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Solar Leasing Comes to New York

SunRun, “the nation’s leading home solar provider” and solar leasing pioneer, announced yesterday that it has expanded into New York. We’ve covered solar leasing (and SunRun) here on CleanTechnica a number of times, but for anyone not yet familiar with solar leasing’s benefits and downsides, here’s a list for you:

With solar leasing, you get a fixed cost of electricity for 20 years. (With electricity projected to rise considerably over the coming decades, that offers a big, positive relief.)

With lower average electricity costs over that 20-year period, you are projected to save thousands or even tens of thousands on your electricity bills.

SunRun owns and manages the solar system over that time, and, also benefiting from the power it produces, makes sure that if it runs into problems they are fixed quickly. (In other words, SunRun takes care of maintenance.)

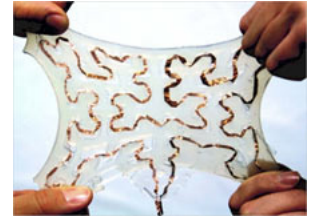
You don’t have to pay the large, upfront cost of a solar panel system or get a loan for one. “Downside” — in the end, you will probably save less money than you would if you bought the solar power system on your own. (But you’re still saving thousands or tens of thousands....)



http://cleantechnica.com/2011/11/03/solar-leasing-comes-to-new-york-from-sunrun/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+IM-cleantechnica+%28CleanTechnica%29

A Versatile Touch Sensor

A new system adapted from a technology used for underwater cables could lead to touch sensors in clothes and coffee tables.



We live in an increasingly touchy-feely tech world, with various ways for smart phones and tablet computers to sense our finger taps and gestures. Now a new type of touch technology, developed by researchers at the University of Munich and the Hasso Plattner Institute, could lead to touch sensitivity being added to everyday items such as clothing, headphone wires, coffee tables, and even pieces of paper.

The new touch technology relies on something called time domain reflectometry, or TDR, which has been used for decades to find damage in underwater cables. TDR is simple in theory: send a short electrical pulse down a cable and wait until a reflection of the pulse comes back. Based on the known speed of the pulse and the time it takes to come back, software can determine the position of the problem—damage in the line or some sort of change in electrical conductance.

<http://www.technologyreview.com/computing/39036/?nlid=nlcomm&nld=2011-11-07>

oPower's Gaming Technology Gets Neighbors to Compete to Save Energy

Wasting time Playing games online is fun. Even staid old utilities are catching on by now.

In truth, ConEd didn't come up with much of a game. It's more like a guided tour of energy savings around your house, even though the link may say "play now."

Other companies, however, are designing real online games. oPower is famous for getting households to decrease their utility bills by telling them how they are doing compared to their neighbors. It was only a matter of time for oPower to take things to the next level and let friends compete with each other on Facebook.

It doesn't get much better than that: save electricity and money, while playing games online.

<http://theenergycollective.com/gernotwagner/68430/efficient-gaming>

STEM Jobs Outlook Strong, but Collaboration Needed to Fill Jobs

They've got plenty of jobs in science, technology, engineering, and math—STEM—ready to fill. Unfortunately, the supply of STEM workers isn't meeting businesses' needs. And this is jeopardizing our nation's ability to drive innovation and competitiveness and seize a global advantage. The gap is baffling. A U.S. Department of Commerce report shows that in the past decade STEM jobs grew at three times the rate of non-STEM jobs, and that STEM workers have greater job stability.

<http://www.usnews.com/news/blogs/stem-education/2011/11/03/stem-jobs-outlook-strong-but-collaboration-needed-to-fill-jobs>

Improving Science, Technology, Engineering, and Mathematics Education

The American Dream remains an aspiration for millions of American families throughout the United States, just as it was for me in my youth. Achieving the American Dream starts with a solid education.. The American public school system should be the equalizer of economic opportunity throughout the US, one that can elevate and enhance a child's creativity and thought, allowing he or she to be a competitive player on the world scene, just as it was 40 years ago when I watched Apollo 11 land on the moon.

Yet, as our nation's science, technology, education and mathematics (STEM) workforce heads toward retirement, too few students are motivated to replace them. American students consistently display lower scores on most STEM-related assessments than their peers in countries across the world. The US National Assessment of Educational Progress showed that from 2004 to 2008, 41 percent of 17-year-olds do not have a basic understanding of medium-difficulty math procedures. Furthermore, Programme for International Student Assessment comparisons in 2006 show American students ranking 21st out of 30 in science literacy, and 25th out of 30 in math literacy, among students from developed countries.

http://honda.house.gov/index.php?option=com_content&view=article&id=1132:improving-science-technology-engineering-and-mathematics-education&catid=16:blog-posts&Itemid=357



Boy Scouts of America Introduces Robotics Merit Badge

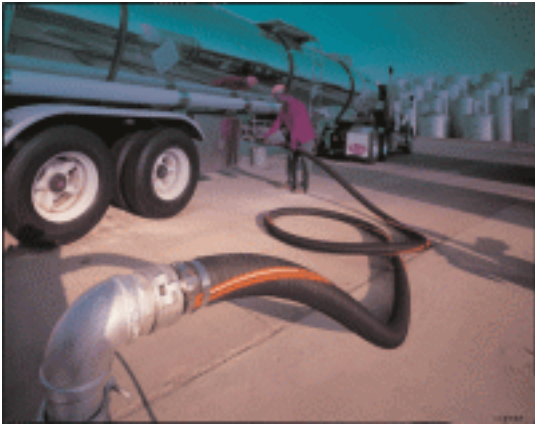
When people think of the Boy Scouts of America (BSA), they envision activities like camping, knot-tying, and canoeing, but soon, they'll need to add robot-building to that list. Scouts in 2011, through the introduction of the Robotics merit badge, now have the opportunity to design, build, and demonstrate a robot of their own creation.

The Robotics merit badge is part of the BSA's new curriculum emphasis on STEM: science, technology, engineering, and math.

The BSA focus on STEM takes a fun, adventurous approach to helping Scouts develop critical skills that are relevant and needed in today's competitive world. The new merit badge is one of 31 STEM-related merit badges that Scouts can earn.

“The Robotics merit badge is an example of how Scouting remains true to its roots to help young people be prepared,” said BSA Chief Scout Executive Bob Mazzuca. “While the guiding principles of Scouting—service to others, leadership, personal achievement, and respect for the outdoors—will never change, we continue to adapt programs to prepare young people for success in all areas of life.”

<http://www.scouting.org/Media/PressReleases/2011/20110411.aspx>



How materials impact hose-connector performance

The right metal and plating can mean the difference between long life and quick failure

- Operating environment, temperature, pressure, impulse frequency, vibration, and potential hazards play a key role in coupling selection.
- Carbon-steel couplings handle most general-purpose applications, but stainless steel, brass, and aluminum are other

common options.

- Many different platings are used to protect fittings. Base selection on performance, cost, and compatibility with the base metal.

Much has been written about the polymers used in industrial and hydraulic hose, from tube stocks to body compounds and cover materials. But an often-overlooked aspect of the materials used in a hose assembly concerns the coupling metallurgy and plating. Both play major roles in ensuring a hose handles the rated pressure and doesn't leak, prematurely fail, or compromise the safety of operators and equipment.

<http://machinedesign.com/article/how-materials-impact-hose-connector-performance-1103>

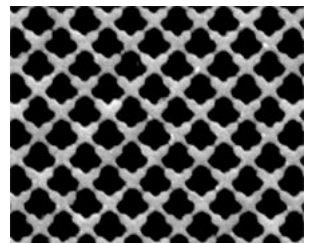
Wood Biofuel Could Be a Competitive Industry by 2020

Fuel made from wood could become a competitive commercial alternative to fuel made from corn by 2020 if the wood biofuel industry is supported, according to a new University of British Columbia study. Wood-based ethanol is currently blended with gasoline to satisfy government-mandated targets to include renewable content in transportation fuel. Compared to corn, wood-based biofuel is considered more sustainable but is not currently produced in large commercial quantities in Canada and the United States because the costs are too great.

<http://www.sciencedaily.com/releases/2011/11/111108133045.htm>

A Super-Absorbent Solar Material

A new material, patterned at the nanoscale, absorbs a broad spectrum of light and could make thin-film solar cells more efficient.



A new nanostructured material that absorbs a broad spectrum of light from any angle could lead to the most efficient thin-film solar cells ever.

Researchers are applying the design to semiconductor materials to make solar cells that they hope will save money on materials costs while still offering high power-conversion efficiency. Initial tests with silicon suggest that this kind of patterning can lead to a fivefold enhancement in absorbance.

<http://www.technologyreview.com/energy/39106/?mod=chfeatured>

Filling the Demand for Skilled Manufacturing Workers

It is astonishing that employers are being blamed for the skills shortage (“Why Companies Aren’t Getting the Employees They Need,” The Journal Report on Leadership, Oct. 24). U.S. manufacturers know that we can’t survive without a well-trained and skilled work force, and we have been scrambling to do something about it.

A large number of highly skilled employees are nearing retirement; 40% of America’s skilled manufacturing workers will retire in the next five years. Meanwhile, manufacturing technology continues to advance and with it the need for highly skilled workers. Many manufacturing-technology programs at secondary and post-secondary schools have closed in recent years, making it increasingly difficult to fill essential roles. When the global economy begins to rebound, employers will face even greater challenges finding skilled workers.

<http://online.wsj.com/article/SB1000142405297020452820457701011125112918.html#articleTabs=article>

Hybrid Power Plants Can Help Industry Go Green: Affordable Solar Option for Power Plants

Hybrid cars, powered by a mixture of gas and electricity, have become a practical way to “go green” on the roads. Now researchers at Tel Aviv University are applying the term “hybrid” to power plants as well.

Most power plants, explains Prof. Avi Kribus of TAU’s School of Mechanical Engineering and its innovative new Renewable Energy Center, create power using fuel. And solar thermal power plants -- which use high temperatures and pressure generated by sunlight to produce turbine movement -- are currently the industry’s environmentally-friendly alternative. But it’s an expensive option, especially when it comes to equipment made from expensive metals and the solar high-accuracy concentrator technology used to harvest solar energy.

<http://www.sciencedaily.com/releases/2011/11/111103120448.htm>

Lesson: Cookie Mining

Look around you. Many everyday items, such as lightbulbs, cellphones, and ordinary drinking glasses, contain minerals that mining engineers have figured out how extract from the ground. They also help secure coal for power plants that light up cities. The economics of mining can pose major challenges. To learn the process, students will buy “properties” (chocolate chip cookies), purchase the “mining equipment” (paper clips), and pay for the “mining operation” and “reclamation.” In return, they receive money for the “ore” they mined. The object: develop the mine, safeguard the environment, and make as much money as possible.



<http://teachers.egfi-k12.org/cookie-mining/>

Rochester's new schools: a mix of promise and caution

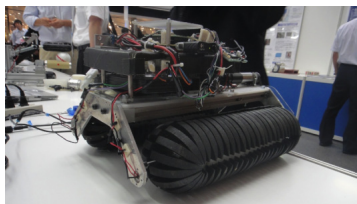
A year after the city school district opened five new high schools in a sweeping attempt at reform, a Center for Governmental Research evaluation gives a moderately upbeat, but cautionary report on the schools' progress.

The new schools - Early College; Science, Technology, Engineering, and Math High; Robert Brown High School of Construction and Design; Vanguard Collegiate; and Integrated Arts and Technology - opened in the fall of 2010.

In general, the schools performed better than the district as a whole, the CGR report says. Students' GPAs were higher. And many ninth-grade students had already earned five credits, which can be an indicator of progress toward graduation, says CGR's Kirstin Pryor.

But results on state exams for the new schools were mixed. In head-to-head comparisons of passing rates, the new schools generally performed better than the district as a whole, but not dramatically so. The explanation could be rooted, the report says, in a lack of consensus about what constitutes instructional rigor and high expectations by teachers and students

<http://www.rochestercitynewspaper.com/news/articles/2011/11/EDUCATION-Citys-new-schools-a-mix-of-promise-and-caution/>



New Omni-Crawler can move in all directions

When the need to move super-heavy objects arises, short, squat crawlers are usually deployed to get the job done. Unfortunately, that heavy lifting ability comes at the sacrifice of mobility (no sideways motion), so maneuvering objects into place can be a lengthy process. Recently, researchers from Japan's Osaka University (OU) rolled out an innovative battery-powered, remotely controlled prototype crawler that incorporates properties from an omni-directional wheel known as the Omni-Ball (also designed by the OU team), to travel in virtually any direction desired with minimal energy loss. They dubbed it the Omni-Crawler, and it could change the way things are moved from now on.

<http://www.gizmag.com/omni-crawler-moves-in-all-directions/20386/>

Green Your Route Travel App Wins EPA Innovation Award

The U.S. Environmental Protection Agency has named the pioneering Hootroot travel app a top winner in the agency's Apps for the Environment Challenge. Hootroot was created by Brighter Planet, a leading provider of carbon and energy calculations.

Brighter Planet's Hootroot app, which allows users to find the most efficient ways to travel between two points using Google Maps, was first runner-up in the Best Overall App competition. The awards will be presented Nov. 8 at the EPA's Apps for the Environment Forum in Arlington, Va.

http://cleantechnica.com/2011/11/11/green-your-route-travel-app-wins-epa-innovation-award/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+IM-cleantechnica+%28CleanTechnica%29

Engineering is elementary for district's fifth-graders

Fifth-grade students in the Ballston Spa School District are learning what it is like to be an engineer.

Thanks to a grant from Time Warner Cable, students are taking part in “Engineering is Elementary,” a six-week program implemented by the Children’s Museum of Science and Technology focused on civil engineering and transportation.

The after-school program is being offered to fifth-grade students in the Ballston Spa School District.

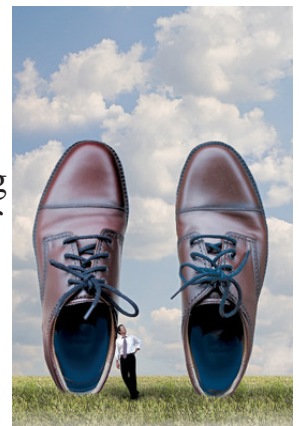
“Students are learning how to take an idea and problem and produce an end result,” said Dawn Baldwin, one of the CMOST instructors.

“It is not all just talking and books. We do a lot of hands-on experiments.”

<http://www.timesunion.com/local/article/Engineering-is-elementary-for-district-s-2262695.php>

Why Companies Aren't Getting the Employees They Need

The conventional wisdom is that our education system is failing our economy. But our companies deserve a lot of the blame themselves.



Everybody’s heard the complaints about recruiting lately.

Even with unemployment hovering around 9%, companies are grouching that they can’t find skilled workers, and filling a job can take months of hunting.

Employers are quick to lay blame. Schools aren’t giving kids the right kind of training. The government isn’t letting in enough high-skill immigrants. The list goes on and on.

But I believe that the real culprits are the employers themselves.

With an abundance of workers to choose from, employers are demanding more of job candidates than ever before. They want prospective workers to be able to fill a role right away, without any training or ramp-up time.

<http://online.wsj.com/article/SB10001424052970204422404576596630897409182.html>

Sensor-laden dragonfly may help future robots soar

It’s not a bird! It’s not a plane! It’s a dragonfly, and researchers are using a microchip attached to its belly to understand the complex mechanics of its flight.

Dragonflies capture their prey mid-flight, requiring precise control of horizontal and vertical movement to line up their meal with their mouths.

“Dragonfly wings almost swim through the air,” says electrical engineer Matt Reynolds from Duke University. “They have many more degrees of freedom than an airplane’s wing.”

<http://www.newscientist.com/blogs/shortsharpscience/2011/11/sensor-laden-dragonfly-may-inf.html>

Fact Sheet

NATIONAL FACTS ABOUT CAREER AND TECHNICAL EDUCATION



- The Association for Career and Technical Education (ACTE) represents approximately 27,000 teachers, administrators, educators, and counselors involved in Career and Technical Education across the U.S. and abroad.
- There are 14.4 million secondary and postsecondary Career and Technical Education students in the U.S. Career and Technical Education is offered in middle school, high schools, two-year community and technical colleges and other postsecondary schools.
- Career and Technical Education has a wide range of Career Pathways including: Horticulture Science, Natural Resources Sciences, Accounting and Finance, Business Management, Child Development, Culinary Arts, Biotechnology, Nursing, Digital Media, Web Development, Marketing Management, Sales and Service Marketing, Carpentry, Automotive Service Technician, Welding, Firefighting, and Engineering.

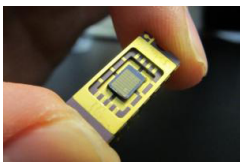
<http://www.schools.utah.gov/cte/documents/month/CTEFactSheet2.pdf>

Siemens Boosts Its Stake in Tidal Power

Marine energy has long looked to be a niche area, capable of meeting just a few percent of global power demand. But this seemingly limited energy source is drawing some big players, the latest being Siemens. The German engineering giant boosted its stake this month in Bristol, U.K.-based tidal energy developer Marine Current Turbines from under 10 percent to 45 percent. The attraction, according to Michael Axmann, chief financial officer for Siemens's solar and hydro division, is the predictability of marine power.

Solar and wind farm operators struggle to predict tomorrow's output, and bad forecasts can wreak havoc with power transmission planning and market prices. In contrast, the gravitational pull of the moon and sun that controls tidal cycles provides a sure means of anticipating the output from tidal generating stations. "Power output of the systems could be calculated for centuries in advance," says Axmann.

<http://www.technologyreview.com/energy/39119/page1/>



New Lightning-Fast, Efficient Nanoscale Data Transmission

A team at Stanford's School of Engineering has demonstrated an ultrafast nanoscale light-emitting diode (LED) that is orders of magnitude lower in power consumption than today's laser-based systems and is able to transmit data at the very rapid rate of 10 billion bits per second. The researchers say it is a major step forward in providing a practical ultrafast, low-power light source for on-chip data transmission.

<http://www.sciencedaily.com/releases/2011/11/111115133030.htm>



Tradition with Innovation

They mined precious metals, built cities, and used their knowledge of nature to navigate seas and grow crops that changed global diets. Were Native Americans, Hawaiians, and Alaskans the country's first engineers? Surfboards, potatoes, and igloos are just some of the fruits of tribal traditions. Your designers will delight in this week's activity celebrating Native

American Heritage Month. It should float their boats!

Native American STEM Heritage

<http://teachers.egfi-k12.org/native-american-stem/>

Lesson: Can-Do Canoe

<http://teachers.egfi-k12.org/can-do-canoe/>

Educational Video Game Challenge Now Open for Entries

The National STEM Video Game Challenge opens today, aiming to motivate interest in Science, Technology, Engineering, and Math (STEM) learning by tapping into students' natural passion for playing and making video games. The annual competition, held by the Joan Ganz Cooney Center at Sesame Workshop and E-Line Media in partnership with sponsors AMD Foundation, the Corporation for Public Broadcasting/PBS KIDS Ready To Learn Initiative, Entertainment Software Association and Xbox 360, is accepting submissions of original video game concepts and designs from students and educators in four categories at stemchallenge.org

<http://www.marketwatch.com/story/educational-video-game-challenge-now-open-for-entries-2011-11-15>

Harnessing the Power of the Sun for Oil Production

Coalinga, a small town in California's Central Valley, is home to the past, present and future of energy. The town was originally called Coaling Station A, and served as a coaling station for the railroads in the late 19th century. The name was later shortened to Coalinga. Coalinga sits on the aptly named Coalinga Oil Field – one of the largest in California. The oil field was discovered in 1887 and is one of the nation's oldest producing oil fields. And last month, Coalinga gained another distinction – home to the world's largest solar-to-steam enhanced oil recovery project.

Most oil in California is considered "heavy." It is thick and viscous – much like molasses. These attributes make it very difficult to recover using conventional means. That is why steam is injected into the reservoir to heat the oil, reducing its viscosity, and allowing it to be more easily recovered. The steam is generated by burning natural gas.

<http://theenergycollective.com/des-king/68968/harnessing-power-sun-oil-production>



Workshops

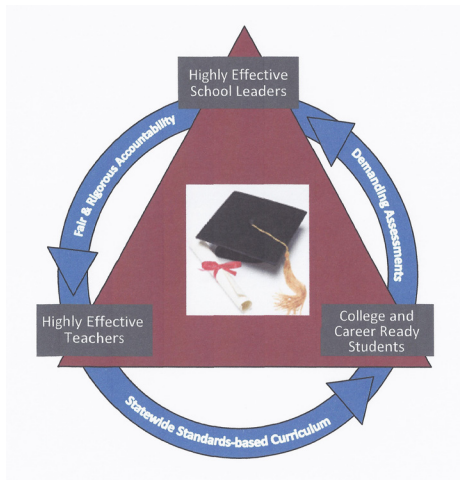
Energy Smart Students workshops are free of charge and are offered year-round for educators in New York State. Workshops focus on such topics as energy forms and sources, energy efficiency, and renewable energy.

Educators who attend a workshop participate in hands-on instruction, earn staff development hours, and receive FREE curriculum correlated to the New York State Learning Standards in Math, Science, Technology, Social Studies, English/Language Arts, and Family and Consumer Science. Curriculum materials include an assortment of lesson plans, colorful posters, reproducible worksheets, kits, and supplemental materials for students.

NYSERDA also offers substitute stipends for any workshop taking place during school hours. Alternatively, we can bring these free workshops to your district on a staff development day. To learn more call 1-877-NY-SMART (Option 6) or email info@nyess.org.

<http://www.getenergysmart.org/EnergyEducation/Workshop.aspx>

Slideshow from the Commissioner’s Presentation at the NYSSBA 92nd Annual Convention



- Adopting Common Core standards and developing curriculum and assessments aligned to these standards to prepare students for success in college and the workplace
- Building instructional data systems that measure student success and inform teachers and principals how they can improve their practice in real time
- Recruiting, developing, retaining, and rewarding effective teachers and principals
- Turning around the lowest- achieving schools

<http://usny.nysed.gov/docs/nyssba2011.pdf>

"So Junior High:" Getting Hip to Science, Technology, Engineering and Math

Ask the average middle-school student about their interest level in math or engineering, and you're likely to get an indifferent shrug in response. This should be cause for alarm, as the discussion at last week's Innovation and America's Future Forum centered around the significant lack of science, technology, engineering and math (STEM) skills among today's workforce.

Part of the problem, according to keynote speaker Senator Kay Bailey Hutchison, is that STEM education does not start early enough. Her proposed solution: Fortify STEM learning in middle school. To take it a step further, she advocated bolstering middle school students' interest in these subjects. In short, make it fun.

<http://www.theatlantic.com/21stCenturyEducation/archive/2011/11/-so-junior-high-getting-hip-to-science-technology-engineering-and-math/248476/>

Two companies to locate to SUNYIT, up to 185 jobs possible

Assembly Speaker Sheldon Silver and Utica Assemblyman Anthony Brindisi announced Thursday that Phoenix, Arizona-based Valutek, an industry-leading manufacturer of clean-room supplies, will relocate its corporate headquarters and operations to the SUNY Institute of Technology at Utica/Rome (SUNYIT) campus, creating 25 jobs as part of the growing partnership with the Albany College of Nanoscale Science and Engineering (CNSE). Additionally, infrastructure, which currently occupies space at the campus through its Center of Competency in Information Technologies (NCCIT), will establish its Upstate New York Command Center in early 2012 at SUNYIT, with plans to quickly expand to 10 employees and ultimately create 150 full and part time jobs.

<http://www.wktv.com/news/local/Two-companies-to-locate-to-SUNYIT-up-to-185-jobs-possible-134042413.html>

Competition & STEM Program Opportunity for Girls

Girl Scouts of the USA is proud to be an outreach partner with the Joan Ganz Cooney Center at Sesame Workshop and E-Line Media to introduce the second annual National STEM Video Game Challenge open to Girl Scouts! This challenge invites game makers to show their passion for playing and making video games and aims to motivate children's interests in Science, Technology, Engineering, and Math (STEM). Up for grabs is almost \$200,000 in cash and prizes, with multiple ways to win! The entry period is open through March 12th, 2012



<http://blog.girlscouts.org/2011/11/competition-stem-program-opportunity.html>

Where We'll Find Tomorrow's Manufacturers

Manufacturing is the key driver to U.S. economic prosperity, according to Rob Atkinson, president of the Information Technology and Innovation Foundation (ITIF, www.itif.org), a non-partisan think tank for advancing technological innovation and productivity. But will manufacturing be the savior for the U.S. job market? No, says Bill Strauss, senior economist and economic advisor for the Federal Reserve Bank of Chicago (www.chicagofed.org). Atkinson and Strauss both gave keynote presentations Tuesday morning at Manufacturing Perspectives, a forum for the industrial press corps at Rockwell Automation's Automation Fair this week in Chicago. Although Atkinson and Strauss were at odds on a few key points, they agreed that there is a serious lack of talent available to fill vacancies within the science, technology, engineering and math (STEM) sector.

<http://www.sustainableplant.com/2011/11/where-we-ll-find-tomorrow-s-manufacturers/?show=all>



Minnesota Study Finds Promise in Using Abandoned Mesabi Iron Range Mines to Store Wind Energy

The potential is there to re-purpose abandoned open pit iron ore mines in northeastern Minnesota's Mesabi Iron Range to store energy from wind turbines and farms, according to a team of researchers at the University of Minnesota-Duluth's Natural Resources Research Institute (NRRI). Doing so would not only enhance the competitiveness of wind power, it would make beneficial use of land that's been severely degraded. Wind energy has been growing fast in Minnesota, thanks to its geography, climate and impetus from the state's Renewable Portfolio Standard (RPS), which requires that utilities and electric co-ops at least 25% of their electricity from qualifying renewable sources by 2025.

http://cleantechnica.com/2011/11/23/minnesota-study-finds-promise-in-using-abandoned-mesabi-iron-range-mines-to-store-wind-power/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+IM-cleantechnica+%28CleanTechnica%29

Why Simply Selling Our Airwaves Will Cost Us in the Long Run

The deficit super committee and congressional technology committees searching for new money are considering "incentive auctions" of the TV band spectrum. Versions of these plans that focus on simply selling as much spectrum as possible would threaten the future of wireless innovation in the U.S.

For starters, it would threaten what appears to be the next wave in wireless communications—a wave exemplified by two recently launched products. The first product is Amazon's Kindle Fire, which came out as a purely Wi-Fi device from a company that only four years ago launched the Kindle as a cellular-only device with service baked into the device price. The second is a \$19.99 unlimited voice, text, and data service from Republic Wireless, which uses Wi-Fi as baseline infrastructure, and cellular as its fallback.

<http://www.technologyreview.com/communications/39136/?mod=chfeatured>

Oriental Hornet: Expert Solar Power Harvester

Do you know who is the most competent solar power expert, according to a research team from Tel Aviv University? It is the humble common Oriental hornet found in our gardens! Much to the astonishment of the scientists and researchers, the hornet utilizes solar power much like a plant and it produces electricity.

Think how much easier it would be if only we could unravel how the hornet manages it. This discovery could revolutionize future solar power harvesting.



<http://www.alternative-energy-news.info/hornet-solar-power/>

Natural nanomaterials - they are everywhere



Last month, when the European Commission offered its definition of “nanomaterial”, it recommended to identify a nanomaterial only on the basis of its particle size: “The justification for this choice is that properties or risks posed by a nano-sized material are not determined by the intention of the manufacturer and do not differ depending on whether the nanomaterial is natural, produced incidentally, or the result of a manufacturing process with or without the explicit intention to produce a nanomaterial. There are many naturally occurring nanomaterials and they may exhibit similar properties to those that are manufactured. From a definition point of view it is therefore not logical to omit certain types of materials on the basis of their genesis.”

<http://www.nanowerk.com/spotlight/spotid=23516.php>

Using the sun to disinfect water

A team of engineers at Purdue University has built a prototype of a machine that disinfects water using UV radiation from the sun, a potential boon for the world’s 800 million people who lack access to safe drinking water. The UV radiation inactivates waterborne germs by damaging them so they cannot reproduce. The device consists of a parabolic reflector with a transparent pipe running down the middle. Water flowing through the pipe gets exposed to the sun’s radiation during the day.

The trough-shaped reflector was made by lead engineer Ernest R. Blatchely III in his garage. To make the reflector reflective, the team lined it with aluminum foil. The trough itself is made of paulownia wood from a tree that grows rapidly in equatorial regions, an area which often doesn’t have sources of clean water. The wood is light, strong, and stable, so it will not warp, twist, or crack in climates that are either dry or humid, or those that swing back and forth between the two.

<http://machinedesign.com/article/using-the-sun-to-disinfect-water-1103>

Non-toxic, solution-based inorganic solar cell chemistry with Earth-abundant elements

While the current solar panel market (18.2 GWp manufactured in 2010) is still dominated by crystalline silicon solar cells, thin-film solar cell technologies based on chalcogenides (S, Se, and Te) are dramatically increasing their market penetration. For instance, the company First Solar produced 1.5 GW of CdTe modules in 2010 with an estimated 2.3 GW by the end of 2011. Other CdTe companies like Primestar (owned by energy giant GE) are ramping up CdTe production while a sea of other companies (Solar Frontier, Miasole, Ascent, Nanosolar, etc.) are focusing on CIGS (copper indium gallium (di)selenide) solar cells. CIGS holds the possibility for higher efficiencies with lab scale device efficiencies already at 20.3% (“New world record efficiency for Cu(In,Ga)Se₂ thin-film solar cells beyond 20%”).

Apart from device performance, price volatility issues (in particular with indium), rare earth elements scarcity issues (for instance with tellurium), and potential environmental issues (e.g. toxicity issues with cadmium) have raised some concerns about both CdTe and CIGS. A frontrunner in the search for the next generation of thin film photovoltaic materials are low-cost quaternary copper-zinc-tin-sulfide (CZTS) and copper-zinc-tin-chalcogenide (CZTSSe). Notably, these materials are composed of naturally abundant elements in the Earth’s crust and have very low toxicity (see “Abundant inorganic material could replace platinum in dye-sensitized solar cells”).

<http://www.nanowerk.com/spotlight/spotid=23443.php>

Four new American Chemical Society podcasts shine a light on solar energy

The American Chemical Society (ACS) has released a series of audio podcasts highlighting the science and cutting-edge technology behind solar power. The podcasts, available free of charge, tell the story of how scientists and students are making progress in harnessing the abundant energy of the sun. Well-suited for classroom use, the first two episodes explain the chemistry behind solar power—an alternative to fossil fuels that could have a larger role in the years ahead as a sustainable energy source for the world. The third and fourth podcasts describe a competition supported by the U.S. Department of Energy called the Solar Decathlon, in which students compete to build the world’s best solar homes. The podcasts are based on articles published in the latest issue of ChemMatters, ACS’ magazine for high school students. Published quarterly by the ACS Office of High School Chemistry, each issue contains articles about the chemistry of everyday life and is of interest to high school students and their teachers.



<http://www.eschoolnews.com/2011/11/23/four-new-american-chemical-society-podcasts-shine-a-light-on-solar-energy/>



The airship finally takes off - Hybrid Air Vehicles has first civil customer

The famous and well documented Hindenburg disaster of 1937, when the hydrogen-filled airship burst into flames whilst attempting to tether to its moorings in New Jersey, killed off the ‘lighter-than-air’ aircraft industry, as well as 35 unfortunate souls. Since the 1970’s however, a deter-

mined band of, mostly British, aviation engineers has been battling to design and build a commercially viable ‘air vehicle’. Many false starts, experimental craft and research projects followed (funded mostly by the U.S. military) but viability remained elusive, until now.

Hybrid Air Vehicles, a British Company founded in 2007 by the late Roger Munk and a direct descendant of those previously unsuccessful efforts, has recently achieved two massive commercial wins that seem to indicate that the airship has a very rosy future indeed. The clue is in the company name, however. These are not the cigar-shaped gas-filled ‘balloons’ of yesteryear but hi-tech semi-rigid lifting bodies that rely on vectored thrust from onboard engines and the aero-lift from the body shape for up to 40 percent of their lifting capacity with helium providing the rest. In addition, the use of pontoons on the underside of the hull that feature hovercraft-like skirts and driven fans means that that the aircraft can land on earth, concrete or water without ground crew.

<http://www.gizmag.com/hybrid-air-vehicles-airship/19746/picture/141789/>

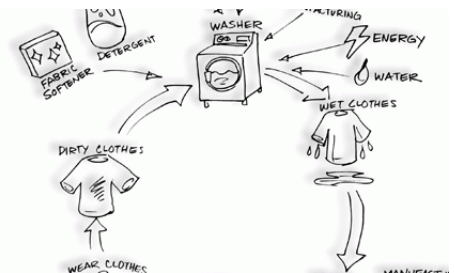
Engineering for “radical” resource efficiency

A design approach called “whole-systems thinking” helps cut energy use and waste.

From manufacturing to disposal, nearly every product made uses resources and generates waste. Waste means unnecessary cost. Therefore, any opportunity to cut waste saves money.

Many engineers often latch on to what seems to be a solution before appropriately defining a problem. This can be a big issue in product development, where design teams are often located in different silos and assigned narrowly scoped tasks. Engineers tend to get used to solving problems just by repeating techniques and following industry-standard practices. However, such limited approaches can sometimes make situations worse.

A more-effective, but less-familiar, approach is called “whole-systems thinking.” The well-researched method has been used for generations. The basic idea is to analyze and consider the way constituent parts of a system relate to one another, instead of merely focusing on the parts themselves.



<http://machinedesign.com/article/engineering-for-radical-resource-efficiency-1117>

Perspective: Two New Studies Address Jobs in STEM

Two recently released reports consider the overall labor supply-demand balance in science, technology, engineering, and mathematics (STEM) fields and reach very different conclusions. One report, “STEM: Science, Technology, Engineering, Mathematics,” from the Georgetown University Center on Education and the Workforce, argues that there’s a shortage of science and technical workers. The other, “Jobs Americans Can’t Do? The Myth of a Skilled Worker Shortage,” from the Federation for American Immigration Reform (FAIR) -- a nonpartisan policy group that normally favors limits on immigration -- argues that there is a glut. The difference in their conclusions could hardly be starker. Yet the two reports have much in common.

http://sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2011_11_25/credit.a1100130



Spider know-how could cut future energy costs

The finding comes from comparing silk from the Chinese silkworm (*Bombyx mori*) to molten high density polyethylene (HDPE) - a material from which the strongest synthetic fibres are made. The researchers used polarised light shining through a disk rotating over a plate to study the how fibres are formed as the two materials are spun.

HDPE forms filaments at over 125 C and in addition requires substantial energy input in the form of “shear force” applied to the material in its molten form. Silks, in contrast, in the same set-up forms filaments at ambient temperature and in addition requires only a tenth of the shear force. If the energetic costs of melting HDPE are included for comparison, silks become a thousand times more efficient.

The discovery of low-energy method for fibre formation has led the researchers to view silks as a new class of polymers they call ‘aquamelts’.

<http://www.physorg.com/news/2011-11-spider-know-how-future-energy.html>

Oil and gas wells find new life with geothermal

OLD oil and gas wells might soon be reborn as environmentally friendly geothermal power generators.

Geothermal energy holds promise as a low-carbon source of electricity because of its ubiquity - rock temperatures increase by between 25 and 50°C for every kilometre of depth due to heat from the Earth’s core. But as much as half the cost of geothermal power plants comes from drilling into the Earth.



<http://www.newscientist.com/article/mg21228394.100-oil-and-gas-wells-find-new-life-with-geothermal.html>

Noncoaxial motors enhance differential applications

With a mechanical differential, a wheel that loses traction spins with low applied torque, limiting the torque delivered to the other wheel. To overcome this design deficiency, mechanical differentials are sometimes equipped with mechanical-locking, slip-limiting, or electronic traction-control systems. Unlike mechanical differentials, which always apply equal torque to both wheels, a differential electric machine can deliver higher torque to the wheel that maintains traction.

Consider an electric machine having identical asynchronous induction-type rotors, and an electronic control with the two stator windings powered by a single-frequency ac-voltage source. If one wheel starts to spin while traction holds the other, minimal torque is applied to the spinning wheel while torque delivered to the stationary wheel increases as the output frequency from the controller rises. If the second wheel loses traction as well, it's probably time to call the tow truck.

<http://machinedesign.com/article/noncoaxial-motors-enhance-differential-applications-1117?page=0%2C1>

Building a knowledge economy

In this knowledge-driven world, those countries that have invested massively in education, science, engineering and innovation have progressed rapidly. The divide between the rich and the poor today is simply a “knowledge divide” – those countries that have acquired knowledge in cutting-edge fields and used it to invent new products and processes, and other countries which are simply importers of technology. Even small countries such as Finland and Austria, with populations of about a quarter or half that of Karachi, have higher exports than Pakistan, a country that is a nuclear power with a population of 170 million.

<http://www.thenews.com.pk/TodaysPrintDetail.aspx?ID=79341&Cat=9>

Food for Thought

Technology can never replace inspiring teachers

Over past decades we've seen a whole parade of educational “bandwagon” panaceas come and go. Among them: “Progressive Education,” “Back to Basics,” “No Child Left Behind” and, more lately, “Race to the Top.” Most all of those efforts were intended to mend an increasingly tattered American public education system, but for one reason or another they simply never proved totally successful, and in some cases they were even detrimental — although the verdict is not yet in on the last of those mentioned

<http://www.watertowndailytimes.com/article/20111125/OPINION03/711259985/-1/opinion>