

## ENERGY NEWS REPORT

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### BUSINESS NEWS

**HP in the Energy Sector** - *[Everyone is jumping into "energy". Some are veterans, like GE, and others are start-ups, with new and not-so-new concepts. Several are in semiconductors, and introducing solar materials and technologies revolving around silicon that can be used for cells. But some of the long-established companies, with no obvious energy connection, are moving into the energy consulting space. We saw this with IBM, who wants to show you how to be more energy-efficient with hardware, software, logistics, and more; probably a good idea. But, IBM is also inventing some high-efficiency devices and computer systems, so we can expect solid results from their multi-pronged strategies.]*



Now HP appears to be entering the energy business, but with a new twist. It turns out that about 65% of the worldwide electric power systems run on HP platforms. So HP has chosen to focus efforts on developing a vertical solution to meet this sector's growing regulatory demands. The result is HP Trusted Compliance Solution for Energy (TCS-e). The goal is to help power and energy companies reduce security risk by providing robust protection against hacking threats. The automation technology in HP TCS-e also helps energy companies reduce the business risks and costs associated with noncompliance, such as audits. With security uncertainty plaguing the marketplace at large, some extra legislative attention is being paid to infrastructure-critical energy companies who labor under ever-increasing compliance requirements and reliability standards. *[Don't be surprised if HP eventually figures out that they should add operating efficiency improvement, but this might be a stretch if they want to include power generation and transmission. Then again, this might be something that IBM could tackle.]* Source: IW

### SOLAR



**Renewable is Getting Energized** - The UT's IC2 Institute (Austin, TX) reported that increased investment in solar technologies could result in more than 100,000 new jobs. Development of the solar energy industry in Texas could have a significant economic impact for consumers, the environment and workers, according their report, "Opportunity on the Horizon: Photovoltaics in Texas". The report suggests that the near-term benefits of nurturing the solar energy industry in Texas will stimulate the state's economy, reduce the cost of power for consumers and minimize greenhouse gas emissions. The paper cites a recent UC-Berkeley study that finds the solar industry produces seven to 11 times as many jobs on a megawatt capacity basis as coal-fired power plants and has larger, positive trickle-down effects than wind energy. Estimates suggest Texas could generate 123,000 new

high-wage, technology-related, advanced manufacturing and electrical services jobs by 2020 by actively moving toward solar power. It is predicted these jobs would be created across the entire state as large solar farms grow in West Texas, silicon plants develop along the Gulf Coast and manufacturing centers appear in Central Texas.

**Semi + Solar Means Synergy** - The solar industry is for support from the equipment and materials supply chain to help drive down the cost of photovoltaic (PV) technology, according to Solar Energy Industries Association (SEIA). The single biggest factor to bring down solar cost per watt is moving to larger substrates, on tools adopted from the semiconductor industry. The global solar industry **spent \$2.8-billion** on plants and equipment in 2006 as it added 548 MW, for a 33% jump in capacity, to a worldwide total of 2204 MW. Solar sales reached \$10.6-billion last year and will likely grow to somewhere between \$18- and \$31-billion by 2011, for a 170% to 290%. But much of this forecasted growth depends on lower costs, and that depends on such things as deposition tools with better yields and higher throughput, economical slicing and handling tools for thinner wafers, better coating materials and lower cost polysilicon. Applied Materials thinks that large substrates could potentially bring thin-film solar costs down by 25%, but sees a continuum of further cost reductions to come from other suppliers scaling up near big-thin film solar plants, from the makers of clear solar soda lime glass to gas suppliers providing the silane and hydrogen precursors, to those making the environmental control and packaging equipment.

Much is to do with economies of scale so there's a wider range of opportunities supplying the solar industry with the same equipment and materials as the semiconductor industry, because it's earlier on in the maturation of the industry. It's like the integrated circuit industry years ago, when the makers were doing a lot of their own equipment design. But now the industry is growing so fast there's no longer time to do it all in-house. New materials are another area for reducing costs, since materials account for 60% of the typical cost of a conventional wafer-based solar cell. Now that solar is becoming a significant market, suppliers are starting to invest in developing products tailored to its specific needs, he said, "So there was no focus on the market. The grade of silicon for solar is lower and Corning and others, are stepping in with a lower-cost, lower-purity solar silicon feedstock made with a metallurgical process that can be blended into high-purity polysilicon without impacting cell performance. Also, a lower-cost encapsulant of silicone may allow higher efficiency cell performance and that may last longer, and that will also help cost. Source: Renewable Energy Access.

**More Polysilicon Capacity** - Solartech Energy intends to partner with several Taiwan-based companies to establish a polysilicon fab in the US. Volume production at this fab would begin in 2010. A shortage of polysilicon is constraining development of Taiwan's solar photovoltaic industry, so Solartech plans to establish a new company to construct a polysilicon fab in the US. Solartech did not disclose its future partner list, but will



announce details regarding technology transfer next month. Most believe that the company will merge with local solar cell makers. Solartech is thought to be crimped by lack of polysilicon now, but the company refuted the claim by saying that it has sufficient supply of raw materials through late 2008 through long-term sourcing contracts and supply is available in the spot market. They plan to double its capacity to 60-peak megawatt (MWp) in late 2007. Solartech's lineup of solar cell production ranges from mono- and multi-crystalline base materials, and the company has also announced in June that it will extend its presence to thin-film solar cells. Currently the company delivers a power conversion rate of over 16% for its solar cell with yields surpassing 95%. Solartech is now listed on Taiwan's stock market. Source: DigiTimes.



#### **Solar Cell Makers Climb**



SunPower, a solar power systems maker, more than doubled earnings because of high product demand. Revenue surged 218% to \$173.8-million compared to the expected \$156.7-million. For solar power firms such as SunPower, Trina Solar, First Solar and JA Solar jaso, are all riding high thanks mostly to high oil prices. SunPower posted its seventh straight quarter in the black. Early stages of solar power is typically a low-margin due to growing pains and lots of R&D. SunPower now has one solar cell production line up and running, with two more coming; they were buying sells previously. Fabing their own cells should achieve margins of 30% by the end of 2008. High energy costs and increasing concerns about climate change makes alternative power a high demand area. Germany and Japan started incentive programs back in the 1990s that helped jump-start the solar industry. In recent years, California and New Jersey have spent billions on similar programs. Solar cells also are far more efficient than in the past decades, but prices still need to come down. The price of silicon has risen in recent years due to high demand, limiting solar firms' ability to enter commercial markets. Leading companies like First Solar have adopted thin-film solar cell technology to reduce their silicon needs. SunPower with enough guaranteed silicon to produce two gigawatts (2,000-MW) but will produce 250-MW in 2008 and 400-MW or more in 2009. SunPower's goal is cutting installed solar system costs by 50% by 2012. SunPower expects total 2007 sales of \$730 to \$750-million and 2008 sales to rise to \$1 to \$1.2-billion. Source: Business Investor Weekly.

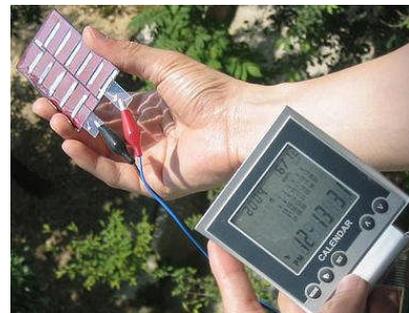
**First Production of Granular Polysilicon** - WACKER intends to build a new granular-polysilicon production facility for the solar industry at its plant in Burghausen, Germany. With annual nominal capacity of 650-metric tons, the new facility is expected to come on stream by the end of 2008. It will produce granular solar-grade polysilicon from trichlorosilane using fluidized-bed technology. Granular polysilicon offers processing advantages to solar-wafer manufacturers that employ certain production techniques, thereby supplementing WACKER's existing product portfolio for the photovoltaics industry. WACKER successfully tested its new method in pilot reactors over the past 2½ years and is now initiating first-ever commercial-scale production. Tests by customers show that processing granular polysilicon is far more efficient than conventional techniques using polysilicon chunks. Moreover, the comparatively low energy consumption compared to conventional deposition positively impacts the energy balance

of solar cells. With rising solar-silicon demand, WACKER POLYSILICON has been expanding capacity since 2000, increasingly supplying the photovoltaics industry. The division is currently the world's second-largest polysilicon producer. Source: SI



**Plastic PV Advances** - Plastics solar PV got a significant boost in efficiency due to a discovery made at the Center for Polymers and Organic Solids at the University of California, Santa Barbara. A team created a new "tandem" organic solar cell with increased efficiency. Tandem cells are comprised of two multilayered parts that work together to gather a wider range of the spectrum of solar radiation, at both shorter and longer wavelengths. The result is 6.5% efficiency and this is the highest level achieved for solar cells made from organic materials. The new tandem architecture improves efficiency and promises to be less expensive to produce. They say they can be fabricated by low-cost printing and coating technologies that can simultaneously pattern the active materials on lightweight flexible substrates. Tandem solar cells, two solar cells with different absorption characteristics, are linked to use a wider range of the solar spectrum, were fabricated with each layer processed from solution with the use of bulk heterojunction materials comprising semiconducting polymers and fullerene derivatives. The cells are separated and connected by the material TiO<sub>x</sub>, a transparent titanium oxide. This is the key to the multilayer system that allows for the higher-level efficiencies. TiO<sub>x</sub> transports electrons and is a collecting layer for the first cell. In addition, it acts as a stable foundation that allows the fabrication of the second cell, thus completing the tandem cell architecture. Source: SI

The Gwangju Institute of Science and Technology (Korea) has developed a plastic solar cell with 6.5% efficiency; quite good for plastic PV. Existing solar cells that use silicon semiconductors cost around \$2.30 to generate one watt of electricity. But this group's solution costs just ten cents per watt. Plans are already in motion to increase efficiency up to 15% after which we could see these things hitting the marketplace at large by 2012. [While plastic PVs have a way to go for achieving par with Si-type cells, they continue to move ahead, but slowly. Seems like there is a place for PPV today with all the attention, so let's keep a look out]. Source: Engadget.



**Solar Cell Efficiency Approaching 50%** - University of Delaware researchers have managed to crank up the efficiency of silicon solar cells to a record-breaking 42.8% under standard terrestrial sunlight conditions. The new record is an important milestone on the path to the 50% efficiency goal set DARPA under its Very High Efficiency Solar Cell (VHESC) program to develop affordable, portable solar cell battery chargers. The new results put the pieces in place for a solar cell module with a net efficiency 30% greater than any previous module efficiency and twice the efficiency of state-of-the-art silicon

solar cell modules. DARPA is initiating the next phase of the development program by funding the newly formed DuPont-University of Delaware VHESC Consortium to transition the lab-scale work to an engineering and manufacturing prototype model. The VHESC solar cell uses a novel lateral optical concentrating system that splits incoming light into three different "energy bins" of high, medium and low, and directs them onto cells of different light sensitive materials that together cover the solar spectrum. Importantly, the concentrator is stationary with a wide acceptance angle optical system that captures large amounts of light and eliminates the need for complicated tracking devices. Previous high-efficiency cells used a concentration device that required sophisticated tracking optics, a concentrating lens the size of a table and were more than a foot thick. By contrast, the UD consortium's devices are far thinner at less than 1 centimeter. The low profile and lack of moving parts translates into portability, which means these devices easily could go on a laptop computer or a rooftop. Source: University of Delaware.

## **WIND POWER**

**More US Windmill Factories** - LM Glasfiber will begin construction this fall on its plant on 135 acres at the Little Rock Port along the Arkansas River. The new North American headquarters in Little Rock will cost \$150-million and employ more than 1,000 people. The plant is scheduled to open in the first quarter of 2008. The project is referred to as Project Zephyrus for the Greek god of the western wind; Project Z. LM Glasfiber hopes to break ground on the factory in September and will initially hire about 500 workers. The plant will employ at least 1,000 workers over the next five years and will include a training facility for the company. The company is expected to manufacture



blades ranging from 120 feet to 220 feet in length at the facility. LM Glasfiber had \$3.54 billion in sales in 2006. The company has eight manufacturing plants and 4,200 employees. In North Dakota, LM Glasfiber has a plant in Grand Forks, where it employs about 700 people. The company produces about 33% of the windmill blades in the world market and operates 10 factories in eight countries. The company's only other U.S. plant, in Grand Forks, N.D., opened in 1999 with about 60 workers and company officials late last year announced plans to increase its work force to more than 700.

**Return of the Windcharger** - [Many decades ago, our most important communications product was charged at home by the wind. But the product faded away as we got spoiled with cheap energy piped to the home. Now, Gotwind has brought back that old idea, whether they know it, or not]. The wind charger is a small, portable mobile phone charger that uses stored kinetic energy to fully charge a mobile phone in up to 2-hours. Weighing only 150 grams, the wind generator may be a convenient answer for your next camping trip and adds another option to the growing number of ecologically friendly phone

accessories such as solar powered phone chargers and wind-up units. The Gotwind wind charger uses a conventional horizontal axis wind turbine and has a propeller diameter of 30cm. The turbine then activates a 3-phase alternator producing about half a watt of power, which can be filtered into a rechargeable battery for use anywhere. Mobile phones can then be plugged into a control box on the unit for charging. Gotwind have anticipated that most makes and models of phone can then be fully charged in 1-2 hours. An additional feature of this clever portable generator is a tent mounting system that consists of four legs that allow you to secure it to most modern tents. You will never be away from a fully charged phone, even when away from all civilization, even though that might be the reason you went camping in the first place! [So what did the original WindCharger do? It charged up radio batteries, especially in rural areas. You may have seen a small windmill on a metal tripod, next to a farmhouse (not the more modern do-nothing-but-spin replicas). The windmill cranked out DC as it turned a generator and this was just right for charging the old lead-acid batteries that are still the standard for modern vehicles. Source: Gizmag.



## MANUFACTURING & PRODUCTION

**Solar-Tec Singapore** - SolarTec AG (Germany) is firming up plans to gain a presence in Singapore, including the setting up of a \$100-million manufacturing plant and a listing via a reverse takeover. SolarTec plans set up a production facility here to make thin-film solar modules, essentially glass panels coated with photo voltaic (PV) cells that are about 1-2 microns thick and can produce electricity to power a building. Such thin-film modules can also be used for field installations in a large power plant. The factory will have an annual capacity of 45-MW; solar cells produced per year could supply the needs of about 20,000 people in a year. The facility will occupy 15,000 ft.<sup>2</sup> and employ about 150 people and require about \$103-124 million in investment. The panels are made of amorphous silicon and the thin film modules can be integrated into buildings as roofs or windows. Although they have efficiency rates of 10%, they have high absorptivity of light, making them suitable for cloudy areas. And cost is a fraction of what traditional, silicon flat plate modules. First year sales could be \$200-million. Besides making solar modules, the company also builds solar parks for third parties for a fee. These solar parks produce electricity that either feeds into the power grid or supplies the power demand of a nearby commercial unit. The company has five solar park projects in Germany, one in Spain, and is negotiating for a 30-40-MW solar park project in Sicily. SolarTec operates a 40 MW thin film module plant near Berlin, as well as a factory in Aschheim, near Munich, which makes monocrystalline silicon solar cells and germanium-based modules. Commercial scale production started in 2006. Source: SI



**CIGS Going On-Line** - Miasolé (Santa Clara, CA) said it will start volume production of its sputtered thin-film copper indium gallium selenide (CIGS) on flexible stainless-steel foil sometime

later in 2007. The company is running the first vacuum system every day and now bringing up a second roll-to-roll coater but are waiting for higher efficiencies before starting commercial production. Although the company's R&D tool reportedly consistently makes cells of 8% to 10% efficiency on 5 ft 2 in substrates, the production roll coaters are still running mostly in the 4 to 6% range. The atomic-level control of the tricky deposition of CIGS film is key to efficient performance. Miasolé's approach relies on much of its control of the thin-film sputter target materials, then uses multiple rotating targets to control the gradient of composition through the CIGS film at the nanoscale. The low-cost production tools and high-speed process should allow the nanoscale CIGS film to bring solar costs down dramatically. Source: SI



## **BIO-FUELS**

**Ethanol from Cellulose** - Range Fuels announced a construction permit from the state of Georgia to build the first commercial-scale cellulosic ethanol plant in the United States. The 100-million-gallon-per-year cellulosic ethanol plant construction will take place this summer, with phase one of the plant scheduled to complete construction in 2008; initial capacity will be 20 million gallons a year. Corn-based ethanol is inherently limited. The U.S. Department of Energy has identified over 1-billion tons of biomass annually that could be converted to biofuels, including ethanol. Range Fuels' technology can transform all of this biomass, including wood chips, agricultural wastes, grasses, and cornstalks as well as hog manure, municipal garbage, sawdust and paper pulp into ethanol. The company has already successfully tested close to 30 types of biomass for producing ethanol. The company's technology uses a 2-step process to convert the biomass to synthesis gas, and from this gas to ethanol. It eliminates use of enzymes through a thermo-chemical conversion. In addition to the ability to process a broad range of potential biomass feedstock, this "K2 system" benefits from a modular design. Depending upon the quantity and availability of feedstock, the system can scale from entry-level systems to large configurations, and the range of system size allowing placement near the biomass source which in turn reduces transportation costs and allows the most appropriate size system to be deployed. Source: Industry Week.



**Pasta Price Up BioFuels Blamed** - Italy's staple food, pasta, will go up by about 20% this autumn and the use of durum wheat as a bio-fuel is being blamed. But with strong demand at home and a growing export market, Italians are increasingly forced to import high quality durum wheat from abroad. Much comes from Canada and Syria but, according the president of the Italian pasta manufacturers association, the Canadians have said they have no more durum wheat for sale until November. Syria, meanwhile, has

just banned the export of grain. The result will be a price hike of 20% for spaghetti and fettuccine by the autumn for Italians who have long been accustomed to cheap pasta in their supermarkets. Canadian production of durum wheat has soared in recent years, but it is increasingly being sold as a bio-fuel to make ethanol which is why the wholesale price is going up. Global warming may be one of the main reasons for a decline in production in some traditional durum wheat-growing areas in the Mediterranean. Italy now imports 40% of the durum wheat used to make pasta. Source: BBC News.

## FUEL CELLS

**Fuel Cell Record** - Ford's is trying to break land speed records with a fuel-cell powered car. Ford has released details on a planned 200 MPH attempt for its new Ford Fusion Hydrogen 999 car, which would make it the fastest fuel cell car in the world. Ford will take its 10 years of hydrogen research expertise to the Bonneville Salt Flats in August in an attempt to set the world land speed record in a hydrogen fuel cell powered Ford Fusion. The land speed record attempt will take place during Bonneville Speed Week from Aug. 10-17. The attempt will be sanctioned by the Southern California Timing Association. The Ford Fusion Hydrogen 999 land speed record vehicle was designed by Ford engineers, fabricated, and built by Roush (Allen Park, MI). Ohio State students are providing the design of the 770 hp electric motor, while Ballard is supplying the hydrogen fuel cells. The company already has a fleet of 30 hydrogen powered Focus fuel cell vehicles on the road as part of a worldwide, seven-city program to conduct real world testing of fuel cell technology. The 30-car fleet has accumulated more than 540,000 miles since its inception in 2005. The Ford Edge with HySeries Drive uses a series electric drive train with an onboard hydrogen fuel cell generator to give the vehicle a range of 225 miles with zero emissions. Source: AutoBlog Green.

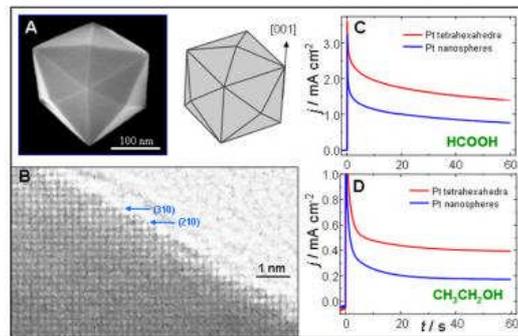


## CONVENTIONAL

**Return of the Diesel** - A new Cummins diesel engine can meet the 2010 EPA emissions standard. Cummins Westport announced the formal certification from the United States Environmental Protection Agency (US EPA) for its ISL G engine. The ISL G surpasses EPA 2007 phase-in levels and meets 2010 emission standards of 0.2 g/bhp-hr NOx and 0.01 g/bhp-hr PM. Meeting the spec required several new technologies including catalysts, cylinder temperature control and Exhaust Gas Recirculation (EGR) to delivering ultra low emissions. The power ratings from 250 to 320 horsepower will deliver increased thermal efficiency and over 30% higher low-speed torque compared with today's best engines. Cummins Westport has received over 500 orders from U.S. transit properties, including Sacramento Regional Transit and the Orange County Transportation Authority (OCTA). Source: Industry Week.



**Nanocrystals for Fuel Cells** - a new way to make cubic zirconia with very small crystal sizes could be key to making hydrogen fuel cells more reliable and cost-effective. Fuel cells face significant challenges since they run at temperatures of 1,500 to 1,800 degrees. Just reaching working temperature requires energy, and the heat quickly wears out metal, plastic and ceramic components. Prevailing fuel-cell designs also require an expensive platinum catalyst. The new technology could allow fuel cells to run at much lower temperatures, 122 to 212 degrees F. UC Davis invented a method to make oxides such as cubic zirconia (zirconium oxide) with extremely small grain sizes, on the order of 15 nm. At that scale, the crystals conduct electricity very well, through the movement of protons. The material could be used in fuel cells that are based on chemical oxides. Source: PhysOrg.com.



## EFFICIENCY



**CORPORATE GREEN**

**Corporate Green** - *The environmental movement is here again after being dormant for decades and will continue to have a greater influence on corporate decisions. Green and energy are tied together since the days of wholesale pollution by industry are past, at least in the USA. Some companies are selling green/energy technology and services while others are adopting it for advantage. Google seems to be getting a lot of attention by playing the "Carbon-neutral" card. Google states that they are committed to becoming more environmentally responsible and have highlighted some of their strategies, like solar panels on new facilities.* Google has signed up The Climate Group to help with environmental plans aimed at becoming carbon-neutral by 2008. They will use a 3-pronged approach to turning Google carbon-neutral: (1) cutting the company's energy consumption, (2) making greater use of renewable energy and (3) offsetting any additional carbon consumption through accredited schemes. Google has already set up solar panels on its Mountain View headquarters generating 1.6 MW and intends to expand the program to create 50 MW of energy (could power 50,000 homes). The Climate Group says that the impact of Google's environmental drive will be wide reaching, including the visibility of the "go green" message - and that may be the biggest benefit. But cutting carbon emissions Google will save money and they will be sure to point this out. Google estimates that its data centers use only half the power of conventional ones, thanks to a commitment to efficient power supply design and evaporative cooling rather than air conditioning. Any remaining deficiency will be made up through cleaner energy sources, stringent planning for new centers and monitored offsetting activities. Source: Silicon.com

Grengle

**Low Energy on McD Menu** - McDonald's is networking its kitchen equipment to save energy, use power lines more effectively and save some cash. Using gear from a

company called Echelon, McDonald's plans to network its kitchen equipment to manage energy use and cut maintenance costs through networked power lines. Echelon noted that McDonald's kitchen equipment will communicate "over existing power lines, making for easy installation and retrofitting of equipment while enabling McDonald's to install the equipment without tearing out walls. McDonald's tested various alternative technologies, including radio frequency (RF), but found Echelon's power line technology to be the most reliable and cost-effective solution." Data from all of this kitchen equipment will be



collected on Echelon servers and analyzed to improve processes and manage costs. Echelon also notes that its platform will also connect to heating and air conditioning systems and lighting setups. McDonald's is hoping to shave 10% of its \$1 billion energy budget. Some office buildings have cut energy use by 20%. *[This sounds like a good idea and one that could become a business].*  
Source: ZDNet