

Crystal Research Associates, LLC

800 Third Avenue, 6th Floor

New York, NY 10022

(212) 851-6681

www.crystalra.com

Nanotechnology Update

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Commissioned by

Livingston Securities, LLC

825 Third Avenue, 2nd Floor

New York, NY 10022

(212) 520-8481

www.livingstonsecurities.com

CONTINUING COVERAGE OF NANOTECHNOLOGY AND THE BUILT ENVIRONMENT

This report is an update to a comprehensive industry review, *Nanotechnology and the Built Environment: The Transition to Green Infrastructure* (published November 2011), available at www.crystalra.com or from Livingston Securities, LLC by calling (212) 520-8481. This March 2012 update contains a number of sector and government developments since the release of the February 2012 update.

Key sector developments on...

Cement/Concrete ▪ Display Technologies ▪ Lighting/Organic Light-emitting Diodes (OLEDs) ▪ Nanomaterials ▪ Smart Grid Networks ▪ Water Treatment ▪ Windows

As well as developments in...

- U.S. Policy Toward Alternative Fuel Technologies, Industrial Assessment Centers, Efficiency, Renewable Energy, and Photovoltaic Building Codes
- Independent Research Emphasizing the Importance of Government Support for Sustainable Cities
- International News from South Africa and Iran

INNOVATIVE COMPANIES IN THE NANOTECHNOLOGY ARENA MAY BE THE KEY FOR NEW GROWTH AND VALUE IN ESTABLISHED BUILDING SECTORS, AS INVESTMENT IN NANOSCIENCE IS LEADING TO MORE ECOFRIENDLY, ENERGY-EFFICIENT, HIGHER-QUALITY INFRASTRUCTURE.

Recent Sector Developments

Cement/Concrete

Innovative BIPV Partnership May Enable Architects to Design Energy-harvesting, Zero-emission, Green Buildings

Heliatek GmbH, a German photovoltaic technology provider, has entered into a joint development agreement with RECKLI GmbH, a manufacturer of elastic molds for concrete building façades. The companies plan to integrate Heliatek's organic solar panels with concrete blocks, creating a building-integrated photovoltaic (BIPV) product that reduces a building's carbon footprint. According to Heliatek, its solar panels' thermal properties, which have an efficiency constant up to 80°C (176°F), do not require additional ventilation, making them suitable for such application. Heliatek's partner RECKLI is a subsidiary of InnoTec TSS AG (TSS-Frankfurt).

<http://www.heliatek.com/?p=1561&lang=en>

Nanotechnology-based Coating that Protects and Insulates at a Level Appropriate for Nuclear Facilities

Industrial Nanotech, Inc. (INTK-OTC) announced the first sale of its patented protective and insulation coating line, Nansulate, to a U.S. nuclear power facility. The nanotechnology-based coating line delivers cost-saving thermal insulation properties with weathering resistance to withstand adverse conditions, including UV rays, moisture, and corrosion. In addition, Nansulate coating technology facilitates the encapsulation of surfaces contaminated with lead, a key issue during the decommissioning of nuclear plants. Industrial Nanotech's coatings and products benefit a range of power and energy production companies, including solar, wave, wind, oil, gas, coal, and nuclear facilities.

<http://www.azonano.com/news.aspx?newsID=24241>

BASF Venture Capital GmbH Invests \$5 million in U.S.-based Solidia Technologies, Inc.

In February 2012, BASF Venture Capital announced a \$5 million investment in Solidia Technologies, Inc. as part of a \$27 million financing round that also includes Kleiner Perkins Caufield and Byers, BP Ventures, and Bright Capital. Solidia's technology platform allows for the sustainable production of building and construction materials. The cementitious materials produced by its process are believed to exhibit improved mechanical properties, lower life-cycle costs, and a reduced environmental footprint versus standard concrete. The technology uses CO₂ as a reactant, consuming the greenhouse gas during production. With this technology, cement manufacturers can use current equipment to produce indoor and outdoor low-environmental impact products, ranging from pavers to structural precast concrete.

<http://www.basf.com/group/pressrelease/P-12-122>

Display Technologies

Electrochromic Display Technology Reaches Consumers in the Form of Marketing Displays

L'Oréal's Luxe Division in Portugal is launching an interactive perfume selection product based on Ynvisible S.A.'s printed electrochromic display technology in several Portuguese perfume stores. Ynvisible's point-of-sale display combines printing and electronics solutions to direct the customer by conducting a short quiz to identify the shopper's perfume preferences. This is the first interactive display developed by Ynvisible to be commercially used in the retail environment.

<http://www.ynvisible.com/press/news/whats-up/detail/343>

Nanotechnology-based Approach to Multi-player Gaming

In late February 2012, Gunze Ltd (GNZLF.PK-OTC) presented a new type of touch display at the International Nanotechnology Exhibition and Conference in Tokyo that can recognize different users. Gunze pairs a capacitive screen with electrodes, which a user touches with one hand when interacting with a game or application. When the user touches the interactive screen, the display can detect which particular circuit is completed, and can use that information to differentiate between up to four different players accessing the display at the same time. The technology has potential for gaming technology and arcade games, among many other future uses.

<http://www.engadget.com/2012/02/21/gunzes-new-touchscreen-tech-knows-whos-touching-it/>

Lighting/Organic Light-emitting Diodes (OLEDs)

Alternative Materials for LED Substrates Ramp Up Development

Today, the cost and performance of high-brightness LEDs is closely linked to the substrate material used in their manufacture. Synthetic sapphire is most commonly used as a substrate but is associated with high costs—a key factor stimulating the development of new technologies. Ongoing research on LED substrate technology aims to enable less costly and more effective LED lighting products through lower manufacturing costs and automated production. Such developments could have a significant impact on the ability of LEDs to penetrate the general-purpose lighting market. In addition to sapphire, three other materials are contending to be the LED substrate of choice: silicon (Si), silicon carbide, and gallium nitride (GaN). In addition, companies are researching the use of glass, germanium, and aluminum nitride (AlN) as possible substrate options.

Thus, manufacturers are developing competing substrate materials to offer improved cost/performance ratios. Among them, the following companies have announced recent developments in these efforts: (1) OSRAM Opto Semiconductors GmbH, which recently presented an Si research update finding that the use of Si can provide a significant potential cost reduction; (2) Bridgelux, Inc., which raised \$25 million in funding from China to continue its Si substrate research; (3) Cree, Inc. (CREE-NASDAQ), which continued silicon carbide development in an effort to benefit from the material's stability and thermal conductivity (noting that its price might limit cost-reduction opportunities); (4) Sora Inc., which unveiled a GaN device capitalizing on the material's thermal and structure advantages while trying to overcome instability and defect-prone properties; and (5) Nitride Solutions Inc., which closed an oversubscribed \$2.5 million round of financing to support its AlN substrates.

<http://www.greentechmedia.com/articles/read/the-battle-of-the-led-substrates-heats-up/>

Voluntary New Performance Standards for Commercial Lighting May Save up to \$5 Billion Annually

On February 15, 2012, the U.S. Department of Energy (DOE) announced that it has introduced voluntary new specifications for commercial lighting that could save businesses up to \$5 billion annually. The new guidelines, which include the DOE's Commercial Building Energy Alliances' (CBEA) High Efficiency Troffer Specification and updated specifications for high-efficiency parking lots, have already been adopted by Wal-Mart Stores, Inc. (WMT-NYSE), Lowe's Companies, Inc. (LOW-NYSE), and the Cleveland Clinic Foundation. They set minimum performance levels for LED and fluorescent overhead lights used in commercial buildings, offices, and restaurants as well as in high-efficiency parking lot and parking structure lighting. Ultimately, voluntarily adhering to the new energy-saving lighting specifications could enable building owners to reduce their energy use by more than 40% versus conventional commercial lighting and by 50% versus typical lighting systems in parking lots.

http://apps1.eere.energy.gov/news/progress_alerts.cfm/pa_id=678

New Report Available with an In-depth Look at the OLED Lighting Materials Market

The OLED lighting segment could eventually emerge as the largest addressable market for OLED materials, according to a report from NanoMarkets, LC entitled “*OLED Lighting Materials Markets 2012.*” In recent years, OLED luminaires have become increasingly available to consumers, and a number of new companies have entered the OLED field. As this space continues to expand, research seeks to determine what materials could improve OLED lighting efficiency, lifetime, and cost of ownership going forward. Companies at the forefront of OLED lighting technological research and the OLED lighting firms that are first to market are expected to have a major impact on deciding which materials emerge as the materials of choice for OLED lighting in the future.

http://www.nanomarkets.net/market_reports/report/oled_lighting_materials_markets_2011

New Executive Management Appointments at LUMEnergi™

In February 2012, LUMEnergi™, Inc., a provider of lighting energy management solutions, named lighting industry veteran Mr. Barry Weinbaum as president and chief executive officer (CEO). Mr. Weinbaum brings more than 30 years of experience in high-tech markets, including communications, nanotechnology, electronics components, consumer products, semiconductors, software, wireless, and lighting. As stated in LUMEnergi’s press release announcing the executive appointment, Mr. Weinbaum’s experience in venture-backed, entrepreneurial companies and the technology industry may benefit the expansion of the company’s products and services, including NetLight™, a hardware and software set of integrated lighting control systems that enables up to a 70% energy savings and a streamlined installation process. In addition to Mr. Weinbaum, LUMEnergi™ appointment a new senior vice president of sales, vice president of marketing, and chief financial officer, for whom biographies are provided in the below MarketWatch article.

<http://www.marketwatch.com/story/lumenergi-assembles-team-of-industry-leaders-to-accelerate-growth-of-advanced-lighting-energy-management-company-2012-02-15>

Reducing Energy Use, Bulb Weight, and Costs While Increasing Average Lifetime

In March 2012, Nexxus Lighting, Inc. (NEXS-NASDAQ) is expected to introduce its Array® LED BR30 replacement light bulb, which consumes less than 10 W to produce the equivalent light output of a 65 W incandescent bulb. The Array® LED BR30 incorporates technology that improves the bulb’s dimming circuitry, lowers costs, and supports over 50,000 hours of use. As well, the company’s patented Selective Heat Sink Technology™ (SHS) reduces the weight of the bulb to roughly seven ounces versus currently marketed LEDs, which can be over one pound (16 oz.). Nexxus Lighting reports that its Array® LED BR30 bulb not only reduces energy consumption, but could replace 25 standard incandescent 65 W BR30 bulbs over its average lifetime. Nexxus Lighting believes that a single Array® LED BR30 bulb could outperform the equivalent of 25 65 W bulb replacements while requiring 85% less energy. The new bulb exceeds Energy Star® performance standards. While Nexxus Lighting is initially pricing the bulb below \$29, the company may ultimately lower the price below \$20 to encourage widespread consumer adoption.

http://www.nexxuslighting.com/news/pressReleases/news_021312.php

Demand Drivers for Energy-efficient Lighting

NanoMarkets recently released “*Smart Lighting 2012*,” which analyzes the worldwide smart lighting market. According to the report, the search for efficient and cost-effective lighting solutions is expected to be the main driver for smart lighting technology. The preferred aesthetics of smart lighting products and their capability to deliver improved lighting versus standard options are also factors fueling demand of these technologies. Going forward, the introduction of new, enhanced electronics and intelligent luminaires are resulting in additional products that could continue to drive market adoption of compact fluorescent lights (CFLs), LEDs, OLEDs, and other forms of energy-efficient lighting. NanoMarkets’ report also studies opportunities arising as networking strategies integrate smart lighting solutions with smart grid technology, combining the benefits of both systems and solutions.

http://www.nanomarkets.net/market_reports/report/smart_lighting_2012

Nanomaterials

Researchers Describe a New Technology to Displace the Wood Pulp in Paper

The use of nanocellulose, a new class of nanomaterial comprising crystalline or fibrous units of cellulose, could reduce the carbon footprint of paper manufacturing processes by 15% or more as well as reduce production costs. Nanocellulose has been found to also hold potential for producing paper that has less porosity and improved printing quality. Paper businesses are reportedly embracing this technology, with industrial test facilities already up and running.

<http://www.rsc.org/chemistryworld/News/2012/February/cellulose-nanomaterial-paper-environment.asp>

Oregon State University Announces Commercially Significant Metamaterial Discoveries

On February 23, 2012, researchers at Oregon State University reported that they have discovered a way to make a low-cost material (a metamaterial) that accomplishes negative refraction of light and other radiation in the way that costly, complex crystalline materials do today. OSU’s research entails ultra-thin, ultra-smooth, all-amorphous laminates, essentially a layered glass that has no crystal structure, for the creation of metamaterials. The low-cost laminate metamaterials are created with technology similar to that used in LCD television screens. The university believes these materials could have extensive applications, ranging from a super lens (a device for light magnification at levels that exceed existing capabilities) to stealth coatings for near invisibility, among other uses in electronics manufacturing, lithography, biomedicine, insulating coatings, heat transfer, space applications, optical computing, and energy harvesting.

<http://oregonstate.edu/ua/ncs/archives/2012/feb/discovery-opens-avenue-%E2%80%9Cnegative-refraction%E2%80%9D-new-products-and-industries>

Carbon Nanotube-based Paint Could Make Airplanes Invisible to Radar

According to research being conducted at the University of Michigan, a nanostructured coating composed of carbon nanotubes could enhance the stealth capabilities of aircraft by making them indistinguishable from the night sky as well as by preventing radar detection. The long straws of pure carbon that make up carbon nanotubes, each just a few nanometers in diameter, completely absorb a broad spectrum of light and radio waves. Thus, if an airplane painted with the nanotube coating were to be targeted with a radar beam, there would be no reflection, rendering the aircraft undetectable by radar technology. Nanotubes’ ability to act as a type of invisibility cloak has also been demonstrated by the University of Texas at Dallas’ NanoTech Institute, where a submerged heated sheet of nanotubes affected the optical properties of the surrounding water, creating the illusion of invisibility.

<http://www.technologyreview.com/article/39238/>

Smart Grid Networks

Hitachi, Ltd. (HIT-NYSE) Invests \$30 million in Smart Grid Networking Startup Silver Spring Networks, Inc.

In early March 2012, IPO-candidate Silver Spring Networks raised \$30 million from global consumer and business product company, Hitachi. Silver Spring Networks provides networking platforms and services for smart energy grids. This transaction was part of a strategic alliance between the companies that centered on the development of integrated solutions to power utilities and users in the global smart grid sector. As part of the investment, Hitachi reportedly acquired from Silver Spring convertible bonds with stock acquisition rights. This relationship with Hitachi may help Silver Spring expand its smart grid footprint.

<http://www.greentechmedia.com/articles/read/silver-spring-hitachi-join-forces-on-smart-grid/>

March 14-16, 2012: VERGE DC Conference

VERGE DC, a conference focusing on new technologies for sustainability, energy, buildings, information, and transportation, is scheduled to be held in Washington, D.C., from March 14, 2012, to March 16, 2012. VERGE DC is attended by corporate leaders, policy makers, and technological innovators in the fields of sustainability, building and energy management, utilities, fleets and logistics, government and policy, R&D, and corporate financing.

<http://www.greenbiz.com/events/2012/03/verge-2012>

Diverse Technology Options for Smart Grid Deployments

The use of cellular technology in the residential smart meter market is gaining momentum as cellular carriers' rollout favorable service terms for utilities, with prices reduced to \$1 per meter or less per month. At present, residential smart meters have been dominated by utility-owned mesh networking technology supplied by companies such as Silver Spring Networks, Trilliant Holdings, Inc., Itron, Inc. (ITRI-NASDAQ), Toshiba's Landis+Gyr, General Electric Co. (GE-NYSE), and Elster Group SE (ELT-NYSE). However, Trilliant, Landis+Gyr, and companies like SmartSynch, Inc. are now focusing on the development and deployment of cellular technology to complement and facilitate the expansion of existing infrastructure. The ability to integrate varying smart meter technologies could be a key factor in determining business success within this growing market. In November 2011, SmartSynch announced a partnership with Grid Net, Inc., the smart grid startup using 4G technology to network the grid. Silver Spring Networks is also implementing cellular technology, adding cellular nodes to its IP-based mesh networking technology at certain difficult-to-service endpoints. These developments seem to indicate that success in the smart grid market does not depend on a specific communications technology, but on the ability of companies to integrate different technologies, and the flexibility to create strategic partnerships.

<http://www.greentechmedia.com/articles/read/the-return-of-the-cellular-smart-grid/>

Smart Grid Collaboration

Itron, Inc. and electric and gas company National Grid plc (NGG-NYSE) have entered into a collaborative agreement to field-test the capabilities, functionality, and interoperability advantages of Itron's new smart grid solution in Massachusetts. Based on Cisco GridBlocks™ Architecture, the Itron multi-application system integrates advanced metering, home area networking (HAN), and distribution automation (DA) functionalities, and is designed to eliminate the need for proprietary or vendor-specific integration of applications and devices. The partnership is anticipated to strengthen Itron's vision for the creation of an open, multi-application utility smart network.

<http://www.thestreet.com/story/11420691/1/national-grid-and-itron-team-up-for-smart-grid-innovation.html>

Water Treatment

Advocacy Group Recognizes Water Sustainability Efforts in the U.S.

The Clean Water America Alliance, a Washington, D.C.-based advocacy group, announced five winners of the 2011 U.S. Water Prize, which recognizes projects and efforts to improve water sustainability in the U.S. The winners included the City of Los Angeles; the Milwaukee Water Council; the National Great Rivers Restoration & Education Center in Alton, Illinois; the New York City Department of Environmental Protection; and Oakland, California's Pacific Institute.

<http://www.uswaterprize.org/winners.php>

Water is a Significant Global Opportunity in the Advanced Metering Infrastructure Space

Water is a growing trend for advanced metering infrastructure (AMI) as utilities face low water supplies and strict conservation measures in certain parts of the U.S. and other countries worldwide. Utilities can use smart water meters to measure how much water is getting to endpoints, to help enforce compliance in areas with conservation rules, and to determine when a water meter needs replacement. Eventually, smart water meters may also be used to match electric supply and water demand, as pumping water requires substantial electricity.

Three years ago, eMeter Corp. was one of several meter data management providers to offer water management services in addition to electric smart meter products, although more companies are now offering water metering tools. Acquired by Siemens AG (SI-NYSE) in late 2011, eMeter is positioning its platform as a comprehensive product suitable for gas, electricity, and water and across different meter vendors. eMeter's products help utilities monitor data and identify water usage spikes due to faulty pressure valves or leaky sprinklers, among other causes. This information can be quickly relayed to customers, who can address the problem early on, saving money and conserving water. In addition, its capabilities also allow the expansion into international markets, such as the Middle East.

<http://www.greentechmedia.com/articles/read/emeter-boosts-its-mdm-with-water-offerings/>

Windows

Manufacturing Breakthrough for Energy-Saving Windows

GED Integrated Solutions, Inc., a global supplier of window and door manufacturing systems, introduced a new residential window manufacturing process called Automated Tri-Lite Assembly System (ATLAS), which reduces production time while improving the insulation and energy efficiency of residential windows. In 20 seconds, ATLAS can be used to produce a triple-pane glass window, a significant improvement over traditional production methods that can require longer than two minutes. In September 2011, GED's ATLAS technology was named "Best in Show" during the GlassBuild America industry event. The development of ATLAS was funded in part through a \$1.2 million investment from the DOE in 2009 to support the creation of an improved manufacturing process in terms of volume and efficiency for energy-saving residential windows.

http://apps1.eere.energy.gov/news/progress_alerts.cfm/pa_id=681

Smart Windows Market Poised for Growth

NanoMarkets, a research firm specializing in the advanced materials and emerging energy and electronics markets, expects the smart window market to experience significant growth going forward due to several key factors: (1) an increasing awareness of and interest in energy conservation and green building initiatives; (2) an expanding global market; and (3) the introduction of improved smart window technologies. Collectively, these trends may benefit material/coating suppliers, glass/window manufacturers, builders, and owners of buildings, homes, and transportation, among others. The smart window market includes both traditional passive technologies as well as newer active developments, such as self-dimming and self-cleaning windows. Greater details of the opportunities and challenges in the global smart window market are provided in NanoMarkets' *Smart Windows Markets 2012* report issued on February 28, 2012.

http://nanomarkets.net/market_reports/report/smart_windows_markets_2012

Polymer-based Solar Panel Breaks Efficiency Record

Researchers at the University of California, Los Angeles (UCLA), have developed a polymer solar cell capable of converting 10.6% of sunlight's energy into electricity in the laboratory, which breaks the prior record of 8.6% achieved by UCLA in July 2011. Polymer solar cells have significant mechanical advantages over conventional cells made from inorganic materials, such as silicon, in that they are lightweight and flexible. As well, they could potentially cost less to produce. However, historically, the rate at which polymer solar cells can convert solar energy into usable electricity has lagged behind that of inorganic solar panels. UCLA researchers are seeking to develop low-cost polymer-based devices that can compete with thin-film silicon solar panels to expand the functionality of solar energy systems, and believe that a polymer solar cell with 15% efficiency in the lab could be sufficient to compete with current thin-film silicon solar technologies, noting that laboratory-derived efficiency numbers typically decrease by roughly one-third when implemented in working modules.

<http://www.technologyreview.com/energy/39763/?nlid=nlmat&nld=2012-02-23>

Government Policies

President Obama Announces Funding for Alternative Fuel Technologies

On February 23, 2012, President Barack Obama announced new funding for two alternative fuel technologies—natural gas and biofuels—as part of an energy strategy to reduce the U.S.’s reliance on foreign oil. The DOE’s Advanced Research Projects Agency—Energy (ARPA-E) plans to allocate \$30 million for the development of natural gas vehicle technologies, focusing on enabling the widespread adoption of this technology. The program aims to capitalize on the nearly 100-year supply of American natural gas, which has the potential to support more than 600,000 U.S. jobs. In addition, the Energy Department plans to allocate \$14 million during fiscal year 2012 to support development of transportation fuels from algae, with an additional \$6.7 million in fiscal year 2014. The DOE is currently supporting more than 30 algae-based biofuels projects. Algae-derived biofuels have the potential to replace up to 17% of the U.S.’s imported oil for transportation.

http://apps1.eere.energy.gov/news/progress_alerts.cfm/pa_id=685

The U.S. Department of Energy Gets Behind a Smart Grid

The DOE is developing a long-term vision for the U.S. electricity system by 2035, which focuses on three central themes: (1) a seamless system from generation to end use; (2) support of clean energy; (3) a system to empower consumers by providing more choices. Under this vision, currently being pitched to state regulators, the DOE hopes to easily integrate any form of energy generation or storage into the main infrastructure as well as make it easy for outsiders to offer new products, services, and markets. The DOE continues to revise its plan with the input of regulators, consumers, utilities, and government agencies.

http://www.smartgridnews.com/artman/publish/Key_Players_Policy_and_Regulation/Smart-grid-vision-alert-DOE-wants-to-make-course-corrections-4503.html

President Obama’s 2013 Energy Budget Targets Efficiency and Renewable Energy

President Obama’s \$27.2 billion budget request for the Department of Energy in FY 2013 includes nearly \$2.3 billion for the Office of Energy Efficiency and Renewable Energy (EERE), which invests in clean energy technologies. This funding would support energy initiatives that focus on cleaner and cheaper energy sources. The appropriation for the Energy Department could also include the following technology-driven projects, among others: (1) \$350 million for ARPA-E, to support early stage research projects that could deliver clean energy technologies; (2) \$276 million for research and development of advanced fossil fuel power systems and carbon capture, utilization, and storage technologies; (3) \$120 million to support the Energy Frontier Research Centers and \$140 million for the five existing Energy Innovation Hubs that focus on grid systems and the tie between transmission and distribution systems; and (4) \$60 million for research on energy storage systems and new approaches for battery storage.

<http://cleanedge.com/resources/news/Presidents-2013-Energy-Budget-Seeks-2.27-Billion-for-Efficiency-Renewables>

Budget: <http://www.cfo.doe.gov/crOrg/cf30.htm>

U.S. Building Code Changes May Open Opportunities for Building-integrated Photovoltaics (BIPVs)

Building-integrated photovoltaics (BIPV) in roofs, glazings, and façades are becoming increasingly common in Europe and Asia, yet are rarely deployed in the U.S. A combination of elements, including the economy, concerns about reliability and performance, and a volatile PV market, may contribute to this anomaly; however, professionals within the industry cite the costly and time-intensive UL approval process for PV panels as the largest barrier. PV panels typically have to be custom-built for each project. In Europe, a custom PV panel built in the same manner as the manufacturer's standard-size offerings can be preapproved, whereas the U.S. building code UL 1703 for flat-plate photovoltaic modules and panels requires retesting to obtain UL approval for custom PV panels as well as for their mounting systems and components. John Wohlgemuth, a principal scientist in PV reliability at the National Renewable Energy Laboratory (NREL) who also works on PV code compliance, has noted that UL 1703 is being modified to help address this issue. Moreover, Wohlgemuth anticipates that the code could eventually be replaced by an international code that eliminates the retesting requirement, although this could take several years.

In the meantime, solar power companies such as Soltecture Solartechnik GmbH and Focus Materials are entering the U.S. market with UL-approved technologies. Soltecture offers Corium thin-film BIPV in a small size (2'x4') to allow easier integration into a building. As well, Focus Materials markets UL-approved rainscreen and curtainwall BIPV mounting systems.

<http://greenspec.buildinggreen.com/content/building-integrated-pv-new-opportunities-bright-future>

U.S. Energy Department Emphasizes Industrial Energy Assessments for Manufacturing Facilities

On February 23, 2012, President Obama visited the University of Miami, where he discussed an Energy Department plan for Industrial Assessment Centers at universities throughout the U.S. These centers are part of a program to reduce energy consumption and costs, and serve to train engineering students in industrial processes, energy assessment procedures, and energy management principles. To date, such assessments have helped save over 530 trillion British Thermal Units (BTUs) of energy—enough to meet the needs of 5.5 million homes—and have helped manufacturers save more than \$5.6 billion in energy costs.

http://apps1.eere.energy.gov/news/progress_alerts.cfm/pa_id=684

New Report Details the Importance of Government Support for Sustainable Cities

In late February 2012, Lux Research Inc. released a new report titled, *Technologies for Future Cities: Integrating Efficiency, Sustainability, and Environmental Concerns*, that emphasized the need for governments to provide long-term sustained support for renewable energy, smart grid, and other future city initiatives. The report used eight cities as models, including old cities (Barcelona, Amsterdam) that are retrofitting existing structures and power grids as well as new cities (Masdar City [UAE]) that are being sustainably built from the ground up. Among other findings, Lux Research notes that the price of renewable energies and associated technologies are too high to appeal to investors without government support. Mechanisms such as incentives, feed-in-tariffs, tax-breaks, rebates, and other financial instruments are critical.

<http://www.cleanenergyauthority.com/solar-energy-news/future-cities-need-government-to-support-renewables-030212/>

An Additional 2.7 Billion People Expected to Live in Cities by 2050

As well, Lux Research's report *Technologies for Future Cities* found that, in addition to government policies, technology incentives are necessary for the development of efficient cities that can support anticipated population growth. By 2050, the number of people living in cities is expected to reach roughly 6.3 billion individuals, up from 3.6 billion today. Both the updating of infrastructure in brownfield cities and the addition of novel greenfield cities is necessary to support such growth. Lux Research estimates the cost to replace and expand upon dated urban infrastructure in brownfield cities globally could exceed \$40 trillion by 2032, in addition to the costs of creating new greenfield cities.

<http://finance.yahoo.com/news/amsterdam-stockholm-smartgridcity-planit-valley-123000406.html>

International News

South Africa Invests in Nanotechnology Development

In February 2012, the Department of Science and Technology received R350 million from South Africa's Minister of Finance to support technology manufacture, including the development and commercialization of novel nanotechnology, renewable energy, titanium, and satellites, among other initiatives. The funding also sought to encourage the employment of graduates in small businesses as part of a larger R9.5 billion plan to encourage business growth through investment in technology, enterprise development, and agriculture.

<http://allafrica.com/stories/201202230077.html>

Iranian Nanotechnology Industry Growing

At the closing ceremony of the First Strengthening Camp for Nanotechnology Human Resources, Dr. Saeed Sarkar, the secretary of Iran's Nanotechnology Initiative Council, acknowledged the expanding nanotechnology field on both an educational and commercial level in Iran with an estimated 12,000 experts with M.Sc. or Ph.D. degrees, more than 2,600 university lecturers creating nanotechnology-centric articles and theses, and 65 knowledge-based companies in growth centers operating in the field. The Nanotechnology Initiative Council seeks to support the development and commercialization of nanotechnologies to improve people's health and quality of life.

<http://en.nano.ir/index.php/news/show/2544>



Jeffrey J. Kraws and Karen B. Goldfarb

Phone: (609) 306-2274

Fax: (609) 395-9339

Email: eio@crystalra.com

Web: www.crystalra.com

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