

# ENERGY NEWS REPORT

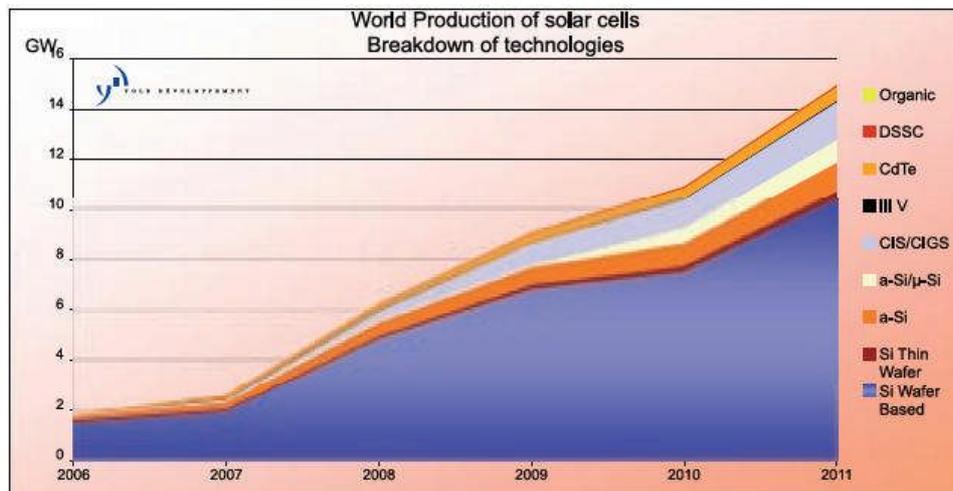
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From Ken Gilleo - [Ken@ET-Trends.com](mailto:Ken@ET-Trends.com)



## BUSINESS NEWS

**More Solar Cells, More Wafers, [or Future Glut?]** - The solar industry is hot right now and grabbing up silicon like crazy. And there is a race to supply materials. MEMC Electronic Materials WFR makes silicon wafers for computer chips, but this year, solar customers are delivering much of its growth. MEMC is also expanding its silicon output as the price for the material climbs. Solar cell makers have had a near insatiable appetite for polysilicon, the raw material that helps convert sunlight into electricity. Solar demand has risen sharply, driven in part by government subsidies for solar projects, particularly in Europe. New plants take years to build, and many companies were slow to see the demand coming. This has doubled the average contract price for polysilicon since 2004. Spot prices have spiked even higher. Those higher prices are driving existing polysilicon makers to expand plants. It's also luring newbies into the field. LDK Solar LDK, a Chinese company that cuts wafers for solar cells, broke ground in August on a plant that would produce its own polysilicon. The company announced plans to boost polysilicon production by about 35% this year, to about 6,000 metric tons, and expects to output about 8,000 metric tons by the end of next year; and about 15,000 by the end of the decade. MEMC says most of its expanded capacity will be semiconductor-grade. That higher standard means it can sell it to chipmakers, if solar demand doesn't hold. The company admits that it has **no idea how big solar demand is today, "We just don't know because we haven't been able to serve the market."** Source: The Edge Daily. *[The last statement is a red flag. Many companies are going after solar materials with no idea about future needs. This sounds like the playbook for the memory industry that is still producing low profits. I think that silicon-based photovoltaic is a dicey market (pun intended, and for other reason's, too. PV is still a costly choice for making power and there are many competing technologies, including thermal-solar that are more efficient and more suitable for energy storage. And if any of the low-cost polymer PVs come through, silicon PV would have a tough future].*



**More and More Solar** - SCHOTT Solar (Private German solar company) plans to boost its manufacturing of solar photovoltaic cells in the United States to 60-MW annually with a new plant. The company has not yet decided where to locate the plant, which will compliment its existing Billerica, MA, factory, with a present capacity of 15-MW. The new plant will also have the capability to make receivers for concentrated solar power for use in areas that get high levels of solar radiation, such as deserts. The new plant should add 300 jobs, mainly manufacturing positions. Future growth is expected and the plant could eventually employ as many as 1,500 workers. The company would not reveal the expected costs of the new plant. SCHOTT Solar's total PV production capacity worldwide is currently 130-MW. For 2010, the company aims for a global annual production capacity of crystalline solar cells and modules of about 450-MW. SCHOTT said it will quadruple its manufacturing of solar panels in the United States beginning in 2009 because, "Demand for renewable energy in the United States is skyrocketing."

Source: Reuters.

**Solar Wafer Deals Continue** - Big Sun Energy Technology has announced the signing of a silicon wafer deal worth \$70.19-million, or 60-peak megawatt (MWp) capacity equivalent, with Swiss Wafers, according to a company. Source: DigiTimes.

## WIND POWER

Nothing to report, unfortunately. The energy wind is presently blowing solar.

## SOLAR

**New Solar-Powered Plane Records** - A solar plane, built by British defense and security technology company QinetiQ, has broken the world record for unmanned flight by staying aloft for 54 hours. The Zephyr, which has about a 60-foot wingspan and weighs just 66 pounds. It broke the record of 30 hours 24 minutes by nearly a whole day, flying to a maximum height of 58,355 feet. The Zephyr then flew a second time, again beating the previous benchmark set by a jet-powered U.S. Air Force plane six years ago with a time of 33 hours 43 minutes to a height of 52,247 feet. The flights have proved that an autonomous UAV can be operated on solar electric power for the duration required to support persistent military operations. By day, the Zephyr is powered by solar panels on its wings. Daylight sun also recharges lithium sulfur batteries that keep it aloft at night. The Zephyr could be used in areas like earth observations and communications relay for defense or security operations. Source: Agence France-Presse.



**Solar Cell Volume Mfg. in India** - Solar cells began to be produced in many parts of the



world as the business expanded like a solar flair during the past year. Moser Baer Photo Voltaic Ltd. (India) built a production line in spring 2007 that turn outs 40-MW of single-crystal and polycrystalline Si solar cells per year. The company is a subsidiary of Moser Baer India

Ltd., a manufacturer of optical discs. Moser Baer plans to increase the production of crystal Si solar cells to 80-MW per year in the second half of 2007. It has already secured materials by making a long-term contract for the supply of Si wafers for solar cells with Renewable Energy Corp. of Norway. Moser Baer also has a plan to produce thin-film Si solar cells and concentrating solar cells in addition to crystal Si solar cells. In March 2007, the company drew attention when it issued a blanket order of production lines for thin-film Si solar cells to a manufacturing equipment maker. A production line that will be constructed in the second half of 2007 can deal with  $2.2 \times 2.6$  m glass substrates, four times as large glass substrates as the existing production lines can deal with. Also, the company will build a production line of concentrating solar cells jointly with Sol Focus Inc. of the US. Source: TechOn.

**NSP Solar Expansion** - Backed by a sufficient polysilicon supply, Neo Solar Power (subsidiary of Powerchip Semiconductor Corp.), plans to triple its solar cell production capacity in the next 6-months and to construct a new solar cell factory in the coming years. Neo Solar will triple its annual capacity from the present 30-MW to 90-MW (peak) in Q1-08. Present production lines are all at peak utilization rate and most customers are from Europe. Neo Solar plans to construct a solar-cell production fab in Hsinchu, Taiwan over the next 5-6 years with a targeted annual capacity of 500-600-MW. In order to secure polysilicon for future expansion, Neo Solar remains open to any partnership, which includes joining fellow Taiwan-based companies' recent announcements on polysilicon production, as well as forming strategic alliances. Gross margins are averaging around 17-18% and rapid sales growth is expected in late 2007. An initial public offering (IPO) is also planned in the near future. Source: DIGITIMES



**SAS Solar** - Sino-American Silicon Products (SAS), the Taiwan-based solar grade silicon wafer supplier, is running ahead of its capacity expansion schedule, with its capacity reaching at least 130-MW by the end of 2007 compared to the target of 120MW. SAS's capacity would reach 200MWp in 2008, and material self-sufficiency would rise to 50% in 2008 from 30% in 2007. SAS is expected to move faster with its expansion, with the goal for next year's capacity increases likely to be achieved by the third quarter of 2008. Overall margins for the second quarter were 32.6%. Margins for the semiconductor wafer segment were 24%, and 35% for the solar wafer segment. SAS's materials come mostly from US-based Hemlock and German-based Wacker. Source: DigiTimes.



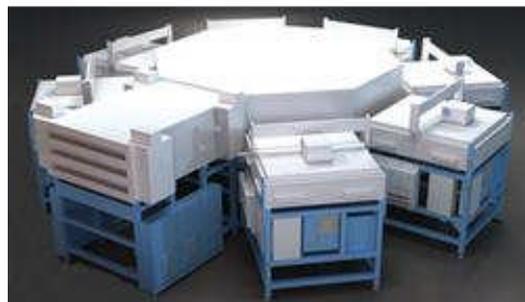
## SOLAR EQUIPMENT

**DEK & BTU in Solar Cell Partnership** - DEK announced a new strategic partnership with BTU International. The alliance which will target complete in-line metallization process solutions for solar cell manufacturers. The idea is to combine DEK's next generation printing technologies and handling designs with BTU's high performance



drying and firing systems. The mass imaging process employed by DEK's Europa and Galaxy printer platforms appears to be ideal for creating the finer features required to maintain exceptional solar cell manufacturing productivity. Mass imaging also overcomes a major technology challenge by exerting greater control over the deposition process. Screen printing is unique in its ability to provide thickness uniformity, especially for highly-loaded materials of the type used for solar. DEK plans to use ProFlow® enclosed print head for even greater process control to enabling high accuracy screen printing of materials such as polymer thick film conductive inks. DEK has been delivering screen printing platforms for thick-film electronic devices since the early 1970s. The company's background in thick-film and electronic surface mount assembly plays a vital role in minimizing the wastage of high-value materials used in solar cell manufacture. A natural solution for depositing the precision metallization layers required by photovoltaic manufacturers, DEK's screen printing expertise presents a clear cost, quality, repeatability and scalability advantage for today's competitive solar cell industry. Source: DEK website.

**New Solar Module Manufacturing** - Applied Materials introduced its Applied SunFab thin-film solar module production line, claiming it the world's first and only integrated production line for manufacturing thin film silicon solar modules using ultra-large substrates glass panels. The SunFab line defines a new standard for the industry that can be replicated by customers to rapidly establish solar panel manufacturing capacity and achieve the lowest production cost per watt. Applied noted that the substrate size (2.2m×2.6m, 5.7m<sup>2</sup> ) are four times bigger than today's largest thin film solar production panels. The SunFab Line can reduce the cost of utility-scale and building-integrated photovoltaic (BIPV) system installations by more than 20%. SunFab Thin Film Line can be configured with single or tandem junction technology and is designed to produce enough solar modules in a year to generate up to 75 megawatts (MW) of electrical power. Applied has already received multiple contracts for its SunFab line from customers in Europe and Asia, the company said. Source: DigiTimes.



**Applied Buys HCT** - Applied Materials *continues to expand in the solar cell manufacturing area.* Applied has agreed to acquire HCT



Shaping Systems SA, a privately held company based in Switzerland that claims to be the world's leading supplier of precision wafering systems used in manufacturing crystalline silicon (c-Si) substrates for the solar industry. Applied will pay about \$475-million in cash for all of the outstanding shares of HCT. Applied said that the acquisition is part of the company's strategy to accelerate customers' ability to reduce the costs of photovoltaic (PV) cell manufacturing to make solar energy more competitive with grid electricity. Applied continues to aggressively pursue its decision to commit substantial resources to becoming a major player in the solar realm. Applied also announced plans to install more than 20-kW of solar power generation capability at its Harris Branch manufacturing center in Austin, Texas. In March, the company committed to installing 1.9-MW at its research campus in Sunnyvale, CA. The acquisition fits their overall strategy to drive down the cost-per-watt of solar power for c-Si and thin film applications. HCT will significantly expand opportunities in the c-Si PV technology sector that currently comprises 90% of solar panel production. Source: Electronic News

## **SOLAR PRODUCTS**

**Solar for Consumer Electronics** - Although present photovoltaic (PV) devices are mainly on the large scale, Solar Focus (Taiwan) sees opportunities coming from the consumer electronics market and regards this as the next key segment to drive demand for PV devices. The company believes that substantial business potential lies in the consumer electronics in addition to the present conventional use of PV applications in buildings or electricity plants. Solar Focus places its focus on these applications first and has already introduced a series of solar-power chargers for handsets, PDAs and



A solar-power handset charger from Solar Focus



Charging Pack - Solar Focus

other portable consumer electronics devices. Solar Focus obtains its capacity from the US-based thin-film solar cell maker United Solar Ovonic (Uni-Solar) with an annual capacity of a million peak megawatt (MWp). The company is also working with Taiwan-based electronics companies to co-develop solar-power applications. Source: DigiTimes.

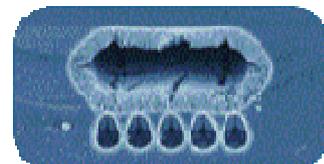
**Low Cost Solar Panels Ready for Mass Production** - Colorado State University's method for manufacturing low-cost, high-efficiency solar panels is nearing mass

production. AVA Solar will start production by the end of 2008 on the technology developed at Colorado State. The new 200-megawatt factory is expected to employ up to 500 people and run production at 200-MW; power 40,000 homes. The goal is to produce at less than \$1 per watt. The team has developed a continuous, automated manufacturing process for solar panels using glass coating with a cadmium telluride thin film instead of the standard high-cost crystalline silicon. Because the process produces high efficiency devices (ranging from 11% to 13%) at a very high rate and yield, it can be done much more cheaply than with existing technologies. The cost to the consumer could be as low as \$2 per watt, about half the current cost of solar panels. In addition, this solar technology need not be tied to a grid, so it can be affordably installed and operated in nearly any location. The process is a low waste process with less than 2% of the materials used in production needing to be recycled. It also makes better use of raw materials since the process converts solar energy into electricity more efficiently. Cadmium telluride solar panels require 100 times less semiconductor material than high-cost crystalline silicon panels. The university has spent the past 16 years perfecting the technology and it's now ready. Annual global sales of photovoltaic technology have grown to 2-billion watts and roughly a \$6 billion industry. Demand has increased nearly 40% a year for each of the past five years, a trend that analysts expect to continue. By 2010, solar cell manufacturing is expected to be a \$25 billion-plus industry. Source: IW.

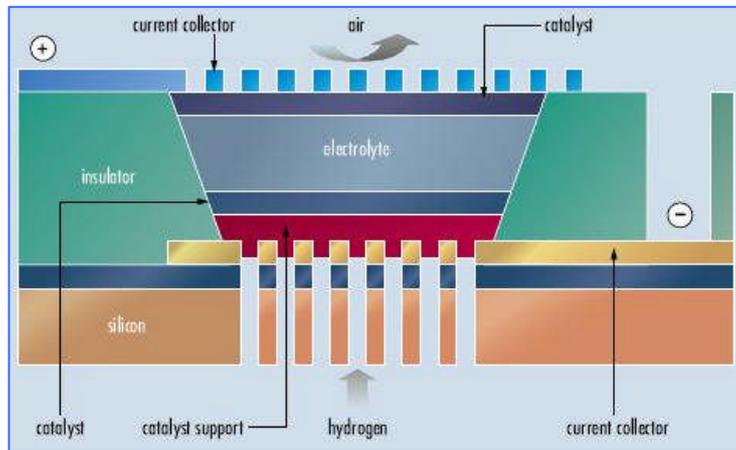


## FUEL CELLS

**MicroPower-** STMicroelectronics plans to deliver micro fuel cells to the market in 2009 and it's recently announced collaboration with French public technological research organization CEA is designed to underpin some of this work on miniaturized energy sources. According to STMicro, the proliferation of portable devices has created a huge market, greater safety needs and the need for lower environmental burden. Micro fuel cells for clean energy generation are the answer. The two organizations are also working on other energy generation, conversion and storage technologies, including thermoelectric and mechanical scavenging techniques. ST has been active in the power sector for around 30 years, particularly looking at improving power efficiency. Another major thrust of the company has been powering mobile phones, laptops and other portable electronic products. ST's objective is to create a microfuel cell which gives instant-on operation for mobile phones and portable systems. Laptops and portable systems have different power requirements so the technologies will not be exactly the same. People have been working for a long time on laptop power supplies, but their solutions are not compatible with the size and weight constraints of a mobile phone. ST is developing micro sources rather than macro sources. Power sources for mobile systems are attracting ST and this is a more challenging area. A laptop power source might deliver from 10 to 20W, while mobile power sources would need to deliver less than 5W. Although there is no great difference between mobile phones and, for example, an iPod, mobile and laptop requirements are different, so the power source architectures will be different. Two fuel sources are currently being researched: methanol and hydrogen.



Methanol will be better for high power applications, but for lower power requirements or for high density, hydrogen will be the best choice. Even if methanol fuel cells are further advanced than hydrogen, one thing paramount for all is safety. Methanol systems are more actually dangerous than those fuelled with hydrogen. Another significant issue is that methanol systems generate CO<sub>2</sub>, while H<sub>2</sub> only generates water. ST is not involving itself in developing the hydrogen end of the fuel cell because many other companies are working there. Their first goal is to develop a fuel cell for mobile phones, probably based on H<sub>2</sub>. ST expects to ramp the product in 2009 and believe the regulatory issues to be finalized by then. A key issue is whether fuel cell powered devices will be allowed on aircraft. The first products will be something that can be attached to a phone, but this will be an intermediate step and the final product will be integrated inside a device. The hydrogen route will allow better integration. This step would be more difficult with methanol as its power density is lower. The micro-fuel cell will have two parts: a cartridge containing **NaBH<sub>4</sub>** (sodium borane) as the hydrogen source; and the fuel cell core. The core, or chip, comprises a cathode, electrolyte and anode. Hydrogen enters from one side and mixes with oxygen in the air, reacting over a catalyst to generate electricity. This system will not use electronic or mechanical parts. An important part of the micro fuel cell is the membrane and this is being developed by CEA. Membranes will need to be fine-tuned in order to get a smaller surface. Source: New Electronics.



## CONVENTIONAL

**LNG Deals** - China has struck a deal with Europe's largest oil company to buy liquefied natural gas (LNG) from Australia, to meet the country's soaring demand for clean fuel. PetroChina and Shell Eastern LNG signed a long-term supply agreement for LNG from the Gorgon project in Western Australia. Shell and PetroChina will draw up a detailed LNG sale and purchase agreement by the end of next year, according to Shell's statement. Shell Gas and Power Asia said the deal sets a new benchmark for LNG supplies into China and underlines Shell's commitment to Chinese LNG customers and to the Gorgon project. Shell will sell 1 million tons per annum of LNG to PetroChina during the 20-year contract, Shell said. The Shell-PetroChina agreement is conditional upon a final investment decision from the Gorgon joint venture partners. Source: China Daily.

**China's Coal & Gas Output Hit Record** - China's coal production jumped 11.7% to 1.278-billion tons in the first seven months of 2007; this is 12.7% on an annual bases. During the first seven months this year, the imports of coal soared 49.6% year-on-year to

30.96 million tons, while the exports declined 21.2% to 28.86 million tons. *[Seems strange to be importing and exporting the same material]*. Meanwhile, China's output of natural gas climbed 17.1% to 38.6 billion cubic meters in the first seven months. The crude oil production in China, however, rose only 1.1% for the year to 108.69-million tons between January and July. The output of crude oil slumped 1.7% in July from the same month last year. China, the world's second-largest oil consumer, imported 96.37-million tons of crude oil in the first seven months, up 14.8% from a year earlier. Source: Xinhua

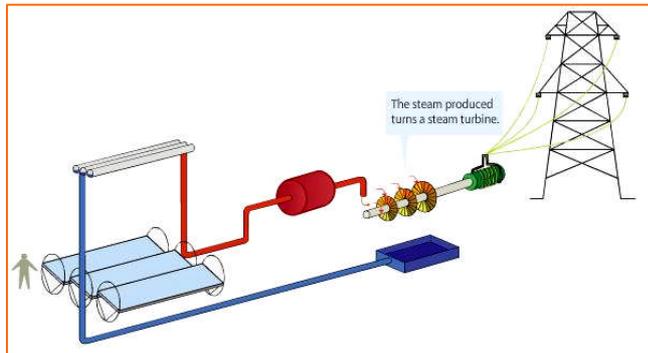


**DuPont Returns to Chemistry** - Chemical giant acquired new technology for lowering sulfur content in motor fuels. DuPont announced the purchase of the IP used to lower the sulfur content of motor fuels from Process Dynamics, Inc., for an undisclosed amount. The business will be folded into DuPont's Clean Technologies division, which is part of DuPont Chemical Solutions Enterprise. The division's other offerings include BELCO Clean Air Technologies, DuPont Clean Water Technologies and DuPont Sulfur Technologies. Petroleum refiners use sulfuric acid as a catalyst in alkylation yet are required to produce low-sulfur motor oil and reduce sulfur-based emissions. The proprietary IsoTherming Technology purchased by DuPont involves a reactor system superior to conventional hydro treating technologies, and can lower capital and annual operating costs while at the same time reducing motor fuel sulfur content. Source: IW.

## ENERGY STORAGE

**Solar Energy Storage** - Drastic fluctuation in solar power output remains a big issue. *[Its surprising that wind power, lower cost/KW, and day/night source of power, is falling further behind solar. Everyone wants to make photovoltaic cells and it may be the poorest renewable option]*. Solar-power startup Ausra (Palo Alto, CA) is working on solar-thermal-power plants that turn sunlight into steam and efficiently store heat for cloudy days. Solar-thermal plants may be the best solution because storing heat is much easier than storing electricity. Solar-thermal plants capable of storing 16 hours' worth of heat could provide more than 90% of current U.S. power demand at prices competitive with coal and natural gas. [Solar hot water heaters have been using this approach for 40-years]. PG&E signed a 25-year deal with Solel Solar Systems (Israel) to buy power from a 553-megawatt solar-thermal plant that Solel is developing in California's Mojave Desert. The plant will supply 400,000 homes in northern and central California when it is completed in 2011. Florida Power & Light also hired Solel to upgrade the 1980s-era solar-thermal plants it operates in the Mojave. Ausra, meanwhile, is negotiating with PG&E to supply power from a 175-megawatt plant that it plans to build in California, for which it secured \$40-million in venture financing. Ausra's design is its relative simplicity. In conventional solar-thermal plants such as Solel's, a long trough of parabolic mirrors focuses sunlight on a tube filled with a heat-transfer fluid, often some sort of oil or brine. The fluid, in turn, produces steam to drive a turbine and produce electricity. Ausra's solar

collectors employ mass-produced and thus cheaper flat mirrors, and they focus light onto tubes filled with water, thus directly producing steam. Ausra's collectors produce less power, but that power costs less to produce. One megawatt's worth of Ausra's solar collectors has been producing steam in New South Wales, Australia, since 2004; the steam is fed into the turbines of a primarily coal-fired power plant. The final piece of the system--a proprietary heat-energy-storage system--should be ready by 2009. Heat storage is more efficient than electricity storage with just 2 to 7% of the energy is lost when heat is banked in a storage system, compared with losses of at least 15% when energy is stored in a battery. By 2010, he expects solar thermal to provide California with baseline power cheaper than natural gas, currently set by the state at 9.2 cents per kilowatt-hour. The footprint of Ausra's planned 175-megawatt plant will be, in contrast, about one square mile. Source: Technology Review



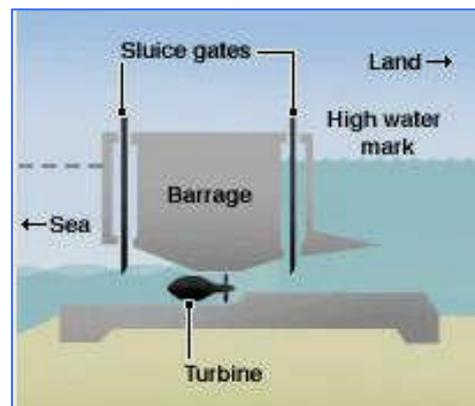
## **BIOFUELS**

**Biofuel Testing for 747** - Air New Zealand says it plans to run the first test flight of a commercial airliner partially powered by biofuel. The 747 flight is one part of a deal signed by the airline, engine producer Rolls-Royce and aircraft manufacturer Boeing to research "greener" flying. One of the four engines will run on a mixture of kerosene and a biofuel, and is set for late 2008 or early 2009. But Virgin Atlantic is planning to beat Air New Zealand to the punch by having its own biofuel flight early next year. The New Zealand government recently declared the objective of becoming carbon neutral, and climate change and their energy minister said the national airline's initiative would help achieve that goal. Whether Air New Zealand and its partners will achieve a first appears uncertain. Virgin Atlantic is planning a UK-based test flight early next year which would also see one engine of a four-engine commercial jet running partially or entirely on a biofuel. A Virgin spokesman said that ground testing was well underway in the US in partnership with GE and Boeing. But this team also has yet to decide which fuel to use. But there's concern. Once hailed as a clean green savior, the whole field of biofuels has become more complex and controversial over the last couple of years. Research shows that some existing technologies actually result in increased greenhouse gas emissions compared with conventional fuels. There's also growing concern too about the amount of land needed to grow existing fuel crops such as rape and maize, and about the impact on wildlife. Source: BBC News website



## TIDAL

**UK Endorses Tidal Power Plan** - An influential government advisory body has endorsed proposals for a tidal barrage across the Severn estuary. The Sustainable Development Commission (SDC) says the project should meet "tough" environmental conditions and remain in public ownership. The SDC says the UK could get at least 10% of its electricity from tidal power. The endorsement of the Severn project, expected to cost about £14-billion and generate about 5% of Britain's electricity. Here's the concept. As tide comes in, seawater passes through barrage to landward side. At high tide, sluice gates shut, trapping water in estuary or basin. When tide recedes on seaside of barrage, sluice gates open and water flows through barrage, driving turbines and generating power. Power can be generated in both directions, but this can affect efficiency and economics of project. The feasibility study will go ahead, but citing climate concerns as the main driver. But environmental groups such as the Royal Society for the Protection of Birds (RSPB), Friends of the Earth (FoE) and WWF are not convinced. Critics say that the Severn barrage would be a hugely expensive, environmentally damaging and legally questionable mega-project. These groups believe the scheme could devastate wildlife in the estuary, and suggest that tidal lagoons would be a more efficient and less damaging alternative. Source: BBC News



## NUCLEAR

**Nuclear Comeback** - Power producer NRG Energy will submit the first application for a new nuclear reactor in the United States in nearly 30 years. Nuclear regulators expect Tuesday morning to receive NRG's application for two new units at its facility in Bay City, Texas, about 90 miles southwest of Houston. It will be the first complete construction and operating license submission the government has processed since before the Three Mile Island accident in Pennsylvania in 1979. Constellation Energy Group Inc. has filed a partial application with the Nuclear Regulatory Commission, which expects up to six more requests this year from Duke Energy Corp., Dominion Resources Inc. and others. Constellation's proposed new reactor would be located in Lusby, MD. Utilities see in nuclear plants an opportunity to affordably meet demand for electricity, which the Energy Information Administration is forecasting will grow by 42% by 2030. High natural gas prices and the prospect of taxes or constraints on greenhouse gases are making gas- or coal-fired plants less attractive. The company already has ordered steel forgings, built exclusively in Japan, that are needed for a new plant, even though approval could take a long time. While NRG and other nuclear renaissance enthusiasts expect new reactors to come online by 2015, a March report from the nonpartisan Congressional Research Service predicted the process would take closer to 15 years to complete for several reasons, including the government's new review, testing and approval procedures. Nuclear Regulatory Commission said the reviews should quicken

once the first license for a certain reactor design is approved. Reactor vendors include Toshiba Corp., General Electric Co., and a joint venture of France's Areva Group and Constellation. NRG selected a GE reactor design already approved by the commission and hired Toshiba to build the two units, which are expected to generate enough power for more than 2 million homes. If NRG receives government approval by 2010, the company expects the first new reactor to be ready four years later, Crane said. New plants with similar reactors are being completed in Japan in less than 48 months, he added. The average cost of nuclear-produced electricity was 1.72 cents per kilowatt-hour in 2006, compared with 2.37 cents for coal-fired plants and 6.75 cents for natural gas plants, according to the Nuclear Energy Institute. Source: Associated Press.

