Earthrise Capital

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EARTHRISE OBSERVATORY

Commentary on energy & environmental technology industry developments

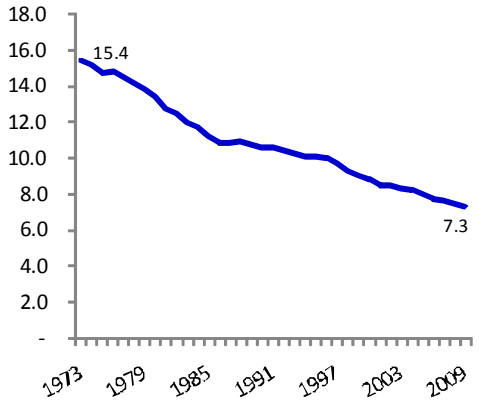
ENERGY & ENVIRONMENT NEWS

Accelerating Gains in Energy Efficiency

The accelerating improvement in energy efficiency in the U.S and globally is a story we see every day in the opportunities available to Earthrise Capital. The EIA recently released data showing that the U.S used less energy in 2009 than in 1999, in spite of an increase in real gross domestic product of over 20% over the past ten years, and a population increase of 35 million people.

Today we use about half as much energy to produce a unit of GDP as we did in the 1970's. It's a phenomenon not limited to the U.S. Exxon Mobil's latest energy survey predicts that the global average annual decline in energy intensity will accelerate to 1.5% a year for the next 20 years compared to the 1.2% decline in the past 30 years.

Energy Use Per Real Dollar of GDP
(Thous. BTUs per real 2005 dollar)



Source: Energy Information Administration

EARTHRISE PORTFOLIO NEWS

Axion Power International, Inc. News:

Axion Power(TM) to Work With Norfolk Southern on Battery-Driven Locomotive Project

NEW CASTLE, Pa., June 9 /PRNewswire-FirstCall/ -- Axion Power International Inc (OTC Bulletin Board: AXPW), the developer of advanced PbC® batteries, announced today that it will launch a development program with Norfolk Southern Corporation (NYSE: NSC), one of the nation's largest railways, to develop a battery management system that would allow rail locomotives to operate on battery power and recharge their batteries through regenerative braking.

Axion Power Chairman & CEO Thomas Granville commented, "……The ability to run locomotives on electricity is well-established, although the standard means of doing so to date has either been a third rail or an overhead connection – both of which require extensive and expensive infrastructure apparatus. Utilizing Axion's unique PbC batteries with their high level of charge acceptance and high cycle life will allow selected locomotives to operate free from diesel generator sets - and will help make Norfolk Southern trains the cleanest in North America."

Interest in hybrids extends to other areas of transportation. No doubt the reasons are similar: environmental concerns and a desire to hedge the cost of fossil fuels in future.

ENERGY & ENVIRONMENT NEWS

How Smart is the Smart Grid?

Very Smart - Sometimes
Venture Beat, May 25, 2010

After a year of big talk, Cisco launches its first Smart Grid products

Cisco Systems, Inc. has been talking a big game about its involvement in the Smart Grid for a year. And it's been successful at building its reputation in the space without ever releasing anything concrete. Today, it's finally made good on the hype, unveiling the first of what its calling its "Connected Grid Solutions."

It has launched the Cisco Connected Grid Router (CGR 2010) and Cisco Connected Grid Switch 2520 (CGR 2520),…designed to facilitate Smart Grid communications, including the wireless transmission of energy consumption data between smart meters, utilities and consumer devices. The major emphasis behind these new offerings: security.

Both the router and the switch are meant to be integrated into existing electrical substations so that IP communications (Cisco's bread and butter) can be used to closely monitor grid operations, including power loads, renewable energy generation, demand response programs, and outages. These operations alone could save utilities millions of dollars a year in maintenance costs, and deliver extremely accurate information to their customers interested in changing their energy consumption and spending behavior….."

EARTHRISE OBSERVATION

Earthrise Capital Comment:

Cisco's new products appear to be a good use of the concept for a Smart Grid. The implementation does not require consumers to change their behavior and should help to improve the quality and efficiency of service while lowering maintenance costs. They improve the reliability and security of the grid, a growing concern to grid operators and national security advisors, and facilitate remote diagnosis and remote repair of faults.

By contrast, utilities' efforts to institute time of use pricing to pay for expensive smart meters are meeting with consumer backlash and regulatory pushback. Baltimore Gas and Electric's proposed rate increase to pay for smart meters was just rejected by their regulator, and Pacific Gas and Electric has slowed its smart meter deployment after receiving lawsuits from customers over higher costs. Residential electricity customers balk at paying much higher energy costs at peak hours when they may have little choice but to leave the air conditioner running. Evidence suggests consumers are not eager to curtail energy use voluntarily. High energy prices result in conservation but they do so gradually through the development of more efficient appliances, industrial and transportation efficiency, and grid improvements.

Earthrise Capital Portfolio Observer

With this new feature, we hope to give our investors a deeper understanding of the Earthrise portfolio through interviews with a team member of one of our portfolio companies. Because we invest generally in young companies with limited resources and a relative handful of employees, each staff member is usually highly trained and responsible for some critical function in the company.

Our first interview is with Zhihao Yang, Co-founder and Chief Technical Officer, NanoMas Technologies, Inc. NanoMas is a development stage company with proprietary chemistry technology used in new higher productivity, resource-efficient processes for electronic materials' manufacturing. Zhihao and his partners, Tom Xu, a materials engineer, and Howard Wang, a polymer scientist, founded the company in 2006. Previously, Zhihao spent eight years at Eastman Kodak in research on display technologies and inkjet printing. It was his unusual background combining both organic and inorganic chemistry, along with his partner Howard Wang's skills in particle characterization, and Tom Xu's engineering skills, which led to the breakthrough in technology and the founding of NanoMas Technologies, Inc.

Zhihao was educated at Nanjing University and received his doctorate in polymer chemistry at University of Wisconsin/Madison. He is a naturalized American citizen and lives with his wife, Yanni, and small son Andy, in Binghamton, NY.

Earthrise Capital: What led you to found NanoMas Technologies, Inc.?

Zhihao: "I was working on materials for printed electronics and I saw that there was a need for a new kind of ink. Some printed electronics applications use flexible plastic substrates. They require a lower curing temperature to preserve the plastic. The inks that were available a few years ago cured at high temperatures. Also there was a need for a lower cost ink, cleaner and more resource-efficient, even for applications such as LCD screens where flexibility is not a requirement. Howard, Tom and I developed that new ink ourselves, and founded NanoMas to commercialize our invention. "

Earthrise Capital: Why did you locate the company in Binghamton, NY?

Zhihao: "Howard was offered a faculty position at SUNY-Binghamton, which is a leader in electronics packaging; he is an associate professor in materials science and mechanical engineering. Also, SUNY-Binghamton is the site of the Center for Advanced Microelectronics Manufacturing (CAMM), the display industry consortium for flexible roll to roll manufacturing processes. CAMM has provided NanoMas access to advanced equipment that we could not have afforded to purchase on our own."

Earthrise Capital: What does your current work at NanoMas primarily entail?

Zhihao: "As Chief Technical Officer, I oversee the research laboratory and product development. After we developed the basic nanoparticle, we founded NanoMas to apply it to commercial products. To make the particle useful, it must be formulated into pastes, dispersions and so forth with characteristics tailored for specific applications. I am involved in developing formulations for different potential customers. I am also involved with the strategic partners who manufacture our nanoparticles."

Earthrise Capital: What applications do you expect will be the first commercial products for NanoMas?

Zhihao: "Chrystalline solar cell metallization through inkjet and similar high throughput printing processes. The solar industry is moving towards using thinner silicon wafers and newer 'contactless' printing techniques to increase solar cell efficiency and reduce costs. The thinner the current-collecting gridlines on the front of a solar cell, the greater the efficiency since more of the cell is exposed to sunlight. Thinner gridlines use less silver, which lowers solar costs. NanoMas is working closely with a leading equipment manufacturer on a proprietary ink formulated for this new printing technology.

Another application is semi-conductor chip packaging which refers to the process used in manufacturing chips, especially the newer stacked '3-D' chips. The need for greater capability in ever smaller form factors is driven by new applications such as the video demands of small cell phones. Printing facilitates the quest for smaller, more robust and increasingly, flexible forms."

Earthrise Capital: What advantages does NanoMas' ink bring to the printing of these chips?

Zhihao: "Solar cell metallization has traditionally used a silver paste which is a good conductor. The new inkjet printing processes for solar cells and 3-D chips require much smaller silver particles than industrial silver suppliers currently offer. Our silver nanoparticle is particularly small and stable. It is easier to use than other silver nanoparticles; it can be fired at much lower temperatures than traditional silver "flake," enabling the manufacture of next-generation solar, semiconductor and display technologies; and we believe it can be produced in volume at lower cost than our competitors' nanosilver. Also, we work with our customers to provide them with a formulated ink, not simply a particle that they would need to turn into an ink."

Earthrise Capital: What's changed in the outlook for NanoMas' products in the time since you founded the company?

Zhihao: "The solar market has moved much more quickly than the printed electronics market. In 2006 we had no idea about the potential in the solar market. You have to find markets where customers have a present need for a new solution and are ready to invest in new equipment and processes. That is true of the solar market today. "

Earthrise Capital: What has been the effect on NanoMas of having venture investors and a large strategic backer (BASF, the German chemical giant)?

Zhihao: "A small company like ours needs established partners, partly for financial resources of course, but other matters are just as critical. We look to our partners for strategic advice, for opening doors to partners and customers, and for product development, marketing and distribution agreements. Customers want to know that a small company has good backing and good partners working alongside it."

Earthrise Capital: Thank you, Zhihao.

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Earthrise Capital Fund is a venture capital fund which invests in resource efficient technologies, including energy efficiency, clean energy, power conversion, energy storage, alternative fuels, and green chemistry.
