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Green Trade Wars Heat Up

↘ JOBS AND RICHES GO TO THE VICTOR

WOMEN RISING

↘ EXECS THRIVE IN MALE WORLD. HOW?

STOCK STARS

↘ HOW DOES YOUR COMPANY COMPARE?

DUKE'S INDIANA HEADACHE

↘ TAKEAWAY LESSONS LEARNED

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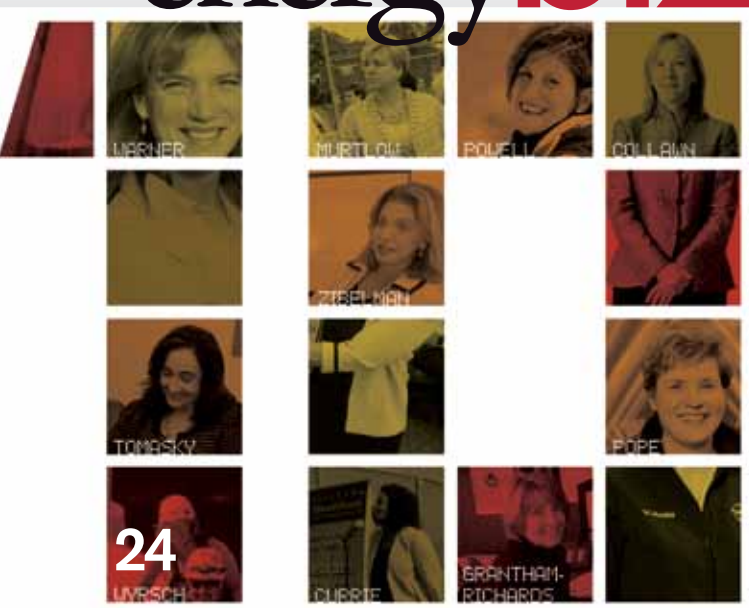

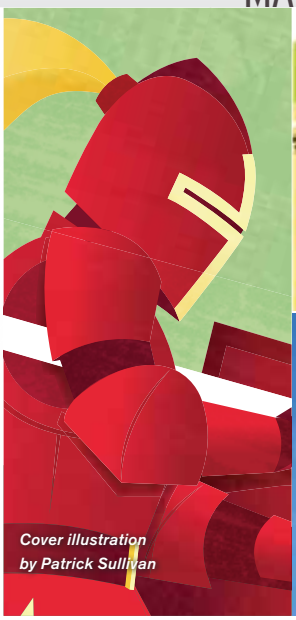
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FEATURES

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Looming Energy Trade Wars

INTERESTING TIMES

DECADES AGO, AS A NEWSPAPER reporter, I covered the trade battles between America and Japan. Japan kept its markets largely closed, satisfied an insatiable American appetite for its cars and electronic gadgets and bought up a swath of America – from Hawaiian golf courses to Manhattan trophy real estate.

That all eventually ran its course, with Japan getting mired in a decade-long economic downturn.

The 21st-century energy technology trade conflicts may bedevil us for a much longer period of time and have sweeping, enduring consequences.

Clyde Prestowitz, the respected president of the Economic Strategy Institute in Washington, was a leading adviser to Ronald Reagan on the trade disputes of the 1980s. His analysis of global trade competition – and America's vulnerability on that front – is a part of our cover story.

"China, India and others are cleaning America's clock in virtually all areas of green technology," Prestowitz writes. "China, and to a lesser degree, India, make it difficult for foreign companies to export to their markets. … The result of all this is that America has pretty much lost the green-tech game before it has even started to play."

Ever since the dawn of the industrial age, the world has moved through several eras. Countries' fortunes surged and ebbed based on how they caught each wave.

Now that wave is a revolution in energy technology.

So it is troublesome when a Massachusetts solar manufacturer – the third-largest solar panel maker in America – decides to close shop, lay off 800 workers, and shift production to a joint venture in China.

China knows where it wants to go. Its investments in clean energy last year soared 30 percent to more than $51 billion, more than any other country and more than one-fifth of total global spending on green energy, according to recent news reports.

That is not all. China is intent on building 245 nuclear reactors and has a $511 billion war chest to back up that ambition. That would mean China would erect more than 2.5 times America's existing nuclear fleet.

Clearly, China's plans to spend massively on renewables and nuclear power will mean its enterprises will become global giants. As they address China's internal build out they will be marching across America, Europe and the rest of the world seeking opportunities to transform the energy landscape with Chinese technology.

There is only one reasonable response. We must work hard to understand the global energy earthquake in the making, and then formulate a strategy.

Several utilities are already active in China in intelligence-gathering mode, sharing new technologies and management insights. American Electric Power has announced it will partner with China's largest power generators to study carbon capture technology.

There is more than enough work to be done in China, America and beyond. It is estimated that 1.6 billion people on Earth have no electricity.

Every utility, every engineer working on power projects, every state and federal lawmaker and regulator must recognize that vast new riches and jobs will go to the enterprises and communities that best understand and best pursue the new opportunities opening up in the energy sector.

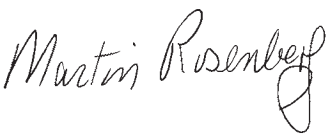
The bold and ambitious will be rewarded. Ignoring the overarching transformation taking place is not an option.

One case in point: Solar panel prices have dropped precipitously in recent years and solar power will soon bloom on millions of America's roofs. Rhone Resch, the president of the Solar Energy Industries Association, predicts flat out that by 2014–2015, "solar will be the fastest-growing source and largest annual new source of electricity coming online in the United States."

If you are an out-of-work builder or roofer, you need to know that is a possibility.

If you sit on the board of a utility planning tens of billions of dollars of transmission investment, you need to know that too.

As the legendary Chinese curse puts it, "May you live in interesting times." Indeed we do.



Martin Rosenberg, Editor-in-Chief

How do you design for future smart grids?

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I enjoy your publication. I find your forward-looking orientation refreshing.

There may well be another game changer out there ["Game Changers," January/February]. Google. It has the potential to bring significant resources and energy to the energy business. I understand its charitable arm is already making great strides in helping consumers track and understand their energy usage.

Phyllis Dube
McFarland, Wis.

I couldn't disagree more with your editorial, "Sputnik Moment," in the July/August issue, which I recently received.

The budget aside, the technology has long been at hand. It is not as lucrative as the various parties you cited might want, but it is as affordable as American businesses demand. The tendency toward expensive new technologies is a dead end. The energy needs of the American economy are as prosaic as the pre-existing technologies.

Patrick O'Leary
Futura Solar
Jacksonville, Fla.

We now have 10 percent of our gasoline mixed with ethanol. I do not understand how a commodity with 50 percent of the energy content of gasoline is useful or valuable for transportation.

Is not the physics of biofuels an important factor in its viability? Is all the effort at R&D and physical plant building not a long-term subsidy by the federal government?

Andrew S. Loebl
Oak Ridge, Tenn.

I have worked within the energy industry for 30 years and I see a great future for renewables ["Land of Rising Sun Power," November/December]. But existing business models don't embrace the necessary small-scale decentralized technology.

Researchers are working on producing liquid fuel with CO_2 as a feedstock and producing hydrogen with solar thermal power.

In the United States, you have some researchers who are working on different concepts than researchers in Sweden.

Peter Platell
Sigtuna, Sweden

As coal-fired units are shut down ["Coal Takes a Back Seat," January/February], will the utility choose to decommission the site, and if so, where will the money come from? Nuclear sites have funding for decommissioning set aside as part of their original licenses, so decommissioning is less of an issue. How will utilities plan and finance an endeavor that will include ash ponds and site remediation?

How will new nuclear plants be funded? Even with government loan guarantees, the financial burden on a utility could be too great.

John Dennis Graves
Worley Parsons
Chattanooga, Tenn.

To contribute to the Letters column, please e-mail your submission to energybiz.editor@energycentral.com. Provide your name, address and daytime phone number. Letters may be edited for style and space.

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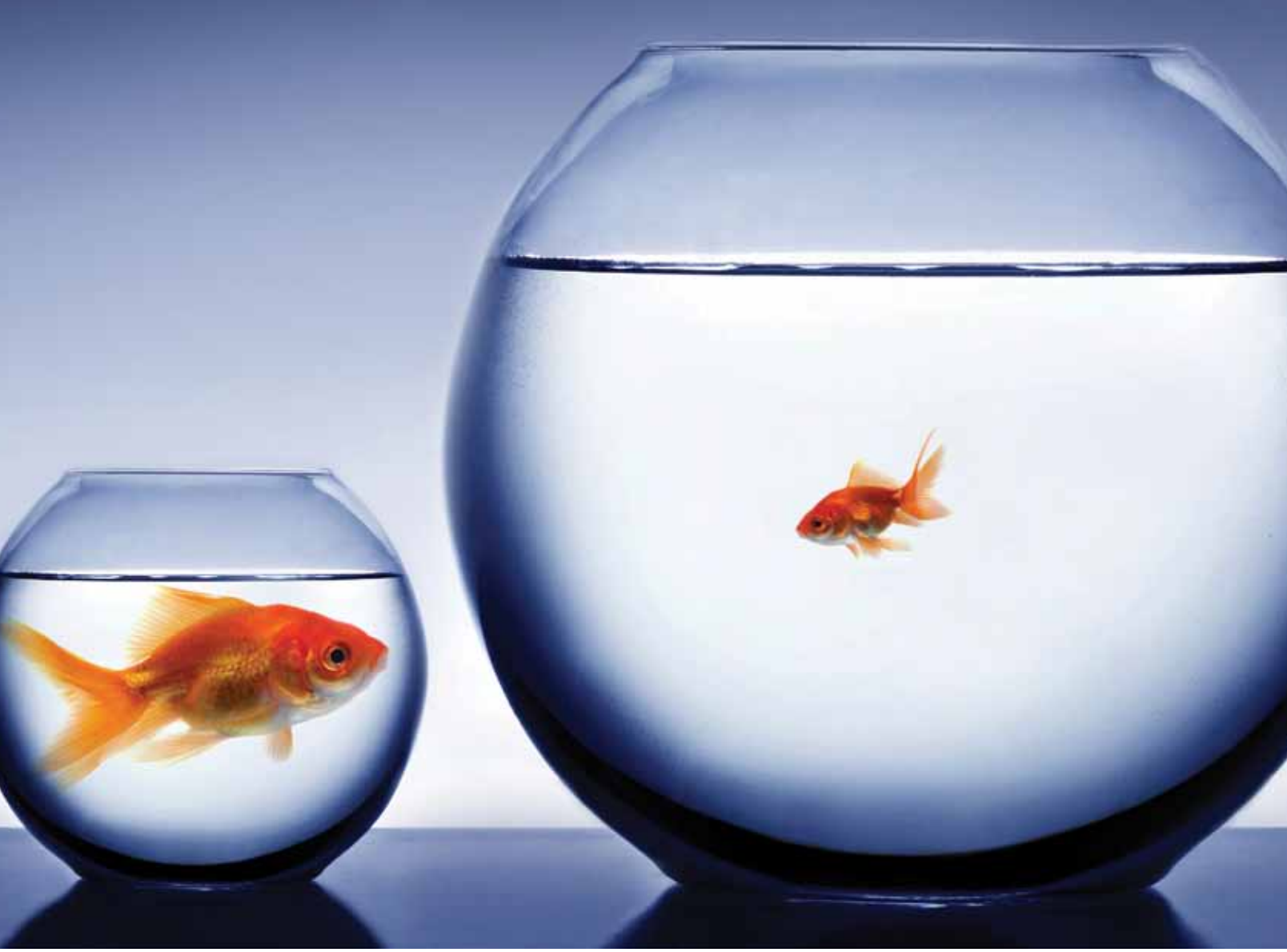

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Stock Stars

SOME SURPRISING WINNERS // BY GARY M. STERN

IN THE REBOUNDING STOCK MARKET of 2010, the energy sector couldn't keep pace with the 11 percent rise in the Dow Jones Industrial Average. Depending on your yardstick, the Dow Jones Utility Index rose 1 percent and the Morningstar Utility Index increased 7 percent, so utility stocks underperformed the market as a whole. Yet certain regional, mid-cap energy stocks shined.

SNL Energy, a financial research firm based in Charlottesville, Va., analyzed the market and identified the top 10 energy stocks of 2010 on the basis of stock price, not including dividend yield.

SOUTH JERSEY INDUSTRIES was a top performer with a stock jump of 38 percent, heading an elite grouping that posted dramatic stock gains.

What triggered the spike in the top utility stocks while so many others rose only slightly or were flat?

Many diversified large-cap utility stocks were sluggish in 2010 due to falling market prices, explained Travis Miller, associate director for utility research at Morningstar, based in Chicago. Utility stocks rose in the first three quarters of 2010, but when the economy rebounded and interest rates rose, utility stocks lagged the market.

NewsFlash

RULES COST JOBS

Thousands of jobs would be eliminated by proposed federal rules to protect streams from coal mines, according to an Associated Press report.

The proposed rules, tightening regulations created during the Bush administration would trim coal production and eliminate 7,000 of the nation's 80,600 mining jobs, according to a federal agency.

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Most top-10 mid-cap energy stocks fall under the radar screen of most analysts, noted Daniel Fidell, a senior utility analyst with the investment banking boutique Brean Murray Carret & Co. For example, South Jersey Industries has a market value of $1.5 billion, Northeast Utilities $4 billion and National Fuel Gas about $5 billion, a fraction of Duke Energy, AEP and Southern Company.

Nonetheless, the top-10 mid-cap energy stocks had "the optimal model for the current environment, supportive regulators helping to recover costs for volatility in earnings, and a forward focus on infrastructure development including replacing aging transmission and expanding gas pipeline and storage development," Fidell said. These activities often yield 12 to 15 percent return compared with about 9 or 10 percent for utility distribution companies.

South Jersey Industries is a diversified holding company that distributes gas to 335,663 residential and commercial customers in Atlantic City and southern New Jersey. Its subsidiaries, such as South Jersey Energy Solutions and SJ Resources, offer solar arrays as well as combined heat and power and landfill gas to electricity projects.

In a December retail report, Value Line's energy analyst Michael Napoli attributed South Jersey's solid performance to several factors: maintaining its thriving retail energy business, gaining new customers who switched to cheaper natural gas over home heating oil, and increasing its dividend 11 percent in 2010 to 36.5 cents a share, which rallied investors.

South Jersey Industries CEO Edward Graham, who is based in Folsom, N.J., pointed to its diversified portfolio: 45 percent of its earnings stem from nonutility subsidiaries selling gas and electric and solar rays, and 55 percent stems from regulated gas customers. Its nonutility businesses grew 20 percent in 2010 while the regulated gas business increased 5 percent. Other factors included a September rate increase that added $10.9 million to earnings and its investment in Marcellus Shale in western Pennsylvania. In fact, its earnings increased 16 percent on average over the last five years, so it wasn't a one-year wonder but had sustained growth.

Diversification drives South Jersey Industries. Its multiple revenue streams include "making money from production, getting paid as a marketer, owning interstate pipelines," Graham said.

One analyst, whose company does not permit him to be quoted, said, "Though South Jersey is a well-run and stable company, you can't bank on steady growth. Its earnings didn't increase 40 percent," he said, so don't expect that 38 percent return this year. Graham counters that its regulated gas industry should grow more than 5 percent in 2011, Marcellus shale investments will continue to pay off, and other projects are in the works.

EL PASO ELECTRIC is a vertically integrated electric utility with 370,000 retail customers in western Texas and southern New Mexico. Its CFO, David Carpenter, says its stock spiked due to a growing customer base driven by the rapidly expanding Fort Bliss Army base. The base grew from 9,000 troops in 2005

TOP TEN POWER AND GAS UTILITIES

BY PRICE CHANGE (%) IN 2010

	UTILITY TYPE	PRICE CHANGE
South Jersey Industries	**Gas**	**38.34**
El Paso Electric	**Electric**	**35.75**
National Fuel Gas	**Gas**	**31.24**
UGI	**Diversified**	**30.55**
Chesapeake Utilities	**Diversified**	**29.55**
Southwest Gas	**Gas**	**28.53**
ONEOK	**Gas**	**24.46**
Northeast Utilities	**Diversified**	**23.61**
OGE Energy	**Diversified**	**23.45**
Corning Natural Gas	**Gas**	**22.86**

Source: SNL Financial

to 24,000 troops in 2010 and is on target for 33,000 soldiers by 2012. Moreover, El Paso received two rate hikes, a $5.5 million hike in 2009 in New Mexico and a $17.2 million hike in Texas in 2010. In the fourth quarter, its announcement that it was exploring issuing its first dividend also sparked the stock price.

This year, Carpenter expects steady growth but downplayed expectations, noting that a repeat of its 36 percent spike from 2010 was unlikely.

NATIONAL FUEL GAS is a diversified natural gas and pipeline utility that serves 730,000 customers in Buffalo, N.Y., and Erie and Sharon, Pa. But treasurer and principal financial officer David Bauer, who is based in Williamsville, N.Y., noted that its stock rose not from its stable regulated business but from natural gas exploration and production. Key to the growth was its drilling in the Marcellus Shale in western Pennsylvania, which yielded 428 billion cubic feet of natural gas in 2010, an increase from 249 billion cubic feet the previous year.

National Fuel owns 740,000 acres of Marcellus Shale and has only begun to take advantage of the vast natural gas reserves there. It drills in 65 wells and is expected to add 100 to 130 wells in 2011. Because of that added capacity, Bauer sees no reason the company can't continue its growth.

Tim Winter, a utility analyst with Gabelli Funds, reinforced Bauer's view, saying that the company's stock rise was attributable to "growing market recognition of its undervalued and significant natural gas reserve positions" associated with a roughly 800,000 acre ownership position in the Marcellus Shale, including 745,000 acres in the Pennsylvania fairway. He also noted steady income from its mature regulated gas and pipeline and storage business.

What will 2011 bring for utility stocks? Morningstar's Miller isn't bullish on the energy sector because he sees weak or volatile commodity pricing slowing earnings for many utilities. Based on the performance of the top 10 stocks in 2010, small and mid-cap utilities that drill in the Marcellus Shale for natural gas and have diversified businesses that look promising.

(GUEST OPINION)

Emerging Leaders

BURGEONING MBA ENERGY CLUBS // BY K. QUENTIN BURCHILL

I CONTEND THAT ONE'S INTEREST in a particular hobby, field of study, and career starts early. Usually brought about through some belief or idea that takes root in the fabric of your being and that you nourish and grow through education and activity into a full-blown passion and professional pursuit. From marine biologists to doctors there are many whose chosen field could be traced back to a belief or idea that ignited a passion. The current wave of young, talented professionals migrating into the energy sector was borne from that process.

The energy sector was not always the subject of dinner table conversation and not always one of the key initiatives of corporations, individuals and politicians. But it certainly seems to be now. Pick up a newspaper, go to any corporate mission statement, look at the agenda of any politician and you will read and hear something about the energy sector and the environment. Our collective conscience believes the environmental stability of our planet is in jeopardy. This belief has taken root in the minds of many young people, and it has become their passion to do something about it.

NewsFlash

BRAZIL ENERGY USE UP

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Brazil's energy consumption jumped 7.8 percent last year as its economy recovered strongly, according to Asia Pulse Data Source.

Industrial consumption of electricity increased 10.6 percent, compared with 2009.

Overall energy use this year is expected to increase 5.4 percent.

Colleges and universities are developing courses and curricula that focus on the environment and the energy sector. Many of the most respected institutions of higher learning in the United States now have degree programs, elective coursework or school-sponsored events driven by the strong interest in energy and the environment. What I have also seen is a proliferation of energy- and environment-focused clubs, especially at the prominent business schools, that are now attracting talented young men and women to discuss topics not covered in the classroom.

Some of these clubs are newly chartered, riding the wave of this global attention to the sector, while some of them have been around for a while but are just now experiencing strong membership growth and attention. Business schools at MIT, Duke University, the University of Texas, the University of Michigan, Cornell University, the University of Pennsylvania, Harvard University and many others have student-formed and administered clubs that regularly meet to share ideas, discuss relevant topics, and hear guest speakers to generally supplement their coursework and prepare them for a career in the energy and environment field. I have had the privilege of meeting and regularly speaking with a great number of these students, and one can't help but be excited about the flood of talent that is coming into the energy field.

> **"... one can't help but be excited about the flood of talent that is coming into the energy field."**

These future leaders are bright, well-educated, and have a passion for the environment and the energy sector that developed from a concern and interest in the future of the planet. The face of the industry is now transforming from the smoky gray color of a utility to an emerging green color of growth and sustainability in renewable energy and clean technologies.

The young men and women graduating from today's business schools are driving the change.

We want to leave a lasting legacy for the next generations, and affecting the planet in a positive way is a profound and important way to do so. We are in good hands with these young men and women who are passionate about saving the planet and have the smarts to know what to do.

K. Quentin Burchill is managing director for energy for the Angott Search Group.

Gatherings//Financial Front

April 8-10	Young Professionals in Energy	Las Vegas
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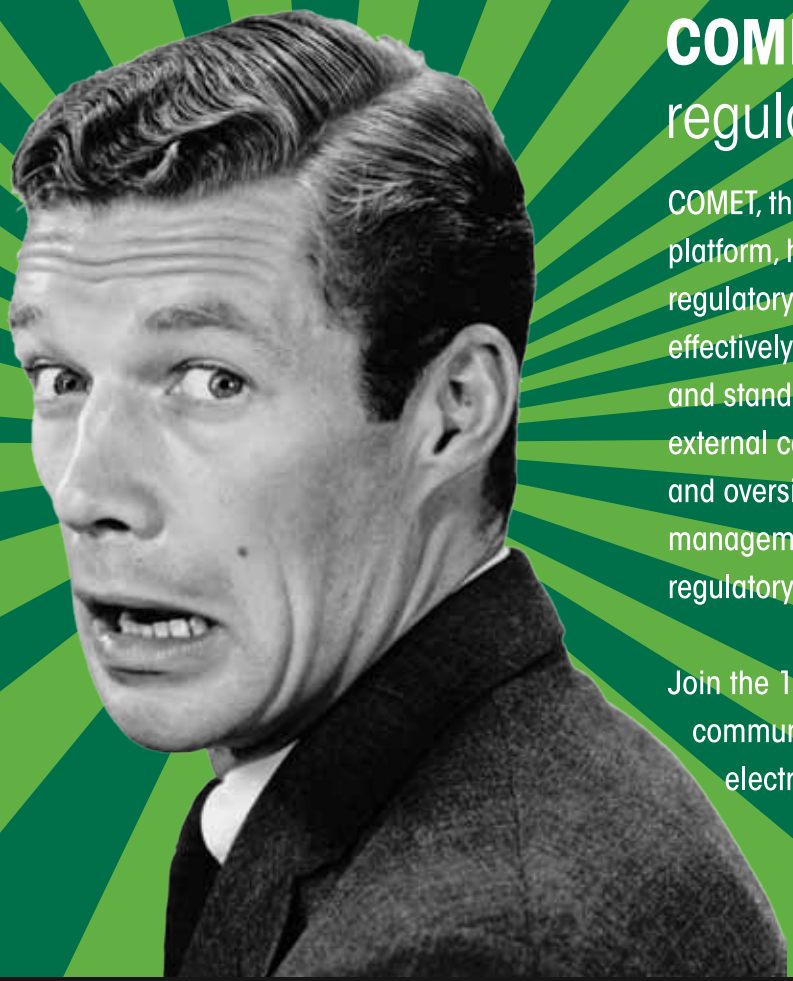

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Green Trade Wars Heat Up

RIVALS SEEK GLOBAL ECONOMIC DOMINANCE

BY DARRELL DELAMAIDE

GREEN ENERGY, WHICH THE OBAMA ADMINISTRATION hailed as the solution to American unemployment, may instead become the battleground of a new trade war.

And the fighting may take place not only in rapidly growing emerging markets like China and India, but also in the U.S. market itself — still the biggest market for renewable energy and the one most open to foreign competitors that often benefit from subsidies or protection at home.

In the meantime, the federal stimulus money for green energy investments that was supposed to create new jobs in the United States mostly ended up in China, critics charge, raising hackles in Congress.

"There has been some political backlash," acknowledges Matt Kaplan, associate director of North American research at IHS's Emerging Energy Research.

Last year, he notes, a controversy erupted over Cielo Wind Power's plan to buy 240 wind turbines from China for a $1.5 billion wind farm in Texas with stimulus funds covering 30 percent of the cost. Angry lawmakers in Washington demanded that restrictions be put on stimulus spending so that they benefited American workers.

"Lots of stimulus money went to China, and not just for green energy," says Kevin Kearns, president of the U.S. Business and Industry Council, which represents small and medium-sized manufacturers. "Many things bought with stimulus money are things we no longer make."

Many of the components for wind turbines and solar cells have become commoditized, giving an automatic advantage to countries with low-cost production. In addition, China and India, among others, protect their domestic manufacturers with subsidies and high local-content requirements.

To be sure, there are countervailing trends. Partly in reaction to the political backlash, and partly because it's simply more efficient to assemble wind turbines near the actual market, foreign producers, including Goldwing of China and Samsung of South Korea, are investing in manufacturing capacity in the United States.

Solar energy, notes Jason Eckstein, a research associate at Lux Research, is a relatively immature industry and still very fragmented, so that U.S. companies with innovations in design can keep a competitive edge.

For huge multinationals like General Electric, which operate manufacturing plants around the world, such trade restrictions are less important because they can install capacity in China or India to meet local-content restrictions.

> **"In just a few years, we've gone from being potentially No. 1 to playing catch-up."**

"GE shareholders may benefit, but not American workers," Kearns observes. "I disagree that what is good for GE is good for America."

The new round of anticompetitive measures in emerging markets comes after European subsidies to wind and solar equipment suppliers helped domestic companies there gain substantial global market share. Denmark's Vestas is the world's biggest supplier of wind turbines, while Germany's Siemens and Spain's Gamesa are also major players. German solar cell manufacturers like SolarWorld benefited from generous tax breaks granted to residential solar use.

But now Chinese manufacturers, nurtured in their home market through subsidies and preferential contracts, have captured about half of the global market for wind turbines. Also, most other manufacturers of wind turbines outsource much of their component production in China.

Using their advantageous cost structure, these Chinese manufacturers now are targeting the U.S. market, where

they don't face the same restrictions U.S. manufacturers face in China.

"They will dump as much as necessary to win market share in the United States," Kearns says.

India has embarked on an ambitious national solar mission to install 20 gigawatts of new solar capacity by 2022, but it is restricting foreign producers by imposing stringent local-content requirements for crystalline silicon solar modules and for solar thermal equipment. A recent study by Lux Research tipped India as the fastest-growing market for solar energy.

But, says Lux Research's Eckstein, U.S. or European manufacturers should not expect to be competitive in the crystalline module India is protecting.

"You don't really want to be in the business of making commodity products in high volume," he says. Instead, Eckstein says, Western companies should be focusing on "disruptive technology" that is competitive by being more efficient.

So, for instance, the thin-film cadmium telluride cells produced by First Solar, among others, are exempt from the local-content restrictions in India because this advanced

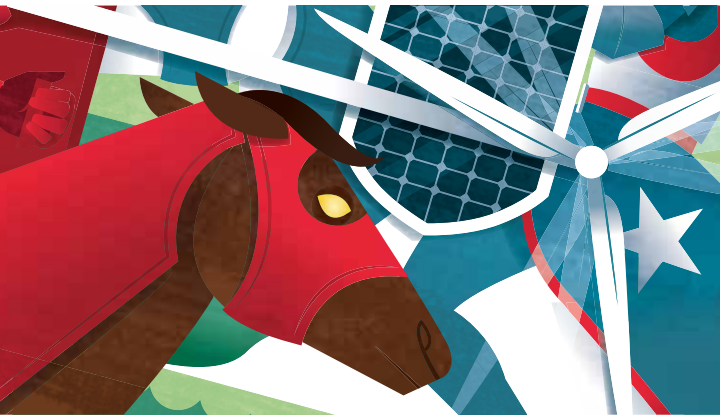
technology is produced in a single process and requires a much bigger capital investment upfront. However, First Solar manufactures only 17 percent of its solar cells in its U.S. plant in Perrysburg, Ohio, with the rest made in Europe or Asia.

The Business and Industry Council's Kearns cautions, however, that U.S. producers should be under no illusions that innovation can continue unless U.S. companies can also be involved in manufacturing.

"R&D and manufacturing are inextricably linked," he says. "R&D will be done where manufacturing is done. There's a feedback loop in developing these products."

In fact, when GE in December announced the sale of another 248 wind turbines in Brazil, the company noted it was investing $200 million for new wind turbine and aeroderivative product developments in that country, including its newest multidisciplinary research and development center in Rio de Janeiro.

Some experts think the main advantage enjoyed by Chinese companies is not the low cost of labor. "Labor costs



are the least important factor," says Ian Bowles, who was state energy secretary in Massachusetts until the end of last year. "Government-backed capital is the most distinguishing factor," he says.

Massachusetts, for instance, wooed Evergreen Solar to the state with $43 million in state aid. The company built a new factory in Devens in 2008 — too soon to benefit from federal aid in the stimulus program, but just in time for the cratering in solar cell prices that threw all of Evergreen's cost calculations out of whack.

As a result, the company said in January it will shutter its brand new Massachusetts facility in favor of building a new plant in China with substantial government aid.

"We supplied 8 percent of their capital needs," Bowles says, "and China is supplying 60 percent. No state can compete with that."

Bowles blames the U.S. Congress for failing to adopt a renewable energy standard or a clean energy standard to remove the uncertainty regarding investment in the United States and unlock capital for American producers.

"There's been a real lack of commitment at the federal level," he says. "In just a few years, we've gone from being potentially No. 1 to playing catch-up."

EER's Kaplan agrees. He says the future of the U.S. industry depends on getting overarching legislation from Congress on renewable and clean energy. "That's going to be the linchpin in creating a more stable industry," he says.

In addition, Kearns says, the United States has to get serious about leveling the playing field for U.S. companies to produce at home.

"You can't beat something with nothing," he says. "You can't beat a heavily subsidized industry in China by talking it up in the United States."

It's not so much a question of matching the Chinese subsidy for subsidy, but, in addition to formulating a comprehensive energy policy, also enacting more industry-friendly measures like a reform of corporate income tax and an easing of the regulatory burden that applies across the board to American manufacturing. Where dumping is involved, it might require more radical measures, such as a border tax on certain imports.

In the meantime, few U.S. companies seem eager to seek redress for protectionist practices in China or India. They prefer instead to go for whatever part of the action they can get, generally partnering with local companies that can obtain the subsidies and contracts.

A case that the U.S. government is finally bringing against China over wind turbine subsidies demonstrates how ineffective the clunky enforcement machinery for trade agreements can be. The Office of the U.S. Trade Representative in December sought consultations with China under World Trade Organization provisions for dispute settlement.

The consultations, which go back to a petition filed in September by the United Steelworkers, concern a single subsidy fund that specifies local-content requirement in contravention of WTO rules. However, this fund was only one of several items in the USW petition. Prior to going to the WTO, the USTR found in bilateral consultation with China that two other subsidy funds were no longer active and China promised to end certain other discriminatory practices.

For the USTR, the move to the WTO is an example of how it works to enforce U.S. rights under trade agreements. "For U.S. companies to continue to grow and innovate in clean energy technology, it is important that all countries producing clean energy products and services follow international trade rules and policies that encourage trade and investment," affirms USTR spokeswoman Nkenge Harmon.

For U.S. manufacturers, however, such interventions offer little relief. Says former Massachusetts official Bowles: "It really is a case of fiddling while Rome burns."

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(GUEST OPINION)

Losing the Game Before it Starts

THE ENERGY TRADE BATTLE SHAPES UP

BY CLYDE PRESTOWITZ

IN THE COURSE OF CHINA'S PRESIDENT HU JINTAO'S recent visit to Washington, there was much talk of opening China's market to the exports of American high-technology goods and services, especially including green technology products.

It sounded logical and, of course, it was soothing to Americans to be pictured as the quintessential makers and exporters of high- and green-tech goods and services. But that only begged the question of exactly which green-tech goods and services America would be exporting to China and other emerging markets like India.

Indeed, the question was only sharpened by President Barack Obama's visit to a General Electric plant in Schenectady, N. Y., after the president named GE Chairman Jeffrey Immelt his chief outside economic advisor. The plant is currently making power-generating steam turbines for export to India, and the visit was meant to highlight America's competitive export capabilities.

The only problem is that steam turbines aren't high tech. In fact, they're exactly what China, India and the rest of the world are trying to get rid of in order to get greener. So the question remains, just exactly what green tech is America going to export, or even buy for itself, or even produce in America.

For sure, it won't be wind turbines or advanced batteries or solar panels. Of course, the United States does have programs to promote and even subsidize development of these industries to a certain extent. But let's take a look at what just happened with Evergreen Solar in Massachusetts.

Evergreen is the producer of a new, cutting-edge type of solar cell that more efficiently turns sunlight into electricity. Because the company is young and remains in the early stages of commercialization of its technology, it has been operating at a financial loss. It applied for a large grant from the U.S. Department of Energy under the department's program aimed at fostering American solar cell development. But Evergreen's application was turned down on the grounds that its product is too commercialized to qualify for a developmental grant. The state of Massachusetts, where Evergreen employs 800 people, did make a grant of about $50 million to the company on the basis of the expectation that Evergreen would help turn Massachusetts into a global center of green-tech manufacturing and development. Yet recently, Evergreen announced that it would be moving all of its production to China and laying off the 800 people it employs in Massachusetts by the end of March.

Nor is this the only such example. Last year, GE and BP both shut their U.S. solar panel plants and moved them to China. Also last year, solar panel production equipment maker Applied Materials not only moved all of its solar equipment production to China, but, in addition, the company moved its R&D center and its chief technology officer to China as well. And it's not just solar panels. The same goes for wind turbines, advanced batteries, clean coal and other green technology.

China, India and others are cleaning America's clock in virtually all areas of green technology. Partly, this is because for environmental reasons they have made major commitments to going green. Thus, both China and India have launched massive programs to install wind turbines, solar panels, advanced batteries and clean coal technology and are already spending far more than the United States in buying and deploying equipment. China is by far the world's largest market for virtually all green-tech products and India is following close behind. Because these are industries with economies of scale, producers must obtain a large share of these markets in order to remain cost competitive.

Here's where the other part of the situation kicks in. China, and to a lesser degree, India, make it difficult for foreign companies to export to their markets. For example, China's buying of green-tech equipment is mostly done by the government, which strictly enforces a "buy China" policy that forces foreign companies to produce goods in China and to transfer technology to China if they wish to sell there. At the same time, China also offers tax holidays, free infrastructure, R&D funding and large capital grants that amount to billions of dollars — far more than Massachusetts can offer, for example — to companies like Evergreen if they move their production to China.

Although many of China's subsidies and policies conditioning market access on producing in and transferring technology to China are in violation of global trade rules, the U.S. government has made no formal complaints.

The result of all this is that America has pretty much lost the green-tech game before it has even started to play.

Clyde Prestowitz is president of the Economic Strategy Institute and author of the book, **The Betrayal of American Prosperity.**

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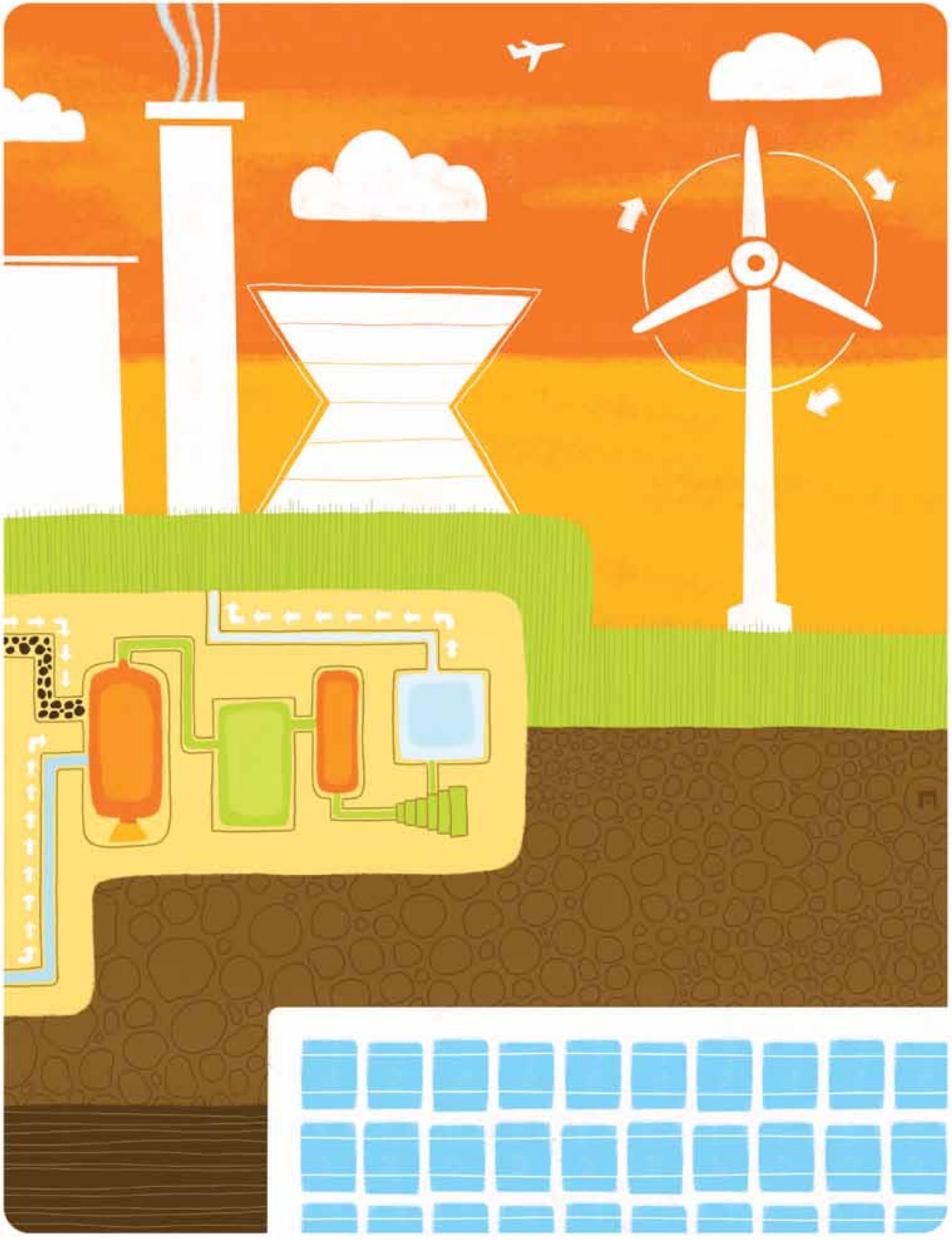

[GUEST OPINION]

Coal Generation Outlook

THE END OF AN ERA

BY DEAN OSKVIG

JUST FIVE YEARS AGO, FEW WITHIN THE INDUSTRY believed that coal's reign as the primary fuel source for U.S. electric power generation would come to an end in their lifetime. In 2006, 19 new coal projects were under construction and coal fueled approximately 50 percent of all U.S. power generation. Although coal will likely remain the primary fuel source for the next 10 years, its market share has already begun to erode, giving way to the coming new era that will be fueled by natural gas.

Dean Oskvig

Diverse factors contribute to the approaching re-positioning of the U.S. energy portfolio that will end coal's reign as our nation's primary fuel source. Among these factors are new, pending and potential federal greenhouse gas regulations; projected low natural gas prices and abundant supply for the foreseeable future; public sentiment; and restricted access to capital for carbon-intensive projects.

Of immediate consequence is the U.S. Environmental Protection Agency's suite of proposed new air, waste and water regulations, and if all are enacted within the current proposed timeline, many will require full compliance within the next five to 10 years. Approximately 16 percent of existing U.S. coal-fired generation will be retired rather than face the cost of compliance. By today's numbers, that could reduce coal's share from half to just over a third of the energy mix.

Natural gas will be our "new coal." The Marcellus Shale alone is estimated to have enough gas to power the entire Northeast for nearly 50 years. And, with plentiful supply, conventional wisdom suggests fuel costs will remain stable and low — similar to our country's vast coal resources.

Power generation demand for natural gas will grow 2.6 percent per year through 2035, when it will account for approximately 40 percent of the nation's energy mix. During that same time frame, coal's contribution will fall and represent just one quarter of the power generation fuel source. Signs of this new era in fuel supply are already apparent. The U.S. Energy Information Administration projects 80 percent of all new added generation between now and 2013 will be from natural gas-fueled facilities.

Coal's role in the development of the United States into a superpower is unquestioned. It was coal that powered the U.S. into and through the Industrial Revolution. It was coal that fueled the steam locomotives as pioneers and gold rush seekers aimed to fulfill the country's Manifest Destiny. It was coal that kept our manufacturing efforts continuously going throughout World War II, helping to bring our country victory in Asia and Europe. And, it was coal that provided our booming population with reliable and cheap electricity that customers nationwide have come to expect and enjoy today.

There is no question that coal's reign as our leading fuel source for electric generation will come to an end. There is also little doubt that although coal's role will be smaller, it will still make a significant contribution to the energy mix for the foreseeable future. The debate now centers on how much and how fast the U.S. energy mix will change.

Dean Oskvig is president and chief executive officer of Black & Veatch's global energy business.

[GUEST OPINION]

A Federal Assist

BOOSTING CARBON CAPTURE AND STORAGE

BY JAMES F. WOOD

ACCORDING TO THE ENERGY INFORMATION AGENCY, annual global energy-related CO_2 emissions have reached 31 billion metric tons. This increase in atmospheric greenhouse gas is considered by many scientists to be a contributing factor in global climate change. Last year, the United States emitted about 5,800 million metric tons of CO_2, and if left uncontrolled, it is estimated the United States will emit about 6,930 million metric tons of CO_2 in 2035.

The U.S. Department of Energy's Office of Fossil Energy, including its National Energy Technology Laboratory, manages a carbon capture and sequestration research and development program, including a portfolio of 9 large-scale demonstration projects, all focused on developing technologies with significant potential to mitigate greenhouse gas emissions. An important component of this research is support of the seven Regional Carbon Sequestration Partnerships; public and private partnership programs that include 43 states, four Canadian provinces and over 400 research institutions, private sector companies and local governments.

> "The uncertain regulatory and legislative environment ... has resulted in reductions in research and development budgets ..."

The regional partnerships' activities are sequenced in characterization, validation and development phases: the characterization phase concluded in 2005 and developed an estimate of CO_2 sequestration potential; the validation phase will conclude in 2011 and will provide data on the most promising regional opportunities to deploy CCS; the development phase has commenced and involves injection of more than 1 million tons of CO_2 into regionally significant geologic formations.

Injection includes substantial monitoring and verification instrumentation to ensure the injected CO_2 remains in the formation and the plume moves in a predictable manner. The most recent estimate of CO_2 sequestration storage resources in the United States and western Canada is between 1.8 and 20.5 quadrillion tons — approximately 5,700 years of storage capability.

The large project demonstration program seeks to integrate advanced carbon capture technologies with CO_2 sequestration through deep saline storage or use in enhanced oil recovery. The program includes projects that will capture CO_2 subsequent to combustion, integrated gasification and combined cycle projects, the capture of CO_2 from industrial processes, and oxy-combustion technology. Last year, federal support, through stimulus and clean coal appropriations, amounted to $3.4 billion and through cost-sharing requirements, leveraged about $7 billion of private sector financing for these projects.

Assuming all projects remain on schedule, significant capital and operating cost data, including construction and schedule information, will be available in the 2015 time frame. Additionally, over $600 million of appropriations has been directed to accelerate project component research into sorbents, solvents, membrane separation, compression and combustion turbine technologies that promise reductions in parasitic load and in operating expenses associated with carbon capture and sequestration for industrial processes as well as for coal- and gas-based electrical generation.

The uncertain regulatory and legislative environment facing electricity generators has resulted in reductions in research and development budgets, as well as deferments in capital and maintenance expenses.

Half the U.S. fleet is unregulated, but even regulated generation is experiencing a backlash from state public service commissions intent on avoiding large rate increases. No new coal-fired project has commenced in the last two years, no doubt in part because the myriad and staggered

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environmental requirements make it difficult for investors to commit funds with great uncertainty about the useful life of an asset.

Substantial wind and solar power have been built in parts of the country where those resources are most available and predictable. But intermittent power cannot replace baseload, and fossil baseload will be required until the cost and risk uncertainty of nuclear generation are resolved and new technology develops reliable and commercial-scale storage of off-peak intermittent power. The DOE's research and demonstration programs are intended to help develop cleaner baseload generation so indigenous fossil resources will be available for generation until economical nonfossil technologies become commercial.

James. F. Wood is the U.S. Department of Energy deputy assistant secretary of fossil energy and clean coal. He is the former president and chief executive of Babcock Power.

[GUEST OPINION]

Carbon Storage Successes

PILOTS ARE PROMISING // BY PHILIPPE JOUBERT

CARBON STORAGE TECHNOLOGY IS ADVANCING BOTH IN Europe and America even in the face of financial, technical and regulatory challenges.

Alstom currently has six major carbon capture and storage pilot installations in operation and another two under construction. We even have second-generation technology at an advanced stage of development in our laboratories. As previously announced, we are also working on five large projects for commercial-scale demonstration, which will test three different capture technologies on a variety of fuels and at a scale of 250 megawatts, each due to store over a million tons of CO_2 per year.

Those five projects are still on track to be operational by 2015.

On the technical front, based on the feedback received from our industrial pilot program, I am increasingly confident that we will be able to overcome the scale-up challenges. We can already demonstrate capture rates of over 90 percent and very high purity CO_2 can be delivered for geological CO_2 storage. The cost estimations derived from our development program also indicate that commercial CCS will be competitive, like any other technology capable of delivering decarbonized power, including nuclear and onshore wind. The technology is the least of the challenges that remain.

However, there are other challenges over which we have much less direct control. These include the regulatory advances worldwide, achieving the financial closure of large-scale projects, and also public acceptance of CO_2 storage.

Starting with regulation, we are seeing strong progress worldwide. The European CO_2 Storage Directive has already been transposed into a legal framework in countries like France, Austria, Finland and Belgium, while work is well advanced in the United Kingdom, Spain and the Netherlands. Progress is a little slower in Germany and Poland, but I'm reasonably confident that we will have the regulation in place by the end of the year.

> **We can already demonstrate capture rates of over 90 percent and very high purity CO_2 can be delivered for geological CO_2 storage.**

In the United States, there is no federal regulation in force, but we have seen significant initiatives emerging in key states like Illinois, Texas, Michigan, Louisiana and Montana, where important issues like long-term storage liabilities are being clarified. Canada's key province of Alberta has just introduced a new bill, currently under review.

Overall, progress has been strong, and I trust that we will eventually get the tools we need, where we need them. The question is the timing. As regulation sets the schedule, industry relies entirely on the diligence of various administrations for their project development agenda.

We have also seen an impressive track record of funding schemes dedicated to large-scale CCS emerging in the last two years. In Europe, it has amounted to 3 billion euros, or $4 billion. In North America, $3.4 billion has been dedicated to the the Clean Coal Initiative. Canada has earmarked $3 billion for such efforts. Despite this impressive effort, and the dedication of all stakeholders, financial closure of CCS projects remains a significant challenge in most cases. This is owing to the fact that there is not yet a clear business model emerging for CCS. In Europe, we have the CO_2 Trading Scheme, but the CO_2 price is not high enough to justify CCS, and there is no long-term visibility. In North America and Canada, federal legislation on cap and trade failed to pass, and the only current business model is enhanced oil recovery, whereby CO_2 is sold to operators to improve the recovery rate of their wells. But that potential is far too scattered and intermittent to support true widespread deployment of CCS. Finance will therefore remain an issue until governments decide either to give a strong and stable price to carbon, or to create an even playing field through regulation or tariffs for all decarbonized energy production technologies, including CCS.

Finally, geological storage of CO_2 comes with its own public communication challenge. While on the technical front, the oil and gas industry has developed all the necessary tools to explore, monitor and verify selected sites to ensure safe and permanent storage, a major educational effort lies ahead in explaining this technology to the general public. This is obviously more a concern for onshore than for offshore storage. In a densely populated Europe, I strongly believe in storage clusters and in the future of offshore operations to overcome this issue.

This year will be a critical year for CCS. Governments, in partnership with industry, must urgently address — and solve — the challenges that remain. Those governments that are the fastest in unlocking the regulatory hurdles will determine which region will lead this technology in the future.

I am confident in the final outcome owing to the strong, continued motivation of all stakeholders.

CCS is moving closer to widespread deployment.

Philippe Joubert is president of Alstom Power.

Women Rising

TEN LEADERS IN A MALE WORLD

BY LISA COHN

THE TOP WOMEN EXECUTIVES AT ENERGY COMPANIES ARE eager to count the reasons they love their jobs.

They're bringing to the public an essential product — energy, and that feels good, they say. What's more, the industry is constantly changing, so no two days on the job are alike. With each new problem solved, a new one arises. And when these women plan and execute a project — a power plant, for example — they're thrilled when they see the results of their hard work.

"I love being in this industry today," says **Mary Powell**, president and CEO of Green Mountain Power. "It's like solving a giant puzzle. You have to look at the environmental issues and the changes we have to make from a technological perspective, and have to balance that with cost."

Adds **Audrey Zibelman**, president and CEO, Viridity Energy, "I love the intellectual complexity. You're always dealing with new issues. You're dealing with very complex decisions that can positively affect a lot of people."

To address complex problems, the top executives — who have math, theater, journalism, law, public policy and engineering backgrounds — have brought to the industry traditional female qualities, they say. Chief among them are people skills, which they often use to draw different stakeholders together and strike compromises about power plant siting, transmission line projects and other controversial issues.

These executives also say that as females, they work well in teams and know how to communicate about technical issues with their customers and the public.

Says Mark Crisson, CEO of the American Public Power Association, "Not to stereotype all women, but the ones I'm dealing with are very good listeners, and they tend be very

good at relationships. They'll bring different perspectives to things." What's more, women often see problems in terms of people, and take personalities into account when they propose solutions, he says.

Ann D. Murtlow, president and CEO, Indianapolis Power & Light, a former engineer, says she enjoys the business because it allows her to interact with a lot of people. "I believe in consistent and frequent communication whenever I can get it." She likes to ride around with linemen because it helps her understand the business from their perspective, she says.

However, for these women, it wasn't always easy making their way into positions that allowed them to take advantage of these female traits in a male-dominated industry.

"Being a woman is not without its challenges," says **Susan Tomasky**, president of AEP Transmission, who first became interested in the industry as a congressional intern during the oil embargos of the 1970s, and worked as an attorney specializing in energy during the 1990s.

"When you enter a big organization that's all engineers, establishing credibility becomes a challenge," she says.

Maude Grantham-Richards, electric utility director for Farmington Electric Utility System, says she had to prove that she didn't get her job simply because she was a minority who was granted a "freebee," she says.

Perry, who has been in the industry for more than 30 years, says that in the early years, she had to develop a thick skin and find ways to boost her confidence in the male-dominated world.

Like Perry, many of these top executives have been in the energy industry for 20 years or more. They can now speak with confidence and pride about their contributions. So do others in the industry.

Phyllis Currie, general manager of Pasadena Water and Power, is proud of the utility's goal of providing 40 percent of the company's power with renewable energy by 2020. That's even higher than the state of California's ambitious goal of 33 percent renewable energy. "I think my contribution really has been to foster a willingness to address environmental impacts, to work in collaboration with my colleagues here in California and as part of APPA to create initiatives that help make a change," she says.

Martha Wyrsch, president of Vestas American Wind Technology, says her contribution is communicating to the general public the benefits of the wind industry. "I think the wind industry is a bit unique in that it is a new form of energy. It is becoming better understood and adopted, yet not fully understood," she says.

Wyrsch has played a key role in better informing the public, says Denise Bode, CEO of the American Wind Energy Association. "As one of America's leading woman executives, Martha has an invaluable gift for communication that allows her to convey the wind industry's compelling message."

Tomasky says her gift to the industry is attempting to ensure that public policy addresses development in an environmentally sound manner.

"When I entered this business, my goal was to make sure we did a better job of making sure public policy appropriately complements reasonable and responsible energy development," she says.

While some female executives say they're helping change the industry, others see themselves as setting an example.

Cynthia Warner, president and chairman of Sapphire Energy, says she's demonstrated to the public the importance of embracing the transition to clean energy. "I'm the most senior energy executive to go from Big Oil to renewables," she says. "I'm setting an example about what the future is about. Change is in the wind." A chemical engineer by training, Warner served as an executive with British Petroleum and with Amoco Oil Company before joining Sapphire, which produces green crude oil from algae.

Similarly, **Patricia Vincent-Collawn**, president and CEO of PNM Resources — a journalism major in college — says she's also setting an example. "I've shown you don't have to have a technical background to succeed in this industry," she says.

When these women look to the future, they see the need for big changes. The most pressing challenge the industry faces, many say, will be coping with the cost of new environmental regulations and integrating green resources into the grid.

Says **Maria Pope**, CFO of Portland General Electric, "Our biggest challenge is absorbing the financial impact of dealing with environmental issues and an aging infrastructure and balancing this against the need for reasonably priced power."

Although difficult, the task will also be fun and engaging, the top executives say. And that's why they're in this industry to stay.

"I love my job. I can't think of anything else I'd rather do," says Grantham-Richards. "This is a field you want to stay in. Every day I learn something new."

INDUSTRY LEADERS

Patricia Collawn // president & CEO
PNM Resources

Phyllis Currie // general manager
Pasadena Water and Power

Maude Grantham-Richards //
electric utility director
Farmington Electric Utility System
New Mexico

Ann D. Murtlow // president & CEO
Indianapolis Power & Light

Maria Pope // CFO
Portland General Electric

Mary G. Powell // president & CEO
Green Mountain Power

Susan Tomasky // president
AEP Transmission

Cynthia Warner // president & CEO
Sapphire Energy

Martha Wyrsch // president
Vestas American Wind Technology

Audrey Zibelman // president & CEO
Viridity Energy

A Revolution in Customer Care

FIVE EMERGING, TRANSFORMATIONAL THRUSTS // BY PAUL KORZENIOWSKI

THE AGE OLD ADAGE, "THE customer is king," now rings true at many utilities. "Utilities have been progressing from using their customer information systems to answer billing questions to leveraging them to run their businesses more efficiently," said Zarko Sumic, a vice president with Gartner's energy and utilities industry advisory service.

Because technology has been evolving at a rapid pace, utilities can now use these systems to service their customers in new ways. Recent advances enable them to gain better visibility into their customers' payment histories, reduce maintenance by relying on cloud-based customer service applications, cut costs by empowering customers to examine their account information themselves, support mobile devices, and use social networking sites to keep customers abreast of service outages. To stay current, energy companies will need to understand these new gold-standard capabilities and then determine how to upgrade their customer service systems so they support them.

Traditionally, energy customers have been a captive audience, one that is unable to change service providers. Consequently, the bulk of the calls that have come into energy company call centers have focused on billing questions, such as, "Did you receive my payment?" "What is my current balance?" and "How much of a penalty will a late payment induce?"

With the economy in a tailspin, a growing number of consumers have had trouble staying current with their payments. Consequently, vendors have been

adding tools so utilities can proactively monitor late payments and prod customers to meet payment due dates. For instance, customer service software suppliers have been linking interactive voice response units – computers that leave voice messages – to their billing systems so utilities can place calls that alert customers about impending payment problems.

This change delivers a couple of benefits. First, it frees time for contact center agents so they can focus on customers in such severe delinquency that they are in danger of having their service disconnected. Timelier payments are another benefit. "Financial advisers were telling our customers to pay their utility bills last, which resulted in some of them having their energy turned off," explained Aundrea Jackson, manager of the customer access center at Puget Sound Energy, which provides electrical power to more than 1 million customers and natural gas services to in excess of 800,000 consumers in the Pacific Northwest area.

Rather than wait to call customers once their bills had reached the delinquency stage, the utility tweaked its Varolii Payment Processing system and started calling customers as soon as a payment was late. Many customers returned the calls and were able to work out various payment plans, including automated payments, so their energy remained on and the utility eventually collected its revenue.

LOOK UP TO THE CLOUD

Cloud computing has become quite popular. In fact, market research firm Gartner pegged worldwide spending on cloud services at $68.3 billion last year, a 16.6 percent increase from 2009 revenue of $58.6 billion. In 2014, the company expects that number to reach $148.8 billion.

So what is cloud computing and why is it generating so much interest? Here, vendors rely on Internet connections to provide computing resources such as software, computing power and storage to customers. One reason for its popularity is that it offloads routine maintenance functions such as upgrades and software patches from a utility to its software vendor. The change enables energy companies to cap their IT support costs.

Salesforce.com was one of the first software suppliers to use this approach, and its customer service system has proven to be quite popular. Enernoc supplies energy management IT solutions to more than 8,200 companies worldwide. The company had a homegrown customer service system but decided to look for a commercial system a few years ago. After looking at a handful of products, Enernoc opted for Salesforce.com. "We liked the flexibility that a cloud-based system offered," said Gregg Dixon, senior vice president of marketing at the energy software supplier.

People power is the main cost in energy companies' customer service centers. Estimates are that an electronic bill costs one-tenth as much to process as a paper bill. In addition, a few days pass as the paper bill makes its way from the customer's home to the utility whereas electronic transactions happen instantly. The same economics hold true for calls to a service center where customers ask about service availability or the process of starting and stopping service. Consequently, utilities have been trying to prod their customers to trade in their paper communications for electronic interactions.

One challenge is that consumers have a variety of ways to interact with utilities: They can enter information on various devices, including laptops, PCs and

smartphones, and use different communication channels such as online, e-mail, instant messaging and, in some cases, video conferencing. "Utilities are trying to offer consumers more automated customer service options," said Gartner's Sumic.

For example, PSE has rolled out My PSE Account, an online system whereby customers pay bills, manage accounts, report an outage, find ways to cut their energy costs, and start or stop service. Currently, about 250,000 customers use the service, and the utility would like to increase that number. "We are constantly communicating with our customers and trying to make our online services more attractive," said PSE's Jackson.

SUPPORT FOR MOBILE DEVICES

On a related note, computer processing power has become smaller and more compact. Consequently, individuals rely on smartphones, such as Apple's iPhone and Google's Android system, to access important information. This change holds true in the customer service realm. Increasingly, vendors are making it possible for consumers to access their billing and account information via their smartphones.

However, diversity is the challenge for software suppliers. Vendors, such as Apple, Motorola and Samsung, have been constantly developing new cell phones. Each time a new model emerges, the software vendor has to tweak its system to support it.

Compounding that challenge, smartphones could be the next way for consumers to pay their bills. Cell phone technology has been evolving, so these devices can function as portable credit cards, and utilities such as PSE are now evaluating how to take advantage of those emerging features.

Whenever an outage occurs, utilities want to notify customers ASAP. "Twitter is becoming a common way for utilities to notify customers about outages," said Denis Pombriant, managing principal at Beagle Research Group.

When an outage occurs, one challenge is finding a means to contact customers. Twitter has become a common way for individuals and, increasingly, companies, to send and receive short text messages to one another. In fact, the service has garnered 175 million registered users worldwide.

> **"The customer service market has been changing and utilities have to keep pace or they will find themselves left behind by competitors."**

One benefit with this approach is that interested individuals establish contact with a utility rather than vice versa. If a company experiences an outage, it can post a note on its Web site, so individuals will receive updates on their Twitter accounts. This avenue is faster and more efficient than calling or even e-mailing customers when a problem arises.

Technology has become a key factor in the success or failure of many businesses and it is now having a significant impact on how energy companies service their customers. "The customer service market has been changing and utilities have to keep pace or they will find themselves left behind by competitors," concluded Beagle Research Group's Pombriant.

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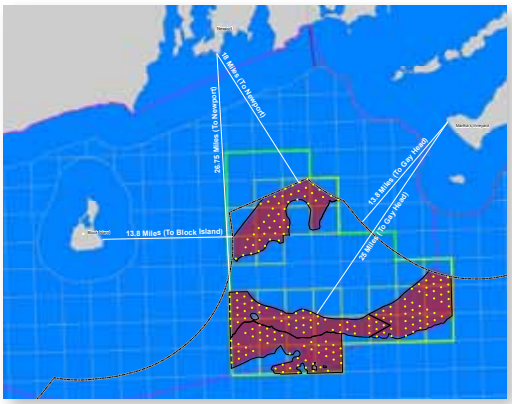
Offshore Wind Accelerates in New England

BIGGER AND DEEPER // BY WILLIAM OPALKA

EVEN BEFORE THE FIRST OFFSHORE WIND TURBINE IS planted along the coast of North America, a Rhode Island developer has embraced the latest European model for seaborne energy development.

Deepwater Wind has been developing plans for several years for a Rhode Island wind farm that would total about 200 megawatts. Those plans were radically altered with the announcement made late last year of the Deepwater Wind Energy Center. A 1,000-megawatt wind farm project to be built in Rhode Island Sound, the Deepwater Wind Energy Center would be barely visible from the shore. Construction is planned to begin in 2014, with the first wind turbines in operation by the end of 2015.



The company's plan always was to build 15 to 25 miles offshore, far away from land and unseen by potential adversaries, in large measure to avoid the permitting controversies that have dogged developments closer to land. The coastal water of the states of Rhode Island and Massachusetts would be affected by this project. Both states have embraced the concept.

Although company officials avoid discussing the Cape Wind project off Cape Cod by name, the message of that 10-year-long saga has not been lost on other offshore developers. Farther offshore, the issue of aesthetics is solved, but other challenges exist.

"You can't just put in 20 turbines 20 miles offshore to make the economics work," said Deepwater CEO William Moore. "As we looked at it more closely, we realized the best way to do this is with a larger-scale project. And we would be building transmission links between southern New England and eastern Long Island."

Changes in the global wind turbine market and the economies of scale also played into the decision. As the Europeans gain more experience developing and operating offshore wind, costs have come down. Improved technology and greater generation potential from larger turbines were also major factors.

"It's only become clear in the last few months that several of the European turbine makers are willing to sell 5- to 6-megawatt turbines into the U.S. market. Until then, we were looking at the medium-sized turbine in the 3-megawatt range," Moore said. "As we looked at the market, and as we looked at the availability of the larger turbines, we realized we could do this. This is how we get to lower costs."

The Thornton Bank expansion off Belgium, which will be using 6.15-megawatt machines built by Repower, is one of the next generations of offshore European wind developments. The fact that projects of this scale with larger equipment have passed muster with the European financial community gives Moore confidence that this model would succeed in North America. Even the turbine costs of $4,000 to $5,000 per kilowatt can be overcome, Deepwater insists.

There are other challenges, like water depths of from 80 to 150 feet, beyond the limits of monopile supports for turbines built closer to shore. Deepwater has taken a page

William Moore, the chief executive of Deepwater Wind, has plans for a major wind development off of Rhode Island.
Photo courtesy of Deepwater Wind

out of the oil and gas drillers' book and believes it has solved that problem. Deepwater will use a lattice tower that might resemble an oil derrick.

Deepwater Wind has partnerships in place in New Jersey with Public Service Enterprise Group, and in New York with Consolidated Edison and the Long Island Power Authority. Deepwater recently moved its headquarters from New Jersey to Rhode Island because that state is much further along with its plans.

Rhode Island has a head start over many other eastern states that have expressed an interest in offshore wind. Its Special Area Management Plan, or SAMP, which all coastal starts must have, has been completed. The several-years-long study considered all of the different uses of coastal waters and the environmental impacts, and which designated areas would be best for offshore wind development.

This process also gives Rhode Island an advantage with the federal Department of the Interior, which has indicated states with a SAMP will be further along with the permitting process.

Deepwater has filed a lease application with Interior's Bureau of Ocean Energy Management Regulation and Enforcement, the office that was created in the aftermath of the Gulf oil spill and that handles permitting issues formerly guided by the Mineral Management Service. This is the first step of federal review. Task forces are organized at the state level in Rhode Island and Massachusetts.

Deepwater's plans for the small pilot project off Block Island are still in place and have been the source of an ongoing controversy about costs. The project would include the first transmission tie-in between the island and the mainland.

"I think if you talk to others in the industry — builders, turbine suppliers and lenders — they are all in agreement that you're much better off starting with a medium-size or smaller project," Moore said.

Deepwater expects power costs for the Energy Center to be in the mid-teens per kilowatt-hour when completed, assuming federal tax incentives currently in place remain. That's a far cry from the 24.4 cents per kilowatt-hour it was able to negotiate with National Grid for the Block Island project, which will number no more than eight turbines. The island, part resort and part nature preserve, has no electricity connection to the mainland and is served by a diesel-fired power plant.

The first negotiations between Deepwater and National Grid resulted in a contract that was rejected by the Rhode Island Public Utility Commission for not being "commercially reasonable." Enabling legislation that supporters say included more consumer protections was passed by the legislature. A new contract between National Grid and Deepwater was approved by state regulators last year.

Opponents called this an end run around regulators to benefit a single project and sued. "Unchallenged, this law and the accompanying PUC decision set precedent that will only undermine the efforts to build a future for renewable energy in Rhode Island," said the Conservation Law Foundation, which otherwise supports offshore wind.

That case is pending before the Rhode Island Supreme Court, with a ruling expected this spring.

In any case, Deepwater knows the higher prices — spread out over National Grid's entire customer base — won't fly if the cost doesn't come down significantly. In New England, that means competing with natural gas. Moore insists that Deepwater will be able to compete on those terms with a source that is expensive to build in that market.

With generally high power prices, state mandates to acquire renewable energy and a multistate compact to cut greenhouse gases, Deepwater will find out relatively soon if it will get that chance.

[GUEST OPINION]

Wind Takes Hold

SPURRING ECONOMIC GROWTH AND JOB CREATION // BY ANDRIS E. CUKURS

BEFORE EASING LAST YEAR, THE GROWTH OF AMERICA'S renewable energy industry was a bright spot in the national economy. In fact, according to the United Nations' "Renewable 2010 Global Status Report," of all the new energy capacity installed in 2009 in the United States, 50 percent came from renewables.

Wind energy has had a significant role in the green energy expansion. Thirty-seven states now have wind turbines generating tens of thousands of megawatts of electricity and millions of dollars in local and state tax revenues and lease payments. In addition, these wind projects have produced 85,000 manufacturing jobs at more than 400 factories, with new jobs created in every state.

As the economy struggles to recover, the wind industry might not bounce back rapidly — much like many other manufacturing industries — but the opportunity in wind energy development and the country's need for diversified energy sources will certainly move wind forward.

In December, Congress passed the Section 1603 investment tax credit extension. The Section 1603 Treasury Grant Program, part of the American Recovery and Reinvestment Act, provided cash grants that helped sustain the wind industry during a time when the tax equity market softened. The program has already provided more than 1,450 renewable energy projects with funding in excess of $5.5 billion. This legislation will continue to create development and production incentives in the wind sector and other renewable energy sectors through 2011.

In addition to the investment tax credit, wind project developers can receive the renewable energy production tax credit. This is a federal incentive for wind energy, offering a credit of 2.1 cents per kilowatt-hour. Last year, the stimulus bill extended the tax credit for wind power facilities beginning construction through the end of this year.

This year also brings a new political environment and opportunity for federal energy leadership. As the economy improves and energy demand begins to rise again, meeting that demand with renewables will continue to be a big issue.

The freshman legislative class is positioned to lead the charge to pass a national renewable electricity standard. Thirty states already have their own renewable portfolio standards, which set a percentage of electricity that must come from wind and other renewable energy sources according to a specific timeline. The governors from these states are backing a national standard to stimulate new investment in renewable-energy projects.

Governors aren't the only backers of wind power. A recent Rasmussen Report finds that 60 percent of voters believe investing in wind and other renewable energy sources offers a better long-term investment than investing in fossil-fuel energy. Wind is a proven energy technology, and its costs often are competitive with energy generated from fossil fuel. Fossil fuel prices can be volatile, but creating a diversified energy infrastructure that incorporates renewables with traditional energy will help ease the cost fluctuations as economic factors change.

> **...wind projects have produced 85,000 manufacturing jobs at more than 400 factories...**

Late last year, a bipartisan group of four Republicans and four Democrats introduced a national renewable standard bill independent of other energy policy efforts. Though the bill did not progress last year, these legislators hope to obtain clearance this year. Creating a federal renewable electricity standard policy like this will help drive the growth of wind energy in the long run while project developers can still reap the benefits of short-term tax incentives.

This would position the wind industry for sustained growth in the United States, maintaining manufacturing and creating construction and maintenance jobs and helping boost the local economies in which wind projects are developed.

I am optimistic about the future of wind in America. Having immediate tax incentives, political leadership on energy and climate issues, public support for renewables and the need for an improved energy structure will lay the groundwork for more wind projects and further underscore wind as a practical, sustainable and beneficial energy source.

Andris E. Cukurs is chief executive officer of Suzlon Energy's North American operations.

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Maintaining Wind Fleets

DEALING WITH HIDDEN COSTS // BY SALVATORE SALAMONE

OPERATIONS AND MAINTENANCE COSTS FOR WIND FARMS have always been thought to be significant. Early Department of Energy studies pegged the costs at between a half and one cent per kilowatt-hour for wind farms in the United States.

Because large-scale deployment of wind turbines had not begun, such estimates, made five years ago or earlier, had great uncertainties because of the limited availability of real-world data. As wind farms have multiplied across the country in recent years, more operators are finding there are hidden costs to maintaining their wind fleets. There are also some promising technologies that might help reduce these costs.

To put the operations and maintenance costs into perspective, consider that wind turbines in the United States currently can produce more than 36,000 megawatts of generating power, according to the American Wind Energy Association. That's if they are working properly. Unfortunately, turbines and their components can experience problems taking them out of commission. Certainly, there can be mechanical problems with generators, gearboxes and blades. Other problems can arise in turbine control systems, electrical systems and with turbine sensors.

Like other electric utility sectors, the largest cost factors in wind turbine operations and maintenance are for parts and labor. Scheduled maintenance and parts repair or replacement are essential, and can be properly budgeted for. Unscheduled maintenance is the cost killer.

What particularly drives wind farm operations and maintenance costs up are the size and weight of a typical turbine. Commonly used turbines in the United States have a tower about 262 feet high, a rotor assembly of blades and hub that weighs about 50,000 pounds, and a generator that weighs in excess of 110,000 pounds. Repairs and routine maintenance require the availability of large cranes and hoists capable of lifting such massive gear. Offshore wind farm operators in other countries occasionally must bring in helicopters to service their turbines.

All of these things add up. As a result, the old Department of Energy estimates of operations and maintenance costs were not far off. In October, Wind Energy Update, an organization that provides news, analysis and business intelligence reports for the wind industry, noted that the average operations and maintenance costs for wind power are about 2.5 cents per kilowatt-hour.

One factor that comes into play is that the brunt of the costs falls on the equipment manufacturers when a turbine or its individual components is under warranty. However, even if these costs are fully covered by the manufacturer,

the wind fleet operator still loses revenue when equipment problems occur. When it comes to today's utility-class turbines, each percentage point drop of availability in a year can result in the fleet owner losing up to $500,000 in revenue, according to one industry estimate.

More troubling for wind fleet owners and operators is that many turbines are coming off warranty. The end of last year marked the first time in U.S. history that more wind turbines were operating out of warranty than were covered, according to *Wind Systems* magazine. And Jon Harman, director, Wind Energy Update, noted that, as of the beginning of this year, "a vast number of operating wind turbines approach … the end of their warranty period."

> **a vast number of operating wind turbines approach … the end of their warranty period.**

To reduce unscheduled maintenance, turbine manufacturers and wind farm operators are eyeing new technologies to help identify potential problems before they happen.

Most manufacturers have offered remote monitoring capabilities so operations and maintenance staff can observe the state of various wind farm components. And, in fact, turbines have numerous sensors built into them to provide data about the operational state of key elements.

This technology is now being complemented by add-on solutions.

One example is predictive analytic software developed by SmartSignal. The diagnostic software works with supervisory control and data acquisition (SCADA) data from existing sensors on a wind turbine. It compares this data to software models customized for individual pieces of equipment to provide early warning of emerging problems.

Others are offering vibration condition monitoring solutions that try to detect gearbox problems at the earliest stage. There is also add-on technology for ice detection. On the academic front, researchers are investigating ways to mine SCADA data to identify turbine performance patterns that might be used to spot potential problems before they affect operations.

Decommissioning with a Twist

THE FUTURE OF NUCLEAR WASTE // BY SALVATORE SALAMONE

EVEN WITH THE SPURT IN LICENSE renewal activity that promises to keep many current nuclear plants in operation another 20 years, there are still a number of plants that must be decommissioned and dismantled now or in the near future.

Costs to decommission and dismantle plants are high compared with those of dismantling other similar-sized structures. The containment building and reactor vessel must be dismantled in a manner that controls dust and examines for radioactivity.

Over the years, a few states and plant owners have made deals to guarantee landfill space for the low-level waste that will result when their plants are dismantled. But a recent deal takes a very different approach.

In what many are calling an incredibly innovative arrangement, Exelon Nuclear, the operator of the Zion Nuclear Power Station, has teamed with EnergySolutions, a contractor that owns a nuclear waste facility. The move is expected to speed the dismantling process, as well as cut the costs.

How does this teaming with a nuclear waste facility owner help?

One of the slowest and most costly operations in dismantling a power plant is separating radioactive materials from nonradioactive materials. Normally, a contractor is hired and any radioactive material must naturally be handled and disposed of properly.

Besides the effort required to identify and separate such materials, each type of material must also be disposed of differently. Nonradioactive materials can go in a regular industrial landfill; radioactive materials go to a licensed facility.

Instead, ZionSolutions, an EnergySolutions company, will process and dispose of all the Zion plant's Class A low-level radioactive waste at the EnergySolutions licensed Clive, Utah, facility. The goal of the program is to safely accelerate cleanup, completing the job in 2020, 12 years ahead of schedule. And according to the *New York Times*, this approach is expected to reduce the dismantling costs by about 20 to 25 percent over conventional methods.

To carry out the plan, the license for the station was transferred from Exelon to ZionSolutions. "This first-of-its-kind approach, will accelerate the decommissioning of the Zion station and restore the land for beneficial reuse sooner than originally planned," said Val Christensen, president and chief executive of EnergySolutions.

Exelon retains ownership of the real estate. As part of the dismantling operation, ZionSolutions will place the spent fuel in dry cask storage, as well as construct a storage facility for these dry casks. After the station is decommissioned, the license for the spent fuel will return to Exelon.

If the approach is successful, it could have implications for 10 other nuclear plants around the country that are slated to be decommissioned. The approach might also be examined with regard to the feasibility of its being used to handle the roughly 100 reactors that are still in operation, but will eventually need to be dismantled.

The license stewardship with a nuclear waste facility owner is a twist on a method that has been employed in the past. For example, about 16 years ago, Maine and Vermont made a deal with Texas to reserve space for future low-level nuclear waste.

Under the terms of the compact, Texas agreed to host a low-level radioactive waste disposal facility, Maine and Vermont would each be guaranteed up to 20 percent of the facility's space. Maine has since dropped out of the compact.

Vermont is counting on the storage availability as it eyes a possible shut down of Vermont Yankee – something that might occur as soon as 2012. The plant was expected to get a 20-year extension to its license. However, as a condition of the sale of the plant to Entergy Nuclear in 2002, the state required legislative approval for continued operation. Last year, that extension was voted down. In November, Entergy put the plant up for sale.

Unfortunately, complications have arisen that might jeopardize Vermont's claim to its Texas storage space, but open up storage to others.

Gatherings// Technology Frontier

April 12-13	Concentrated Solar Thermal Power India	New Delhi, India
April 12-14	Smart Grids Europe	Copenhagen, Denmark

For more information about these and other events, please visit www.energycentral.com/events.

Last year, Waste Control Specialists, the owner of the Texas site, sought approval to accept waste from 36 states that do not have access to a dump. In early January, the Texas Low-Level Radioactive Commission granted approval.

Commenting on the approval, newly elected Vermont Gov. Peter Shumlin said, "It's a race for space. When push comes to shove, the first waste that arrives is the waste that will get in."

These new approaches will give nuclear plant fleet owners more choices in how to manage low-level waste, particularly the waste that will need storage when decommissioning plants. But they do nothing to address long-term storage of spent nuclear fuel.

With the current administration's decision not to proceed with the Yucca Mountain nuclear waste repository, the Blue Ribbon Commission on America's Nuclear Future was formed last year to study the issues and provide recommendations for developing a safe, long-term solution to managing the nation's used nuclear fuel and nuclear waste.

In a January hearing before the commission, a variety of approaches were presented.

Southern Nuclear Chairman Jim Miller told members of the commission that Yucca Mountain must proceed. "The commission would do the country a great service by recommending that the licensing and development of the repository be continued," he said.

Others want Yucca to proceed, but are also calling for more emphasis on the reprocessing of nuclear fuel to minimize the volume of spent fuel that would need to be stored in the facility. "I'm very willing for the Savannah River Site to be the research and development facility for the nation to make that idea a reality," Sen. Lindsey Graham (R-S.C.) said to the commission.

Others agreed about the need to increase reprocessing, and noted the importance of getting to a solution. "Without a final destination for our nation's nuclear waste, I fear that our nuclear industry will never reach its full potential," said Sen. Jim DeMint (R-S.C.) in a statement to the commission.

NewsFlash

U.S. AIR FORCE GOES SOLAR

The U.S. Air Force announced plans to increase use of solar energy on its bases fourfold in four years, according to UPI.

The Air Force is the government's biggest user of renewable energy.

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(GUEST OPINION)

The Biogas Opportunity

WISCONSIN FARMS TAKES EARLY LEAD // BY GARY RADLOFF

BIOGAS IS IN THE STARTING POINT of an exponential growth curve, according to a white paper from the Global Intelligence Alliance. The United States could follow the global trend with a greater number of biogas to energy facilities if policy and economics were to align.

Currently, Europe and other parts of the world are rapidly utilizing anaerobic digesters to create a distributive network of biogas electrical energy, heat, pipeline-quality gas and even compressed natural gas vehicle fuels. The United States is still slowly coming out of the biogas energy opportunity starting line. The Environmental Protection Agency's AgSTAR Program projects that the United States could have upward of 8,000 anaerobic digesters producing biogas on farms across the land, with a total generating capacity of around 1,500 megawatts, which is about 2 percent of all electricity.

The problem is that the United States has only 151 anaerobic digesters on-farm. Wisconsin leads all states with more than 30 on-farm biogas systems. Biogas remains a relatively untapped resource in the United States due to concerns with economic viability and a lack of policies to catalyze growth. Globally, 75 percent of biogas potential lies in anaerobic digestion of agricultural crops, by-products and manure, while 17 percent is in municipal waste and industrial organic waste, and another 8 percent is in sewage and wastewater treatment. One bottleneck to exponential growth is the cost to upgrade technologies needed to boost biogas to the same quality as natural gas, and the current low price of natural gas.

NewsFlash

TIBETAN SOLAR

Tibet has taken to solar power, with 395,000 new solar stoves installed in homes, replacing stoves fired with wood or dung, according to Xinhua news service.

In addition, 10,000 solar panels are powering lights, heaters and appliances in rural areas.

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To better understand how the United States and Wisconsin can catalyze the development of more biogas energy, a delegation of University of Wisconsin – Madison graduate students and some energy policy experts traveled to Germany last September to study the global biogas energy leader. The fact-finding team wanted to know what political, social and economic factors contributed to Germany developing more than 5,000 biogas plants, the majority being on-farm plants, in only about a decade.

The explosive growth in the German biogas industry can be attributed to a policy that guarantees electric grid connection and a premium rate for the renewable electricity supplied. If the United States could jump from 151 anaerobic digesters on-farm to 8,000 farms, it would create significant economic and environmental benefits. The research shows that the agriculture sector will realize environmental and economic benefits from reducing odor, increasing nutrient management flexibility and reducing greenhouse gas emissions, combined with revenue from energy generation sales and potential sales of by-products such as animal bedding. Additional business sectors that can use digesters include landfills, beef-finishing lots, poultry and hog operations, and industrial-scale operations including food processing and cheese-making facilities.

> **Biogas remains a relatively untapped resource in the United States...**

Taking a waste product and making homegrown renewable energy in Wisconsin and the United States just makes sense. On the local level, food processing and dairy agriculture are two of Wisconsin's signature industries generating billions of dollars in state revenue and providing key jobs. Food processing and dairy farms are prime locations for anaerobic digesters. In the United States, some 30 percent of food is thrown out and taken to costly landfill operations. Food waste can prime the pump for anaerobic digesters to produce more biogas energy.

The UW-Madison delegation that went to Germany saw all kinds of creative business partnerships and innovation at the biogas facilities. The team was convinced that if the United States were to follow the lead of Germany and other parts of the world, we could create thousands of new jobs from more biogas energy plants, help reduce waste buried in landfills and clean the environment, but it will require policymakers to show greater leadership here at home.

Gary Radloff is director of Midwest Energy Policy at the Wisconsin Bioenergy Initiative.

[GUEST OPINION]

Saving Power

THE ARCHITECTURE OF DELIVERY // BY PAUL SAVAGE

IN THE SEARCH FOR OPTIMAL ELECTRICAL power delivery methods, one solution would be to move key conversion points upstream, a little nearer the source.

In looking for savings in our electrical power systems, little attention has been paid to the architecture of power delivery. The hub-and-spoke relationship we have with our electricity provider has been in place since the beginning of electrical service and some updating is in order.

Our uses for electricity have changed a great deal over the last 50 years and yet little has been done to support those changes through the design of our power systems. What's the greatest change? On the load side of the power equation, it's undeniably the rise and near domination of the semiconductor. On the source side of the power equation, the sustained high demand for clean, renewable sources of electricity epitomized by solar represents a sea change of what's possible. These two contemporary trends present an opportunity, and it is no coincidence that each sits squarely in the direct current domain.

These two trends do not change the economics of long distance AC transmission and distribution lines. But they do strongly suggest that over shorter distances, in buildings for example, AC may have already served its purpose by bringing us to where we are today, but that DC should be the current that takes us further still.

The majority of our devices today use DC, so let's give it to them. Using a DC distribution circuit for a building brings many benefits such as better compatibility with renewables and battery storage, greater safety and higher efficiency no matter what the type of power input.

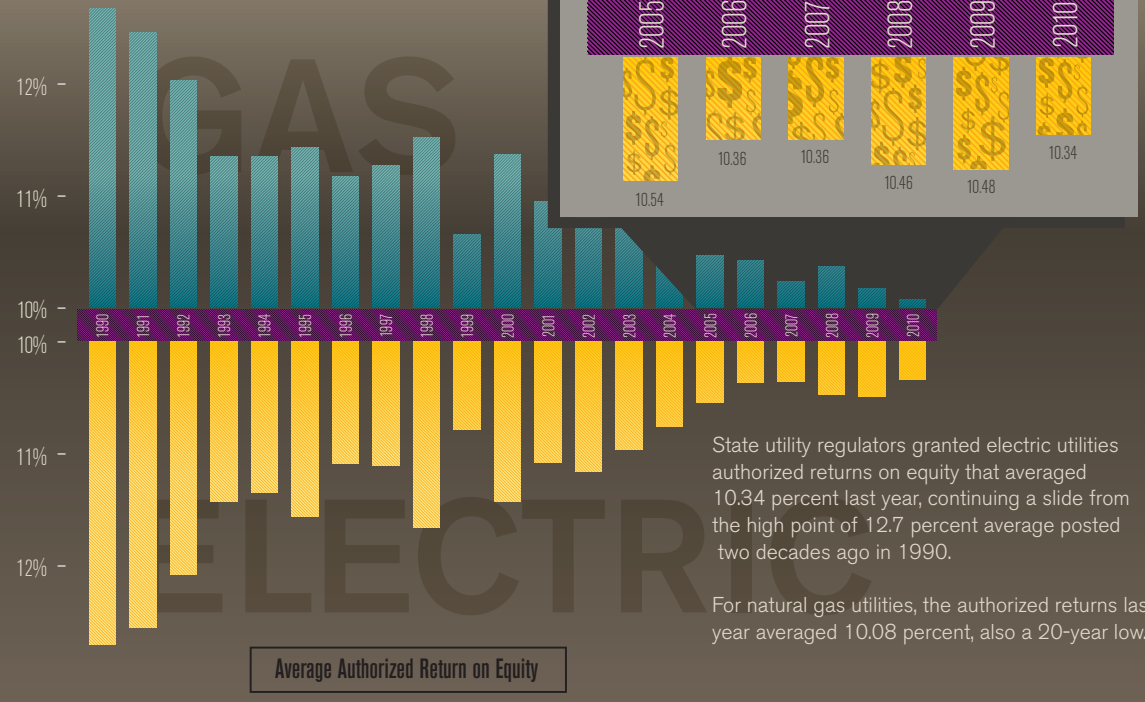
By moving the point of conversion of AC to DC from the device to a little farther upstream closer to the source, we can capture conversion efficiencies that cost too much to provide for loads as small as your cell phone charger. The conventional wisdom is that consumers won't pay for higher-efficiency power conversion. But that's changing. If you have 15 power supplies turning AC into DC in your house, it's quite likely the average efficiency of those devices is about 70 percent. If instead those devices were optimized around a common DC input like 24-volt DC, we could achieve 90 or 95 percent efficiency.

An even more striking improvement is evident when a local DC source such as solar PV is used, avoiding the AC-to-DC conversion step altogether.

The market is starting to turn this way. There are about 70 companies working to promulgate the DC standards needed for this vision to take hold through the EMerge Alliance (www.emergealliance.org).

Paul Savage is chief executive officer of Nextek Power Systems.

RETURNS DIP



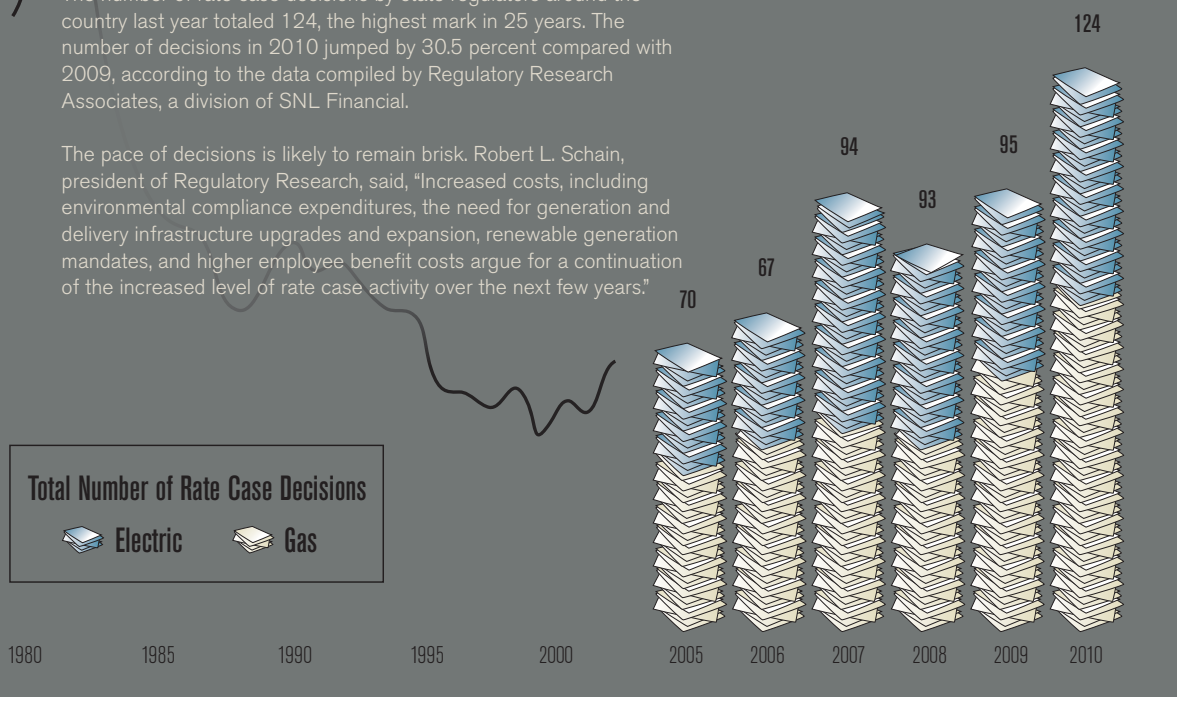
State utility regulators granted electric utilities authorized returns on equity that averaged 10.34 percent last year, continuing a slide from the high point of 12.7 percent average posted two decades ago in 1990.

For natural gas utilities, the authorized returns last year averaged 10.08 percent, also a 20-year low.

RATE DECISIONS SOAR

The number of rate case decisions by state regulators around the country last year totaled 124, the highest mark in 25 years. The number of decisions in 2010 jumped by 30.5 percent compared with 2009, according to the data compiled by Regulatory Research Associates, a division of SNL Financial.

The pace of decisions is likely to remain brisk. Robert L. Schain, president of Regulatory Research, said, "Increased costs, including environmental compliance expenditures, the need for generation and delivery infrastructure upgrades and expansion, renewable generation mandates, and higher employee benefit costs argue for a continuation of the increased level of rate case activity over the next few years."



Dan Reicher Goes to Stanford

GOOGLE ENERGY GURU FOCUSES ON FINANCE AND POLICY // BY MARTIN ROSENBERG

DAN REICHER WAS FRONT and center during several hugely visible energy deals announced by Google. Among them was a recent plan to build a revolutionary transmission line in the Atlantic to jump-start offshore wind generation.

Now Reicher is headed back to school – specifically, Stanford University, where he will become the executive director of the Steyer-Taylor Center for Energy Policy and Finance. The new effort, launched with a $7 million gift, is tied to the university's law and graduate business schools.

Reicher was assistant secretary of energy under President Bill Clinton and director of climate change and energy initiatives at Google. It has been reported that he was considered for the post of secretary of energy in the Obama administration. Reicher recently spoke to *EnergyBiz* magazine about his new job. His comments, edited for style and length, follow.

ENERGYBIZ What is the new initiative you are heading up at Stanford?

REICHER It was recently funded by a husband and wife, Tom Steyer and Kat Taylor. I led my career in the energy world based on this triangle of technology, policy and finance. I'm quite convinced that if we are going to make progress on building and rebuilding our energy infrastructure to be cleaner, more economical, more secure, then we've got to be working at all three points of that triangle. There is obviously a great deal of interest in technology to advance energy. Is there the massive amount of capital we are going to need to fundamentally restructure our energy economy? We need policies and we need more capital. So we're going to do what we can to look at the challenges and opportunities. We will particularly be focused on the intersection between policy and finance.

ENERGYBIZ Some would argue that given your role at Google, you were probably tapped into the richest vein of finance for energy change. And certainly a lot of federal money is spent on energy.

REICHER The company has made some modest investment in energy technology companies and is beginning to make some investments in energy projects.

ENERGYBIZ When you were in the federal government you oversaw billions of dollars worth of investment.

REICHER My budget at the Department of Energy was $1.2 billion a year in efficiency and renewables. It's interesting. A billion dollars on the one hand is a big number, but in the energy world it turns out to be rather a small number. There certainly is a lot of good money going into energy R&D and into venture capital backed startups. But we really face a serious issue when we need to take those technologies that seem to work at pilot scale and move them to full commercial scale. That's where your capital needs are measured literally in the trillions of dollars in the United States and globally. That is where the capital needs are a real problem.

ENERGYBIZ Do you think that the bulk of capital needed for energy investments will come from utilities or new players like Google?

REICHER It mostly is going to have to be coming out of the large investment firms around the world. Yes, the utilities will be raising some of it. But a vast proportion is going to come from the banking world and the equity world.

ENERGYBIZ What about Google?

REICHER Google made investments in energy technology companies. Google is beginning to make investments in energy projects.

ENERGYBIZ Do you think they are going to step up the pace?

REICHER It is hard for me to say.

ENERGYBIZ Why did you think the time was right to leave Google and move to Stanford?

REICHER The whole area in which policy meets finance is critical to dealing with these big economic, environmental and security challenges we face in the energy world. There's a lack of creative thinking about the policy mechanisms that could be helpful about how to raise vast amounts of capital. It's unlikely, for example, that we are going to see carbon legislation adopted anytime soon in this country. So the question becomes what are the other ways that we could actually cause big changes in energy infrastructure to occur to result in cleaner systems, more secure systems, more economical systems? This is a moment at which a lot of thinking needs to go into how to better shape energy policy and finance. Stanford offers a wonderful, wonderful opportunity to do that. With a new Congress coming into power and with the Obama administration looking at its next two years, this is a critical moment to put some new strategies on the table.

ENERGYBIZ If a carbon cap is not going to happen and if a price on carbon is not going to be established by Congress, what new policies should be pursued?

REICHER There are a lot of categories in which one could work. There's tax policy. There's investment policy. There's R&D spending. There are regulatory approaches. The Senate Energy Committee passed out a very interesting energy bill in the last session with strong bipartisan support.

There are some fascinating ideas in there. For example, I have been a big fan of the Clean Energy Deployment Administration or CEDA, which would be a semi-private entity that would have a whole host of tools to invest in the scale up of technologies from pilot to full commercialization. It would consider projects with too high of a risk profile for the traditional investment community to take on.

> **"A billion dollars on the one hand is a big number, but in the energy world it turns out to be rather a small number."**

ENERGYBIZ Are we going to see a global trade war over renewable energy?

REICHER Increasingly, we are going to see this emerge in the trade context. The good news there is that this clean energy technology is now big enough that people begin to scrutinize how it is being handled in various countries. People see this as one of the big economic opportunities of the 21st century. Countries will be pointing fingers at each other as to how they try to advance the clean energy industry in their individual nations.

ENERGYBIZ If the United States is successful forging policy and financial incentives to get our act

together on energy technology, what might our energy economy look like a decade from now?

REICHER That's a great question. We have the opportunity to fundamentally reshape our energy economy to make it more secure, more economical and cleaner.

ENERGYBIZ Do you think we could be off of fossil fuels in the next 20 or 30 years?

REICHER No. But we could certainly use them far more efficiently and more cleanly than we do today. There's a range of opinions about where coal ends up in this equation depending upon how quickly and how cost competitively clean coal technologies can be brought to full commercial scale. Renewables are also at a crossroads.

ENERGYBIZ And energy efficiency?

REICHER We already have cost-competitive energy efficiency opportunities available in the industrial, commercial and residential areas. Why aren't we seeing a greater uptake in our economy and in other parts of the world? That is going to be an area where you are going to see very significant growth because it is the low-hanging fruit. How would you take what is already cost-effective and set up energy tools and really deploy them much more significantly than they have been to date?

ENERGYBIZ You were involved in advising the Obama transition team on energy policy. Are you pleased with where the administration has gone on energy initiatives and what has been its greatest success and failure?

REICHER I was on the Obama transition team and I think we made a good strong proposal on the energy portion of the stimulus package. Congress ultimately adopted a strong energy stimulus package. It is taking longer than all of us had hoped, but that shouldn't be surprising. The money is moving. It is going to good projects. The administration has pushed hard for comprehensive energy and climate legislation. We saw the House adopt that in the last Congress. We saw some progress in the Senate but not fully what was anticipated by the administration. Going forward, I think the administration will be looking hard at what the opportunities are to recraft its approach to climate policy and build an approach to energy policy that can make its way through the new Congress.

ENERGYBIZ Would you like to be energy secretary?

REICHER I'm always open to serving my country. If someone would approach me about it, I certainly would take a very serious look.

ENERGYBIZ How do you think Steven Chu is doing?

REICHER It's been good to have someone with his strong technical creditentials at the Energy Department. The department has been making good progress on a number of fronts, and I think he gets good credit for that.

The Troubled Sunrise Powerlink

THE ENVIRONMENT VERSUS RENEWABLES // BY RICHARD SCHLESINGER

SUNRISE POWERLINK. THE NAME suggests the dawn of a new era of eco-friendly power, so why is the 112-mile-long high-voltage transmission line under construction by San Diego Gas & Electric, designed to bring power from the Imperial Valley to San Diego County, under fire from various environmental and civic groups? For exactly the same reasons that transmission lines come under fire whenever and wherever they're proposed: because no one wants lines and poles obstructing their view and because transmission lines don't generate anything but costs. They're hard to love and easy to oppose.

NewsFlash

LEGAL WIND MOVES

www.energycentral.com

Iberdrola Renewables has taken the first steps to win North Carolina state regulatory approval of a project to develop 300 megawatts of wind generation in the northeastern part of the state.

The project, launched two years ago, could be under construction late this year.

Transmission lines and the grid in general are seen as necessary evils and, as distributed generation becomes more realistic, not even so necessary in many cases. SDG&E has been building the case for its transmission line for over seven years, and although the project has been approved by the Forest Service, the federal Bureau of Land Management and the various California power and regulatory authorities, the PR battle goes on.

Not that it was easy to win approval from the regulatory authorities. California Public Utility Commission Administrative Law Judge Jean Vieth rejected the line outright, and the original proposed route through Anza-Borrego Desert State Park was rejected. Approval was only granted after the line was shifted south, avoiding the park and running closer to the Interstate 8 corridor.

Bill Powers, an engineer and independent consultant to a number of environmental groups, has opposed the project on both economic and environmental grounds. Powers is particularly concerned about inconsistencies in SDG&E's arguments over the years. Part of the original justification, according to Powers, was to provide cheap, low-cost gas power from a plant SDG&E's parent company, Sempra, owns in northern Mexico. Justification then shifted to green power.

"So there was skepticism from the start; a new pathway for gas was never necessary, except perhaps from the vantage point of stockholders," Powers said. "The position then morphed from low-cost gas to green power, but even that has been inconsistent, first emphasizing geothermal, then solar, and then back again to geothermal and wind. So, even in 2005, I thought they were simply trying to hang a cloak of green over the transmission line."

The California commission published an exhaustive 11,000-page environmental impact report, and the first alternative was no transmission line at all. Instead, the report suggested a mix of energy sources, including distributed-generation solar. San Diego County Supervisor Dianne Jacob actively opposed the route, primarily on environmental grounds, but also because of what she perceived as the line's threat to the ability of firefighters to combat wildfires. The area the line will go through is among the most fire-prone landscapes in the world because of an abundance of dense, dry fuels and the infamous Santa Ana winds. To address these concerns, SDG&E made various changes to the line, including eliminating more than 40 poles and other structures and donating use of its helicopters to fire departments in the event fire does erupt along the Sunrise route.

The issues raised by Sunrise Powerlink are hardly unique. T. Boone Pickens abandoned his ambitious wind project largely because of the difficulties and uncertainties involved in getting approval for new transmission lines. While there's broad agreement about the need for more renewable power, except for distributed-generation sources, the problem of moving those electrons from where they're generated to where they're used is fraught with aesthetic, environmental and cost issues.

Stephanie McCorkle, director for communications for California's Independent System Operator, acknowledges that getting public support for the project has been challenging. "It's a balancing act because you have environmental concerns and a lot of support for renewables," she said. "At the same time, there are concerns about what these lines might do to various species, and how they can threaten pristine landscapes. What makes us beautiful is also often what makes us rich in renewables, but if you love renewables, you need to love transmission infrastructure, if only to a certain degree, because for the most part, you can't have one without the other."

Duke's Indiana Headache

THINK BEFORE YOU HIT SEND // BY RICHARD SCHLESINGER

IT'S ONE THING FOR A UTILITY company to cultivate a good relationship with regulatory authorities, but is it appropriate for a top official with a giant utility to e-mail the chairman of a state regulatory commission, asking "Does anyone know if a desire to 'bitch slap a chairman' violates any state's hate crime laws?"

Apparently not.

That e-mail between James Turner, at the time the second-highest-paid executive at Duke Energy, and David Hardy, then chairman of the Indiana Utility Regulatory Commission, was quoted in an article written by John Russell and published in the Nov. 28, 2010, issue of the *Indianapolis Star*. There were hundreds of similar e-mails, and Russell wrote a series of articles that suggested the possibility of an inappropriate relationship between Duke and the commission. Those articles resulted in the removal of Chairman Hardy by Indiana's governor, Turner's resignation and the firing of the president of Duke's Indiana subsidiary, Michael Reed, for unspecified reasons.

That fallout, painful as it has been for senior executives at Duke and some Indiana regulators, has even larger implications for the company and threatens funding for the Edwardsport coal-gasification plant, one of Duke's largest capital projects, which was already under attack because of serious cost overruns.

"...with the release of the secret e-mails, the fragile agreement collapsed."

At 618 megawatts, the proposed Edwardsport plant would be by far the largest coal-gasification plant in the United States. When the Indiana commission first approved the plans in 2007, total costs were estimated at $1.9 billion. Duke went back to the commission early last year with a revised estimate of $2.35 billion. In April, it raised that figure by another $500 million, to $2.85 billion.

The increased estimate was met with resistance by Duke's industrial ratepayers and by various Indiana environmental and citizens' action groups. In September, Duke, a coalition of its large industrial customers and the commission reached an agreement to move forward with construction. But with the release of the secret e-mails, the fragile agreement collapsed.

The various parties to the agreement including Duke filed a petition on December 9 asking that the commission re-examine the agreement because the e-mails "raise questions as to the relationships between and among … individuals, Duke Energy and the former chairman of the commission during the period … that the settlement agreement was being negotiated and submitted."

Timothy Stewart, an attorney with Lewis & Kappes, which represents the industrial customers, contends the e-mails raise questions about whether all the parties were negotiating the cost overruns in good faith. David Schlissell, a consultant hired by the law firm, went much further in his testimony before the commission, claiming there was evidence of "fraud, concealment and gross mismanagement."

Duke, naturally, is reticent about the e-mails. Angeline Protogere, a company spokesperson, was reluctant to go into details about the Duke people involved. "Let me just say the individuals involved are no longer with the company," she said. Jim Rogers, Duke's chairman, is on record as saying that he agrees the settlement should be reopened and believes a new settlement would be the best path forward for the plant.

But not everyone is convinced the plant should go forward. Jerome Polk of Polk & Associates represents a coalition of environmental and citizens' action groups, including the Citizens Action Coalition, Sierra Club Hoosier Chapter, Valley Watch and Save the Valley, that simply doesn't think the plant is necessary or that the technology is ready for prime time. Furthermore, Polk contends that Duke concealed the technological risks involved. According to Polk, Duke presented the Edwardsport plant as a scaling up of its Tampa integrated gasification combined cycle plant. "They claimed it was proven technology," Polk said. "We said it wasn't. It turned out assumptions they made were simply wrong. Ratepayers should not be stuck paying for a science project."

The release of the e-mails was crucial in bringing to light these issues, according to Polk. "It's very likely that a lot of this information never would have been brought to light if it hadn't been for the release of these e-mails," he said.

At this point, the path forward is anything but clear. According to *Indiana Star* reporter John Russell, it's an ongoing story. The Indiana commission has already scheduled additional hearings and lawyers representing both the industrial and citizens' groups believe litigation is inevitable.

PCB Limits Tighten

UTILITIES PUSH BACK // BY STEPHEN BARLAS

ELECTRIC AND GAS UTILITIES ARE pushing back hard against Environmental Protection Agency plans to tighten its regulation of polychlorinated biphenyls. Any new requirements forcing gas and electric companies to test electrical components such as transformers known to be contaminated with PCBs and to reduce those exposures, or to even mark underground or above-ground components, would cost companies millions, perhaps hundreds of millions of dollars.

Pamela F. Faggert, vice president and chief environmental officer of Dominion Resources Services, said the new regulatory measures the EPA is considering could cost her company a minimum of $300 million.

The EPA wants to alter a 1998 Mega Rule that allows utilities to keep transformers, electromagnets, switches, voltage regulators, electrical capacitors, circuit breakers and other equipment in operation if they have PCB concentrations below 50 parts per million. Concentrations above that threshold are also allowed, provided the operator follows applicable management practices and approved characterization and disposal practices.

Jim Roewer, executive director of the Utility Solid Waste Activities Group, a lobbying organization representing many energy companies and trade associations, said the agency is reviewing comments it received after it posted its proposed rulemaking in April. That notice mentioned a smorgasbord of regulatory changes the agency could make. Roewer says he expects the next step, a proposed rule containing specific regulatory changes the agency plans to make, in early to mid-2012. Industry representatives would then submit comments on that proposed rule. Roewer points out that gas and electric utilities have been eliminating PCBs on their own. "But the agency would like to move industry further faster," he said.

PCBs were introduced into electrical equipment and pipelines pre-1970s in transformers, capacitors and coolants and as lubricating oil in pipeline compressors. PCB use was banned by the Toxic Substances Control Act in the mid-1970s out of concern that the chemical caused cancer in humans. But PCBs already present were allowed to remain in electrical equipment under a use exemption that was last refined in the 1998 Mega Rule.

All electrical equipment containing PCBs is old and approaching the end of its useful life. The EPA is concerned that the equipment is therefore vulnerable to leakage. The National Response Center advised EPA that there were a total of 5,578 spills associated with PCBs reported from 1990 through Aug. 19, 2009. In considering further PCB restrictions, the EPA has also cited the Stockholm Convention on Persistent Organic Pollutants, which, among other things, requires parties to make determined efforts to phase out certain ongoing uses of PCBs by 2025. The United States is a signatory to the Stockholm Convention but the U.S. Senate has not ratified it.

Randolph Price, vice president of environment, health and safety for Con Edison, said that like many other utilities, Con Edison has been retiring electrical equipment contaminated with PCBs. Price said that any EPA proposal to, for example, mark equipment containing more than 50 parts per billion PCBs "would result in a tremendous work effort and would result in no reduction of PCB exposure risk to the public or the environment."

Roewer explained that in most instances, electric components must be de-energized before they can be tested for PCB levels. "You can test some equipment live, but that is obviously putting line workers in significant risk," he said. Moreover, companies in Canada facing that country's PCB phase-out have found, at enormous cost, that electrical systems contain only small amounts of PCBs.

NewsFlash

GEOTHERMAL ASSIST

Idaho legislators are considering bills to help speed development of geothermal resources on state lands.

The four bills are supported by Gov. C. L. Otter and are part of his efforts to develop new sources of energy, according to the Twin Falls, Idaho, *Times-News* newspaper.

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– Carl Siegrist, Senior Renewable Energy Strategist, We Energies

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Carbon Storage Flap

REINJECTION PLAN IRKS EXXON // BY PAMELA COYLE

A NEW OPERATION IN WESTERN Wyoming will extract helium and methane and reinject waste gas composed primarily of carbon dioxide back into Riley Ridge Federal Unit, cutting potential greenhouse gas emissions to a fraction.

New technology from Cimarex Energy will come online in the fall as the U.S. Environmental Protection Agency is requiring companies to both monitor and report emissions of carbon dioxide, methane and nitrous oxide, among others. ExxonMobil, which has a large adjacent leasehold, challenged the project before the Wyoming Oil & Gas Conservation Commission, saying reinjection would tamper with the pressure and mix of remaining underground gasses and violate its correlative rights. The commission ruled in favor of Cimarex, though it imposed proximity limits and other restrictions for one zone. Exxon's request for review is pending in Wyoming's 7th District Court in Casper.

Regulators will face more such decisions as carbon capture and sequestration efforts ramp up. The new operation will return gas to the existing formation – minus valuable helium and methane. Three-fourths of what Cimarex takes out will go back into the ground, said Scott Stinson, Cimarex's project manager.

"We could operate for 50 years and emit at our maximum permitted level and the greenhouse gas emissions would be equal to three hours and 16 minutes of Exxon's operation," he said.

The plant design keeps the stream at high pressure and low temperature so the valuable components can be separated in a liquid state. Two issues were before the Wyoming commission – whether the process wastes any of the state's resources and whether it violates the correlative rights of other producers. ExxonMobil said the Cimarex plan "would contaminate hydrocarbon production from active producing wells, result in significant hydrocarbon waste, and cause preferential flow of reinjected waste gas onto ExxonMobil's leases."

Cimarex contends, and the commission largely agreed, that the plan does not hurt the state's interests or Exxon's. If anything, Stinson said, Exxon's ongoing operations have reduced pressure to the extent that the company has been pulling gas from beneath the Cimarex leasehold. Reinjecting waste gas will improve pressure all around.

"We aren't pressuring up a new zone; we are putting gas back in and the rate of pressure decline will be much, much lower," Stinson said.

The gas stream contains two-thirds carbon dioxide. Methane is next at 20 percent and helium accounts for a modest 0.5 percent. The rest is nitrogen and hydrogen sulfide, which is poisonous. "We vent nitrogen into the atmosphere, most of it," Stinson said. "The expense at most other plants is separating hydrogen sulfide and carbon dioxide, and right now we have no real incentive to clean up our CO_2 for sales."

> **Both companies will help us move forward.**

That could change. Denbury Resources, a leading supplier of CO_2 for enhanced oil extraction, bought out Wold Oil Properties' interest in the project last fall. Exxon already has a large carbon dioxide capture plant in southwest Wyoming.

"Both Shute Creek – Exxon – and the new Cimarex project will capture carbon dioxide," said Rod Surdam, director of the Carbon Management Institute at the University of Wyoming and a former Wyoming state geologist. "Both enhanced oil recovery as well as carbon storage demonstrations are dependent on the availability of carbon dioxide, and in Wyoming there is a shortage of CO_2 with relation to oil recovery.

"Both companies will help us move forward," Surdam said.

Powering Up with Manmade Leaves

FUEL FROM SUNSHINE // BY SALVATORE SALAMONE

A DEPARTMENT OF ENERGY-FUNDED initiative seeks to mimic the photosynthesis process in leaves to convert solar energy directly into fuel.

U.S. Deputy Secretary of Energy Daniel Poneman noted what was at stake with this program. "Finding a cost-effective way to produce fuels as plants do, combining sunlight, water and carbon dioxide, would be a game changer, reducing our dependence on oil and enhancing energy security," he said when funding for this work was announced last year.

What makes solar-to-fuel conversion so enticing is fuel's capacity to store energy. "Fuel has a high energy density," said Nate Lewis, a chemistry professor at the California Institute of Technology, and the person heading up the DOE research into artificial photosynthesis. In particular, he noted that compared with storing energy in batteries, compressed air, or by pumping water, fuels offer a much higher energy density capacity.

Solar-to-fuel research has been under way for years. Past attempts have produced prototypes that were either too costly, did not last, were not efficient, or a combination of all three.

Simply put, the technology challenges for success are enormous. Solar-to-fuel research was identified by the Energy Department's Basic Energy Sciences Advisory Committee as an area in which "transformational science breakthroughs are urgently needed."

In particular, past efforts tried to take the sun's energy, and using a catalyst, split water and carbon dioxide to produce fuels. In most cases, the catalyst was based on extremely expensive or rare materials. Additionally, the conversion process can be highly corrosive. As a result, most solutions quickly degrade, thus limiting the amount of energy that could potentially be produced by a device.

The work Lewis and his colleagues are doing is in one of three areas the DOE has focused on through its relatively new Energy Innovation Hubs approach.

The hubs are designed to be multidisciplinary, multi-investigator, multi-institutional integrated research centers. In addition to the solar-to-fuel hub, the other hubs will focus on improving the energy efficiency of buildings and modeling and simulation for nuclear reactors.

The solar-to-fuel hub was announced in July. The DOE committed $122 million over five years to the research.

The work will be carried out by the newly formed Joint Center for Artificial Photosynthesis. The center brings together researchers from six universities and two government labs. Lewis serves as the principal investigator. The center is led by the California Institute of Technology in partnership with the U.S. Department of Energy's Lawrence Berkeley National Laboratory.

Over the next five years, the center's activities will include research into light absorbers, catalysts, membranes, and other elements of the total system. Longer-term, the goal is to move from the discovery phase to commercialization, to improve process efficiencies, and to produce a variety of fuels using the manmade leaf approach.

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