap off-peak power.

CONCLUSION

Wholesale energy storage may not yet be economically viable without subsidies such as a federal tax credit and storage portfolio standards.

Under prevailing conditions, and probably for a long time to come, it would be more economical to build a gas-fired power plant instead of storage.

Retail is a more interesting storage market than wholesale.

I predict that the home of the future will have roof-top solar, battery storage, and at least one electric vehicle.

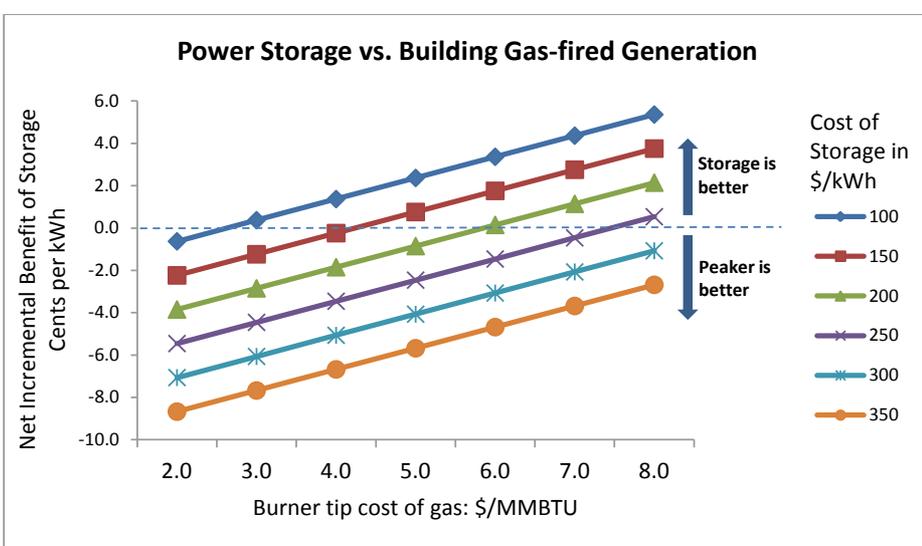
ABOUT THE AUTHOR

Daniel A. Potash is Senior Financial Analyst with Advanced Engineering Associates International, Inc., Washington D.C., a consulting firm specializing in the power industry, international energy reform and privatization, and renewable energy.

Mr. Potash is a member of *World-Gen's* Class of 2001.

	Pure Storage Cents/kWh	Gas-fired Peaker Cents/kWh
Capital Cost	(12.87)	(4.83)
Power acquisition	(4.50)	(4.50)
Round-tip loss	80%	0%
Power sale	6.50	6.50
Carbon cost	-	(1.00)
Net Impact	(12.00)	(3.82)

SENSITIVITY ANALYSIS OF ENERGY STORAGE VERSUS GAS-FIRED PEAKER



CLEAN ENERGY

BY BRETT BLANKENSHIP, WOOD MACKENZIE



The prospects for passing a federal Clean Energy Standard (CES) or Renewable Energy Standard (RES) in the near term remain extremely low given the current political climate and upcoming election cycle, according to a recent analysis by Wood Mackenzie.

On March 1, 2012 Senator Jeff Bingaman (D-NM) put forth the proposed Clean Energy Standard Act of 2012 (CESA 2012) which would require certain electric utilities to generate or procure "clean energy credits" to satisfy determined shares of their end use electric sales beginning in 2015. While passage seems unlikely, the bill's proposal underscores the continuous policymaking efforts to impose renewable-promoting or carbon-reducing measures on the power sector, according to Wood Mackenzie.

The latest proposal follows numerous previous attempts by Congress, including Senator Bingaman, to pass a national renewable or clean energy standard, all of which met the same fate. The difficult political climate that has beset Washington suggests that passage of the latest incarnation remains highly unlikely, particularly in a key presidential election year in which energy policy could well prove to be an important issue.

Proposing a sweeping national standard applicable to an estimated 82 to 89 percent share of the power sector could be seen as wasted political energy as the potential expiration of the federal wind production tax credit (PTC) looms at the end of 2012, according to Wood Mackenzie. If promotion of renewables is desired, political capital is better spent on extending the PTC, which will have a more immediate and tangible impact on renewable energy development. Renewable project developers have already been anticipating a slowdown in response to the potential PTC expiration.

Wood Mackenzie's analysis demonstrates that RES and CES offer unique challenges, especially with CES' inclusion of other no/low-carbon generating sources such as nuclear and natural gas, chang-

ing regional compliance prospects with the wide variation in regional power generation profiles. Similar to cap-and-trade emission reduction programs, federal RES/CES are touted as an efficient economic means to promoting clean energy as they should ideally allocate capital in the most efficient technologies and locations. However, this can result in regional wealth transfer as regions with sparse renewable resources must ultimately subsidize generation and transmission infrastructure development in regions rich in such resources. Nearly 60 percent of all current generation is located in states east of the Mississippi River, while 75 percent of non-hydro renewables are located to the west. A relative lack of renewable generating potential in regions such as the Southeast makes a federal renewable standard challenging politically.

Furthermore, Wood Mackenzie's analysis suggests that near- and mid-term compliance with the proposed CESA 2012 is possible given other fundamental and regulatory drivers. However, the escalating clean energy requirements soon outpace current expectations for clean generation additions. Beyond 2024 the previously accumulated bank of credits would have been exhausted, pushing annual balances under the proposed targets. Wood Mackenzie estimates that the alternative compliance payment (ACP) cost for the 2024-2033 period under CESA 2012 could exceed \$450 billion.

The combination of the declining natural gas prices, environmental policy initiatives and renewable energy policy and incentives indicates that future generating capacity additions will primarily be qualifying clean gas-fired and renewable generators. Still, compliance with CESA 2012 remains a challenge in the long term. Compliance ultimately hinges upon removing significant levels of coal generation from the supply mix as it is still relied on for a sizable amount of energy but provides zero clean credits. Despite generating approximately 45 percent of current energy needs, coal simply cannot exceed 16 percent of the portfolio by 2035. The resource mix would need to transition resiliently to carbon-free sources like renewables and nuclear, which are characterized by high fixed capital costs and low variable costs. The efficiency of the deregulated electricity markets in facilitating such a scenario remains in question, particularly as the clean credit pricing necessary to help finance these projects would be capped by a possibly less than sufficient alternative compliance payment.

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TORYS' TOP M&A TRENDS FOR 2012

Global market uncertainty continued in 2011, resulting in an uneven level of mergers and acquisitions activity in North America and internationally. In these challenging economic times, two things are increasingly important to M&A players: innovation and deal certainty.

Torys' M&A lawyers are looking ahead to 2012 and this is what they see.

1. Canadian Clubs and Other Limited Partner Co-investments Will Stay

By Stefan Stauder, Jonathan Wiener and Matthew Cockburn

Leveraged buyout activity picked up in 2011 and is expected to increase in 2012. Although the market has not quite returned to the frothy levels of 2006–2007, the past year saw an increase in large buyouts, including several multibillion-dollar deals. A significant portion of these buyouts reflected a club-deal structure whereby private equity sponsors invited one or more of their limited partners to invest directly in the deal.

Canadian pension funds were particularly active participants in these transactions. For example, the going-private of Kinetic Concepts saw the Canada Pension Plan Investment Board and the Public Sector Pension Investment Board invest alongside Apax Partners in a US\$6.3 billion transaction that was one of the largest LBOs since the Lehman bankruptcy.

While limited partner (LP) co-investments in LBOs are by no means a new phenomenon, we think that the market climate of 2012 will continue to be conducive to these types of deals.

DRIVERS

We believe that continued growth of LP co-investments in large LBOs is driven by three main factors.

First, the amount of equity that a private fund sponsor can utilize in any one deal has shrunk as a result of volatile financing markets and the more challenging fundraising environment. After a short renaissance of 2006–2007 activity levels and financing terms during the first half of 2011, acquisition financing markets turned for the worse following the U.S. credit downgrade and the deepening eurozone debt crisis. As a result, equity contributions have increased to around 45% on recent large LBOs and even higher percentages on some mid-market transactions.

At the same time, private equity fundraising is down significantly from the all-time highs of 2006–2007. As overall fund sizes have shrunk, so have the amounts

that private equity sponsors can put to use on any single deal. With less acquisition financing available and smaller amounts of equity that can be deployed, transactions that once were within a fund's reach have become more difficult to execute without a deep-pocketed LP providing additional funding.

Second, many private equity sponsors are in active fundraising mode, despite the challenging macroeconomic environment. As competition for LP investment dollars has intensified, offering co-investment opportunities to an LP is often an important inducement to locking up a commitment to a new fund.

Third, certain LPs – and particularly certain Canadian pension funds – have expanded their internal infrastructure, staffed up and geographically diversified their investment teams. As a result, these LPs are now seen as value-added partners that can bring more than just money to an investment opportunity.

OUTLOOK

The benefits of LP co-investments are increasingly recognized and appreciated by deal-making professionals, both on the limited partner and on the sponsor side. We believe that LP co-investing can be a win-win proposition and that the stars are well aligned for more GP-LP clubs in 2012.

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2. Corporate Spinoffs Will Continue to Be an Attractive Way to Return Value to Shareholders

By Cornell Wright, Michael Siltala and Daniel Raglan

The year 2011 saw a record number of spinoff transactions as companies searched for ways to return value to shareholders in the face of challenging market conditions. Assuming these conditions hold, as seems to be the market consensus, we think spinoffs will continue to be an important trend in 2012.

Companies have traditionally relied on M&A strategies to pursue growth. However, market volatility has made valuation challenging, which in turn is making it difficult for companies to buy and sell assets. In particular, the broad IPO market has been stagnant for some time, effectively ruling out IPOs as an option except in very limited circumstances. In addition, although credit markets are open, they have been volatile, and lenders are requiring borrowers to contribute increasing amounts of equity.

Boards of directors are also under

increasing pressure from investors, who are themselves under pressure to deliver returns. At one time, activism was limited to hedge funds and other investors focused on short-term returns. That is no longer the case. Institutional investors, including many of the large Canadian pension funds, have become increasingly vocal and effective in pressing boards of directors and management of public companies to consider changes to corporate strategy and direction. In the past, these organizations focused primarily on corporate governance and disclosure. Many of the recently announced spinoff transactions followed investor demands that companies consider optimizing their business portfolios (e.g., to separate high-growth businesses from low-growth businesses or to move similar sets of assets into distinct publicly traded entities).

Spinoffs can be undertaken in a variety of circumstances. Some are breakups in which the company is divided into two or more major public companies. Others involve a company distributing a segment of its business that is no longer core to its overall strategy or valued by investors; the expectation is that the business will benefit from more focused management and be more attractive to investors as a stand-alone company.

Although spinoff transactions do not require a company to negotiate price and other deal terms with a third party, many complex legal issues need to be considered. Some of the major ones are discussed below.

Board decision making. The board of directors must be satisfied that a spinoff is in the long-term best interests of shareholders and other stakeholders. The benefits and burdens of the spinoff need not be shared equally among affected stakeholder groups; however, the board must strive to treat all groups fairly, balancing their respective interests in light of their legal rights and reasonable expectations.

Separation of assets, liabilities and people. Management and advisers will need to undertake thorough due diligence of the company's business in order to decide how to separate the assets and liabilities of the two companies. Those decisions are significant because they may affect each company's growth prospects and risk profile.

Matters affecting business prospects. Since a spinoff results in the creation of two independent, publicly traded companies, it tends to give rise to business and legal conflicts that the board and management must resolve.

Management compensation. A spinoff will require modifications to management incentive arrangements – for management of both companies.

Securities regulation. Securities laws

in both Canada and the United States require companies to provide extensive disclosure to shareholders in connection with a spinoff transaction. The nature and extent of regulatory review will depend on the circumstances.

Tax. In both Canada and the United States, a spinoff may be accomplished in a manner that is tax-free for both the distributing company and its shareholders, provided that certain detailed requirements are satisfied.

In Canada, a tax-free spinoff is accomplished through a "butterfly" reorganization that generally requires a number of steps to be implemented as part of a court-approved plan of arrangement.

In the United States, the primary requirement is that the distributing company must "control" the company being spun off before the spinoff (an 80% vote and value test) and must distribute all the stock and securities in the controlled company or enough stock to constitute control.

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3. Government Priorities Will Drive M&A Activity

By Patrice Walch-Watson, Mark Bain and Jay Romagnoli

Governments around the world are facing intense pressure to meet a daunting set of challenges: increase revenue, reduce debt-to-GDP ratios, upgrade aging infrastructure assets and operate more efficiently. How to "do more with less" is not a new conundrum, and a frequent government response has been to adopt a strategy of "more steering and less rowing" in the delivery of public infrastructure and services. Global financial and fiscal pressures suggest governments will be compelled to accelerate the transformation of their business models so that they become more of a regulator and less of a direct owner and operator of capital-intensive activities.

For the private sector, a newly restructured set of relationships with government (whether as regulator, counterparty, vendor or partner) could be equally profound. We think 2012 will be a year in which governments will be key players in driving M&A activity in Canada, the United States and around the world.

NEW PRIORITIES MEAN NEW TRANSACTIONS

Governments will be forced to make increasingly difficult decisions on whether and how to ration and reallocate their precious resources. They will be drawn to exploring different types of business

relationships and transactions with the private sector to accomplish their fiscal goals, including

- privatization through sale of government assets or businesses to the private sector;
- broader partnerships with the private sector through joint ventures, market competition and concessions with specified durations; and
- infrastructure investment through public-private partnerships.

GOVERNMENT M&A CAN BRING DIFFERENT ISSUES

Given the particular asset classes and parties involved, government-driven M&A activity can involve some unusual bells and whistles. Being sensitive to the different contexts and imperatives will be key to concluding successful transactions with government. Here are a few:

- **Process.** Government M&A processes need to be clear and well-communicated, often to the general public as well as to the transaction participants. Transparency of process is increasingly important to governments, market participants and the public.
- **Asset assessment.** Assessment of the quality of, and risks associated with, government-held assets and services and (in some types of transactions) cash flow will be important.
- **Regulatory and legislative framework.** In privatization transactions involving the sale of mature government assets, a new (or expanded) regulatory regime may need to be established (particularly in the context of a natural or government-created monopoly) to ensure that the new owners (or concessionaires) can suitably prosper – but at an appropriate price to the public.
- **Revenue use.** Governments need to have clearly enunciated uses for the revenues their transactions will generate and, in some cases, a method for “locking in” what happens with the revenue. Deals will need to be structured or marketed with these revenue requirements in mind.
- **It’s not just about money.** While a government needs to ensure that fair value is realized for its taxpayers, it often has other measures of success it is looking to achieve, such as ensuring that the transaction will generate additional long-term economic activity within its borders.
- **Dealing with the public.** Government M&A transactions are evaluated in the court of public opinion and not strictly on a financial basis.

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4. The Enforcement Bar Will Be Raised Under Competition and Foreign Investment Scrutiny

By Dany Assaf, Christopher Caparelli and Neville Jugnauth

The predominant trend in the Canadian competition and foreign investment landscape for 2012 is enforcement. Although approvals under the Competition Act and the Investment Canada Act have always been important milestones in the completion of merger transactions, recent enforcement trends are making them even more critical.

Similarly, in the United States, recent revisions to the Hart-Scott-Rodino Antitrust Improvements Act and the Justice Department’s lawsuit to block the merger of AT&T and T-Mobile reflect the implementation of President Obama’s campaign promise to step up antitrust enforcement.

We expect that this enforcement activity will affect how M&A deals are done.

Several recent events suggest that in 2012 – being an election year in the United States – the Obama administration’s anti-trust efforts will ratchet up into high gear.

First, the HSR Act was substantively revised in August 2011 for the first time since 2005, and the changes are the most comprehensive in decades. The broader scope of review resulting from this revision may cause more transactions by Canadian pension plans and private equity funds to come under the U.S. antitrust microscope.

In addition, in August 2011, after criticism that the Antitrust Division had not been doing enough to stop anti-competitive combinations through the use of litigation, it sued to block the US\$39 billion merger of AT&T and T-Mobile, which would have created the largest wireless carrier in the United States.

These legislative developments have provided regulators in both Canada and the United States with greater flexibility and broader powers to fulfill their mandates. And, within a growing enforcement environment, the regulators are willing to use these expanded tools in appropriate circumstances. Parties would be wise to keep the following in mind in transaction planning and execution in this new enforcement environment:

- Most enforcement “taboos” have been broken – be prepared for anything.
- Think strategically about all key stakeholders and when and how to consult with them.
- Have integrated, multidisciplinary and, as necessary, cross-border professional teams assembled (including government and media relations) and a strategy for local and national concerns.
- Stay ahead of process, such as document production, to mitigate timing and negotiating leverage risks.
- Negotiate broader and detailed risk and responsibility provisions in deal documents to account for increased enforcement scenarios.

Although regulatory compliance has always been a key part of transaction planning, lessons can be learned from recent enforcement actions and regulatory reviews. Merging parties are well advised to stay at the front of this learn-

ing curve when developing their execution strategy.

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5. Reverse Break Fees Will Become More Sophisticated

By James C. Tory and Andrew J. Beck

Reverse break fees – fees paid by the buyer to the seller on the failure of an agreed transaction – are becoming an increasingly standard contractual tool, along with break fees payable by the seller, for allocating the risk of non-consummation of the deal. We expect this trend to continue with reverse break fees being used in strategic transactions as well as in private equity transactions, where they first made their appearance. We further expect to see increasing nuance in the crafting of reverse break fees, with more differentiation in fee amounts between reverse break fees and the break fees prescribed for sellers; and also differentiation, depending on the event that triggers the reverse break fee, in both the amount of the fee and the exclusivity of the fee as a remedy for the seller.

Break fees payable by the seller have long been a feature of the M&A landscape. Delaware law requires the seller’s obligation to close to be subject to a “fiduciary out” in the event of a superior proposal from a third party; this has become a standard term in all U.S. and Canadian M&A deals. Equally standard is provision for the seller to pay a break fee to the buyer in the event of the seller’s exercise of the fiduciary out.

What Are the Trends in Reverse Break Fees?

1. Increasing use of reverse break fees in strategic deals.
2. Less symmetry between reverse break fees and seller break fees.
3. More nuance in the structure of reverse break fees. Key variables include the following:
 - Triggers for the fee
 - Amount of the fee
 - Exclusivity of the reverse break fee as a remedy

The continuing evolution of reverse break fees illustrates the ability of contract, through innovation, to refine the allocation of deal risk. Given the increasing use and utility of reverse break fees as a protection of seller interests, a seller must give careful consideration to reverse break fees as a component of any M&A deal.

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CARRILLO - IN PURSUIT OF GREEN ENERGY

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moved forward under the assumption that half of the project could be completed and operational by fall 2011. Start-up and commissioning is currently underway. They are currently seeking the remaining \$30 million needed to fund the project, and hope to remain on track to complete the entire project by early 2014. As the largest geothermal project of its kind in the U.S., several hundred contractors and suppliers will be employed as a result. An estimated 2,300 direct and indirect jobs will be created.

Ball State contracted with several companies working together to drill 1,800 boreholes to a depth of 400 feet containing two loops. These contractors included Messer, TL Stevens Well Company, McKeever, Dedicated Geothermal Drilling, Moss Drilling, Ortman Drilling and Dilden Well Drilling. Contractors have begun the work on a portion of the remaining 1,800 boreholes that will be drilled 500 feet deep containing one loop. These contractors include Messer Construction, En Link and Dedicated Geothermal Drilling.

SHARING THE KNOWLEDGE

The implementation of this large-scale geothermal technology has also served as an educational opportunity that crosses the boundaries of several disciplines. The university’s geology faculty, for example, is using this as a research opportunity for students. They will use monitoring wells, placed strategically around the borehole site, to observe water and ground temperatures, as well as the flow of underground water.

In its third year of implementation, project managers at Ball State are evaluating the progress and compiling lessons learned in order to guide other universities facing comparable obstacles, to implement similar projects.

Hundreds of leaders in sustainability have visited Ball State University to date, in order to learn about this one-of-a-kind system. More than 30 universities across the U.S. have reached out to Ball State University leaders in order to learn about executing similar undertakings.

“When people visit Ball State to see the system, they are impressed with the system design,” Lowe said. “After learning more about the project, including the lessons learned, they take away the knowledge that such a project could be implemented nearly anywhere.”

At completion, the ground-sourced, closed-loop project will supply the heating and cooling needs for the entire Ball State University campus.

“Renewable energy enthusiasts worldwide are talking about the Ball State geothermal project,” Lowe said. “We hope we can be examples to others on how they can do this just as effectively.”

OWENS - STOP DIVIDEND TAX HIKE

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DIVIDEND INCOME

If left to expire, the maximum tax rate on dividend income will skyrocket from 15 percent to as high as 43.4 percent. The top tax rate on capital gains, meanwhile, will rise from 15 percent to a maximum of 23.8 percent.

Keeping tax rates on dividends low and on par with those on capital gains is particularly important for the electric power industry.

Electric utility companies paid out 59.2 percent of their earnings in the form of dividends last year.

The next highest payout ratios among U.S. business sectors were Consumer Staples at 44.6 percent, and Industrials at 31.3 percent.

STOCKS IMPACTED

The dividends that utilities pay help to make their stocks more attractive to investors. And through their stock sales, utilities can get the investment capital they need at a lower cost.

Higher dividend tax rates also can reduce the perceived value of a company's stock and reduce the incentive for new investors to become shareholders. Because corporate interest expenses are tax deductible, but dividend payments are not, increasing taxes on dividends will encourage more corporations to favor debt financing over equity financing.

As you know, the electric utility industry is one of the most capital-intensive industries in the country. We face enormous capital requirements to fund a wide variety of the initiatives.

These investments are building clean energy facilities that range from large nuclear plants to small renewable-energy projects, as well as state-of-the-art, coal-based generating units and high-efficiency combined-cycle natural gas plants.

They are automating distribution networks, and replacing analog electric meters with advanced digital meters. And they are preparing for the advent of mass-produced electric vehicles that are just now entering the U.S. market.

INFRASTRUCTURE INVESTMENTS

Today, these investments by our industry total approximately \$80 billion per year on infrastructure—about twice the amount that we were spending a decade ago. Transmission investment accounts for a growing percentage of our capital expenditures.

In 2010, shareholder-owned electric utilities and stand-alone transmission companies eclipsed the \$10-billion mark for the first time.

Distribution investment held steady at \$16.9 billion. This transmission investment represents almost a 10.0 percent increase over 2009 investment levels (nominal \$), and a leap of about 90 percent from a decade earlier (after adjusting

for cost increases).

Since the beginning of 2000, the industry has made a cumulative investment of \$82.5 billion in transmission in real 2010 dollars. Looking ahead, we expect the annual level of transmission investment to rise to more than \$13 billion by 2014.

Given our huge capital expenditures to build an industry that is cleaner, smarter and more efficient than ever, maintaining access to capital on reasonable terms is vital.

CAPITAL INVESTMENT PROGRAMS

Importantly, these capital investment programs also are a source of high-quality jobs and they are often among the largest employers in a given state.

In a weak economy with concerns about unemployment, state utility regulators, utility management, company employees and local communities all agree that financially healthy utilities and the good jobs they offer serve everyone's best interest.

Keeping tax rates on dividend income low—even for high-income taxpayers only—and taxing dividends at the same rates as those for capital gains also will benefit the tens of millions of Americans who own dividend-paying stocks either directly, or indirectly through mutual funds.

The lower rates also support the value of stocks held in life insurance policies, pension funds, 401(k) plans, or individual retirement accounts.

Seniors and retirees in particular will benefit. In fact, taxpayers age 50 and older file almost two-thirds of all tax returns with qualified dividend income, according to data from the U.S. Internal Revenue Service. And taxpayers age 65 and older file close to a third of these returns.

With interest rates at record low levels—a policy the Federal Reserve is likely to keep in place through 2014—many of these seniors and other investors are looking at dividend-paying stocks as a safer alternative to other investments.

STUDY BY JP MORGAN

According to a February 2012 study by J.P. Morgan, total dividend distributions jumped from \$340 billion in 2008 to about \$680 billion in 2011; another big jump is expected in 2012. The study cautions that “the current premium that investors are placing on dividend-paying stocks may be negatively impacted by a change in tax rates.”

Raising tax rates on dividend income and taxing dividends at higher rates than capital gains will hurt investors and businesses in another way as well.

Stock market investors will face lower tax rates if they move from investing in companies that pay dividends to

buying growth stocks that typically don't pay dividends, or to investing in debt investments such as corporate bonds.

TAXED TWICE

This has the potential to lower the dollar amount (percentage rate) by which companies ordinarily increase their dividends and could reduce the stock value for all shareholders.

As a result, Americans who own dividend-paying stocks will take a double hit—not only will they be paying higher taxes on their quarterly dividend checks, but they will also likely see the value of their stocks fall.

And because the market is forward-looking, the fear is that their stock prices will fall sooner rather than later.

If this happens, all taxpayers who receive dividend income would be affected, regardless of their income level.

Another factor that Congress needs to consider is that shareholder income is already essentially taxed twice. The company pays a corporate income tax on its earnings, which reduces the amount of net income that can be paid out to shareholders in the form of dividends.

The top U.S. integrated dividend tax rate is currently 50.8 percent (when both corporate and individual tax levels, as well as state taxes, are factored in), according to a February 2012 study prepared for the Alliance for Savings and Investment by Ernst & Young.

If Congress and the President don't act to stop a dividend tax hike, the top U.S. integrated dividend tax rate will rise to 68.6 percent—the highest level among developed nations.

A recent Bloomberg Government report looked at studies conducted in 1992 by the Treasury Department.

The Bloomberg Government report looked specifically at what would happen if individuals excluded dividends from their taxable income, eliminating the double taxation of dividends.

Bloomberg contends in their analysis that the exclusion of dividends, “may help to encourage companies to increase dividends, giving them more financing, and reduce borrowing, which reduces their debt financing.” Additionally, Bloomberg notes that, “If the tax on dividends is reduced, companies that already pay high dividends per share...may see an increase in investment in their shares without having to change their current dividend payout structure.”

ECONOMIC GROWTH

Finally, raising dividend tax rates will likely slow down the economic growth that has begun. Companies and shareholders make their investment decisions with an eye toward the long-term future.

They know that Congress has acted

in recent years to keep the tax rates on dividends low for all investors, so a future tax increase may not be reflected in current stock valuations.

This raises the likelihood that financial markets and our nation's economy will suffer further if Congress and the President don't act to stop a dividend tax hike.

ENTREPRENEURSHIP COUNCIL

A study by the Small Business & Entrepreneurship Council also found that over the past century, there have been five instances of substantive cuts in the capital gains tax. In each case, the economy benefited. In contrast, there have been two instances where an increase in the capital gains tax clearly had a negative impact on the economy:

- The capital gains tax rate steadily rose from 25 percent to 49.1 percent over the period from 1968 to 1976, and over that time, average annual real economic growth underperformed the post-World War II average (3.0 percent vs. 3.5 percent).

- With the capital gains tax hike in 1987 came slower economic growth. From 1987 to 1996, real annual GDP growth again underperformed – averaging only 2.9 percent compared to the post-World War II average of 3.5 percent.

Time is quickly running out on today's dividend tax rates. With the still-fragile economy finally starting to show signs of recovery, now is not the time to reduce dividend income through higher taxes and punish Americans who invest in our nation's future.

Edison Electric Institute and its member electric utility companies urge you to visit the Defend My Dividend website—www.DefendMyDividend.org—to learn more about this important economic issue and join millions of other Americans in telling Congress to stop a dividend tax hike.

ABOUT THE AUTHOR

David K. Owens is Executive Vice President of Business Operations at the Edison Electric Institute. Mr. Owens has responsibility over the strategic areas of energy supply and the environment, energy delivery, energy services, and international affairs.

Mr. Owens previously served as EEI's Senior Vice President of Finance, Regulation, and Power Supply Policy. He also represented the industry in the areas of finance, ratemaking, regulation, accounting, and taxes. Prior to EEI, Mr. Owens served as Chief Engineer of the Division of Corporate Regulation of the Securities and Exchange Commission.

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HOME SMART ENERGY NETWORKS

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ty systems, “smart” appliances, and telephones. A HAN will allow a consumer to monitor and manage energy usage and remotely monitor and control electric appliances. In-home displays will allow a consumer to keep informed of current energy usage and the cost.

AMI systems and HANs can coordinate to reduce usage of high-load devices such as air conditioners and pool pumps. With time-of-use pricing, appliances connected to the HAN can be set to operate only during low-cost energy periods. The goal with all these devices is more efficient energy management – and cost savings to the consumer.

One important aspect of HANs is cyber security. To assist utilities, regulators, and integrators who are deploying and configuring ZigBee Smart Energy Profile 1.0 and/or Smart Energy Profile 1.1 (collectively referred to as SEP 1.x) in field devices, the EPRI-led National Electric Sector Cybersecurity Organization Resource (NESCOR), the Smart Grid Interoperability Panel (SGIP) Cyber Security Working Group (CSWG), and other experts jointly developed a technical white paper that provides guidance on the use of SEP 1.x. The results were published as EPRI white paper, Smart Energy Profile (SEP) 1.x, Summary and Analysis, Technical Update 1023055, December 2011. There are two objectives for the white paper. First, assist stakeholders in understanding the potential vulnerabilities in SEP 1.0 and 1.1. Second, provide stakeholders with actionable advice on how to mitigate or minimize these potential vulnerabilities and implement best practices and mitigations. Following are highlights from the white paper.

SEP 1.X SUMMARY AND ANALYSIS

Load control capabilities in Home Area Networks (HANs) are an integral part of the smart grid and energy efficiency modernization efforts currently underway. Like other smart grid systems, HANs are vulnerable to cyber attacks and adequate security measures are needed. The SEP 1.x specifications present a communication framework for HAN devices along with a security framework. SEP 1.x is being deployed by several utilities. In addition, some states, such as Texas and California are deploying SEP 1.x in the HANs to give customers the benefits of the product, including addressing cyber security requirements.

The ZigBee SEP 1.x specifications are very detailed. To assist users in understanding the specifications and the security analysis, several representative system architectures were developed. Two of these logical architectures are included below. All logical architectures include Trust Centers, which are a critical component in the configuration, deployment, and maintenance of a secure HAN. The ZigBee Trust Center Best Practices document defines policies and roles for the Trust Center but these

are specified as best practices and not requirements. These best practices should be assessed and recommendations made on whether some, or all, of the best practices should be requirements. Use cases may be developed to assist in this analysis. In addition, cyber security failure scenarios may be used in determining how to configure a Trust Center.

A comprehensive assessment of the security of the SEP 1.x specifications includes an analysis of the security functionality, security controls, cryptographic primitives, and mapping of security requirements. In addition, stakeholders need to understand the differences between versions SEP 1.0 and 1.1 of the specifications, to understand the applicability of each specification to their HANs.

As cyber security threats, vulnerabilities, and environments constantly change, the SEP 1.x specifications will need to be revised, particularly in the area of cryptography. Some of the cryptographic primitives included in the SEP 1.x specifications will be deprecated by the National Institute of Standards and Technology (NIST) or are not approved / recommended by NIST. All proposed revisions should be considered for future updates to the SEP 1.x specifications. In addition, the technical recommendations should be assessed against the SEP 2.0 specification.

The SEP 1.x specification is focused on HAN deployments. There are several other network architectures connected to the HAN, such as a Neighborhood Area Network (NAN), backhaul networks, and other non-ZigBee interfaces within a HAN. These networks do not use ZigBee technology or their architectures and security are not sufficiently detailed in the SEP 1.x specification.

REPRESENTATIVE SYSTEM ARCHITECTURES

Smart energy networks primarily have two types of devices - a smart meter which bridges a HAN to a NAN and ZigBee home devices that are part of a single HAN. Smart meters and HAN devices use ZigBee to communicate across the network. The SEP 1.x specification allows for different network topologies. One topology is where ZigBee devices join a smart energy network coordinated by a smart meter. In this topology, a smart meter coordinates network management and security. In a second topology, the ZigBee devices do not join a smart energy network but create a home area network for the consumer called a Consumer Private – Home Area Network (CP-HAN). In a CP-HAN a device creates an application level bridge between the smart energy network and the CP-HAN. This device is called an Application Layer Gateway (ALG) and is the ZigBee network coordinator for the CP-HAN. Networks with smart meters acting as the coordinator are called Utility

Enabled – Home Area Networks (UE-HAN). In another topology, the ALG is the ZigBee network coordinator and Trust Center for the CP-HAN. In this third topology there is no UE-HAN and the smart meter provides the usage data (and optionally the public pricing data) to the ALG acting as an information sensor.

Following are two representative architectures where SEP 1.x is deployed. Figure 1 depicts a Utility Enabled HAN (UE-HAN) and its connection through a utility meter to a utility backend environment. In this architecture, a smart meter coordinates network management and security. Figure 2 depicts a home area network called a Consumer Private – Home Area Network (CP-HAN). In a CP-HAN, a device (called an Application Layer Gateway (ALG)) creates an application level bridge between the smart energy network and the CP-HAN. The white paper only addresses the UE-HAN and the devices registered with the utility. The CP-HAN and the customer-owned devices on the CP-HAN are outside the scope of the white paper.

TRUST CENTER

The Trust Center in a ZigBee HAN has the responsibility of network coordination, network security, and network management. As such, the Trust Center is the central device in the ZigBee network. Most of the vulnerabilities identified in various security analyses documents can be addressed by proper usage of the ZigBee specifications, SEP 1.x specifications, and deployment of a robust, extensible, and flexible Trust Center. A flexible and extensible approach will make it possible to further improve security by implementing additional measures when new security vulnerabilities and threats are identified.

POTENTIAL VULNERABILITIES, MITIGATIONS, AND BEST PRACTICES

There are many potential vulnerabilities, impacts, and mitigations when deploying, configuring, and implementing SEP 1.x. First, there are vulnerabilities, impacts, and mitigations related to the requirements included in the SEP 1.x specifications, including deprecated cryptographic algorithms and link keys and network keys vulnerabilities. Second, there are vulnerabilities and mitigations for implementation specific requirements that are outside the scope of the SEP 1.x specifications, but that are applicable to ensuring the security of the operational system. Some examples include: access control, devices leaving the network, detecting malicious devices, and key updates. Third, there are best practices, such as for the Trust Center, certificate management, and key domain overlaps. Fourth, there is security functionality that is outside the scope of the SEP 1.x specifications, such as customer privacy in the CP-HAN, restricted physical access to the meter, plug in vehi-

cles, and distributed energy resources that allow devices in the HAN to put energy back into the grid. All of the potential vulnerabilities and impacts should be assessed and mitigated to ensure that the cyber security requirements of SEP 1.x and the operational environment are met.

NEXT STEPS

Securing the Trust Center is only one component to securing the HAN. Areas remaining to be addressed include the practical and operational steps needed to ensure a secure HAN deployment; including ensuring that requirements are met and associated vulnerabilities are mitigated. These additional areas are outside the scope of the SEP 1.x specifications, but necessary to securing the HAN.

After an organization deploys a Trust Center, the deployed and operational hosting system must remain secure. This will require the development of a set of cyber security test scenarios specifically for the Trust Center. This effort should leverage ongoing efforts such as an AMI security test plan being developed by the EPRI-led NESCOR team. Applicable requirements and guidelines developed by standards bodies and regulatory agencies should be used in all the efforts identified above.

CONCLUSION

With the deployment of smart grid technology, including smart meters, HANs, and intelligent appliances, securing the communications among the various devices and with a utility is critical. The SEP 1.x specifications include cyber security requirements applicable to a stakeholder's HAN and interconnected devices.

ABOUT THE AUTHOR

Ms. Lee is a Technical Executive in the Power Delivery and Utilization Sector of EPRI.

From 1996 to 2010, she was a Senior Cyber Security Strategist at the National Institute of Standards and Technology (NIST). She led the Smart Grid Cyber Security Working Group (CSWG) at NIST. Annabelle established the CSWG, defined the work program, and defined the cyber security and privacy strategies for the Smart Grid. The CSWG published the NIST Interagency Report (NISTIR) 7628, Guidelines for Smart Grid Cyber Security in September 2010. The NISTIR is being used throughout the United States and has been adopted by both China and Sweden.

Annabelle was detailed to the Department of Homeland Security (DHS) for four years. At DHS, Annabelle was the Director, Standards, Best Practices, and R&D Requirements Program and the Director of the Supply Chain Risk Management (SCRM) Program within the DHS National Cyber Security Division.

Annabelle has a BA from Stanford University and an MA from Michigan State University.

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