



# THE SFP CADMIUM PRESS REVIEW

21<sup>st</sup> June 2005

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### Cadmium Metal Quotes

**Reuters** 16<sup>th</sup> June 2005

\$/lb in warehouse	Low	High
Min. 99.99%	1.80	2.00
Min. 99.95%	1.80	2.00

**Metal Pages** 16<sup>th</sup> June 2005

\$/lb in warehouse	Low	High
Min. 99.99%	1.70	1.90
Min. 99.95%	1.70	1.90

**Dow Jones** 16<sup>th</sup> June 2005

\$/lb in warehouse	Low	High
Min. 99.95%	1.70	1.80

### WBMS World Refined Cadmium Production and Consumption: 2001 - 2004

(all in MT) Full Year	2001	2002	2003	2004
Production	17,547.0	16,195.3	17,061.8	16,648.5
Consumption	18,062.1	19,204.9	19,661.6	16,888.0
MARKET BALANCE	-515.1	-3,009.6	-2,599.8	-239.5

Source: <http://www.world-bureau.com/>

### Currencies and Commodities

Financial Times Currency Market Data: 21 <sup>st</sup> June 2005	
Euro (€) per US Dollar (\$)	0.82
Pound Sterling (£) per US Dollar (\$)	0.55
Japanese Yen (¥) per US Dollar (\$)	109.40

Source: <http://www.ft.com/>

### London Metal Exchange Official Prices

Zinc: 20 <sup>th</sup> June 2005	
Cash buyer (US\$/tonne)	1,298.00
Cash seller & settlement (US\$/tonne)	1,299.00

Lead: 20 <sup>th</sup> June 2005	
Cash buyer (US\$/tonne)	1,006.00
Cash seller & settlement (US\$/tonne)	1,008.00

Source: <http://www.lme.co.uk/>



## **Cadmium Market Executive Summary**

### **MARKET ROUND UP**

1) Cadmium price remain very firm with supplies of prompt material reported to be extremely tight and few offers in the market. After a flurry of business in the past few weeks, the market is quieter with suppliers and traders reluctant to offer what stocks they have in the anticipation of higher prices. Most recent business to China has been reported in the range \$1.80-1.85/lb but offers are now at \$2/lb and above but no business confirmed. The \$2 level has been seen by some as a target and as one trader said, "Desperation will probably push it over that!"

[Metal Pages 17/06/05. Read source article? – See page 6]

2) Cadmium, a metal mostly used in nickel-cadmium rechargeable batteries, jumped to \$1.80-2.00 a pound on Friday, its highest since November 1995, and looks set for further gains. The price has added a third, or 50 cents, this month on continued strong battery demand from China and tight availability. It hit a high of \$2.10 in 1995 and \$2.30 the year before. "There are lots of Chinese enquiries every day, but insufficient stocks in Europe," a French trader said. "We can't find metal quickly enough and producers say they have sold out, so we expect prices to push above \$2 in the next few weeks." Japanese and Korean battery firms have shifted plants to China, where costs are lower. European supply has fallen in recent years, notably with Metaleurop's closure in 2003. About 95% of world production is traded under long-term deals, leaving a slim market for spot business.

[Reuters.com 17/06/05. Read source article? – See page 6]

3) Cadmium prices have climbed higher and are now in the range of \$1.70-1.90/lb, depending on quantities and quality. Producer sources are well sold (having committed most of their output on long-term contracts) and there is little material available in the spot market. What material that becomes available is quickly snapped up by consumers and traders alike. A European producer confirmed the bull trend and said that the price is "climbing every minute". Chinese buying, according to some sources, has slowed slightly since the price breached \$1/lb. However, this hasn't stopped the Chinese producers from increasing their own domestic prices, with Huludao 4N ingots now 51,000 (\$2.71/lb), up from was 43,000 (\$2.32/lb). Few people would bet their last dollar on cadmium stopping in its tracks now, despite the summer slow-down.

[Metal Pages 13/06/05. Read source article? – See page 7]

4) The cadmium market has been jolted out of its pre-summer slumber, as rising demand for the metal sent prices soaring in recent weeks. Tight supplies and increasing demand has seen prices jump to \$1.80-1.90/lb from \$1.40-1.50 for low-grade material and to \$1.90-2.10/lb from \$1.60-1.70 for high grade. "There is good demand and material is hard to come by," said a merchant, adding: "Prices were creeping up slowly, then they made a sudden jump over the last couple of weeks."

[Platts Metals Week 13/06/05. Read source article? – See page 7]

5) Cadmium has seen demand from China lift the metal. Prices have been moving up as demand from China for production of Ni-Cd batteries, where about 75% of material is used, has been drawing in supplies which have subsequently become tighter. Good demand is also reported to be coming from Japan adding to the pressure on supplies. Business for spot material has been reported at around \$1.70/lb in Europe up to \$1.90/lb for shipments to Asia though some parcels are said to be still being picked up at closer to \$1.40/lb. As the offers move up, there are reports of resistance from China to the higher numbers.

[Metal Pages 10/06/05. Read source article? – See page 7]



## SUPPLY

6) Union leaders representing workers at the Trail plant of Teck Cominco Ltd are reported to have said that current labour negotiations are progressing well. Doug Jones, president of United Steelworkers Local 480, said that the union was optimistic of a positive outcome. Commenting on a previous strike vote in which over 98% of the workers voted to give the union the power to call a strike in the event talks broke down, he said that this was premature and another poll would be taken before any strike would occur. According to a source at Teck Cominco, the key issues are monetary and pensions which will be addressed at critical meetings during 13 - 15 June next week. The plant produces lead, zinc, indium, germanium and cadmium.

[Metal Pages 10/06/05. Read source article? – See page 8]

7) Two labor contracts will expire on Tuesday without new agreements in place at Teck Cominco's large zinc refinery in Western Canada, the firm said on Monday, but talks will carry on after the deadline and employees will remain at their posts. The world's biggest zinc miner and the United Steelworkers of America union will meet again on June 2 and talks might still continue for several weeks as monetary proposals haven't been tabled yet, said company spokeswoman Carol Vanelli. The Trail complex is one of the world's biggest refining operations of zinc and lead, two metals whose prices have surged in the past year because of strong demand from China. It also produces a variety of specialty metals.

[Reuters.com 30/05/05. Read source article? – See page 8]



## DEMAND

### Batteries

8) The new Airbus A380 super jumbo uses nickel cadmium batteries made by Saft. The "ULM" NiCd batteries will supply APU starting and electrical system backup power. Saft was selected by Airbus for its expertise in the aeronautical field. Two out of every three of the world's Ni-Cd equipped aircraft use Saft batteries, notably the entire Airbus fleet. The new generation of batteries to be used on the A380 is already in use on aircraft all over the world and, in particular, the most recent Airbus models, A330 and A340. More than 11,000 ULM units have been produced since 1992 for both civil and military aircraft programs.

[Saft Press Release 13/06/05. Read source article? – See page 8]

9) Electro Energy Inc., a developer and manufacturer of rechargeable batteries, has signed a non-binding Letter of Intent to acquire manufacturing equipment for lithium and nickel batteries from Energizer Power Systems and an option to lease industrial space located in North Central Florida near Gainesville. The facilities that would be covered by the proposed transaction are now managed by a Long Island-based private equity firm Topspin Partners, LP ("Topspin"). It is EEEI's intent to continue its operations in Connecticut, for the development and manufacture of specialty nickel metal hydride batteries and in Colorado for the development of lithium batteries and thermal batteries and the production of specialty nickel cadmium batteries.

[Biz.yahoo.com 16/05/05. Read source article? – See page 9]

10) What do you get if you connect 13,760 rechargeable nickel-cadmium cells weighing a total of 1,300 tonnes? The world's most powerful battery, according to Guinness World Records. Known as a battery energy storage system (BESS), the massive storage device has been installed by battery maker Saft of Bagnolet, France, for an electrical cooperative in Fairbanks, Alaska, to bridge the frequent electricity outages from the local grid. With temperatures as low as -50 °C, being without power can be a big problem for the area's 90,000 residents. So the BESS has been designed to provide 27 megawatts for 15 minutes - long enough for the utility company to bring back-up generation online.

[New Scientist magazine 14/05/05. Read source article? – See page 10]

### Solar Cells

11) Thanks to massive subsidies of solar and wind power by the German government that are being eyed elsewhere in Europe, First Solar expects to book its first-ever profit in 2005, on sales of more than 300,000 cadmium telluride-based panels. The news occurs as rivals using an alternative silicon-based technology face a raw material and cost crunch. The price for silicon, an element used in the dominant technology, has nearly tripled in the last two years as rising demand gobbled up supplies. Paul Maycock, a solar energy consultant at PV Energy Systems Inc., said "First Solar is coming in at a very good time," he said, noting that the price of solar panels has risen to \$3.25 a watt from \$2.60 because of the silicon shortage. Meanwhile in California legislators are considering a subsidy program backed by Governor Arnold Schwarzenegger that could see a major boost for solar energy.

[Toledoblade.com 24/05/05. Read source article? – See page 10]



## IN OTHER NEWS...

### Essential elements

12) Cadmium has been found to have a biological use as a nutrient in the ocean, the first known biological use of cadmium in any life form. Scientists have discovered cadmium within an enzyme from a marine diatom. Diatoms are algae or plankton common in the ocean and a major source of food for many organisms. The finding suggests that certain trace metals, found in very low concentrations in the ocean, are utilized by enzymes that have not been found in organisms from terrestrial environments. Marine diatoms can use cadmium, cobalt or zinc interchangeably for optimal growth, but this is the first use of an enzyme from a marine diatom, or from any biological system, that carries cadmium in its metal-binding site in native form.

[[ScienceDaily.com](http://ScienceDaily.com) 10/05/05. Read source article? – See page 11]

### The Art of Cadmium

13) A new technique for dating paintings has been developed by a scientist in the US. The method, which relies on thermodynamic simulations of how the chemicals in paint deteriorate with age. Paintings age for a variety of reasons, such as exposure to high temperatures, humidity and light. Ageing is mainly caused by changes in the chemical and structural compositions of pigments in the paint as they gradually interact with each other and their environment over time. Analysis on how "yellow cadmium" (which contains cadmium sulphide) and "lead white" (lead carbonate), react with each other at room temperature and pressure can relate a painting to a certain time or place and could hold the key to detecting real works of art from fakes.

[[Physicsweb.org](http://Physicsweb.org) 13/05/06. Read source article? – See page 11]



## **Source Press Articles**

### **1) MARKET ROUNDUP - summertime dulls prices**

Metal Pages 17/06/05

[...] Prices for standard grade 2 material have been reported in a range \$3,330-3,400/tonne in Rotterdam whilst bids for low bismuth material are up to \$3,450/tonne and a sizeable sale has been concluded at \$3,500/tonne in Rotterdam to a consumer. Offers from China have now moved up again to \$3,600/tonne with suppliers citing strong domestic demand and reduced export rebates as the reason. Cadmium price remain very firm with supplies of prompt material reported to be extremely tight and few offers in the market. After a flurry of business in the past few weeks, the market is quieter with suppliers and traders reluctant to offer what stocks they have in the anticipation of higher prices. Most recent business to China has been reported in the range \$1.80-1.85/lb but offers are now at \$2/lb and above but no business confirmed. The \$2 level has been seen by some as a target and as one trader said, "Desperation will probably push it over that!" Selenium remains quiet but very firm on limited supplies whilst there is another effort being made by the Chinese to try and move bismuth prices up to the \$4/lb level. [...]

### **2) Cadmium at 9-1/2-yr high on Chinese demand**

Reuters.com 17/06/05

Cadmium, a metal mostly used in nickel-cadmium rechargeable batteries, jumped to \$1.80-2.00 a pound on Friday, its highest since November 1995, and looks set for further gains, trader said. The price has added a third, or 50 cents, this month on continued strong battery demand from China and tight availability. It hit a high of \$2.10 in 1995 and \$2.30 the year before. "There are lots of Chinese enquiries every day, but insufficient stocks in Europe," a French trader said. "We can't find metal quickly enough and producers say they have sold out, so we expect prices to push above \$2 in the next few weeks." The market has risen steadily since August last year, having spent months between 40 and 50 cents a lb and moving as low as 10 cents in 1998. "There is one offer for 10-15 tonnes of high-grade cadmium for delivery in August at \$2.25/2.30 a pound," another trader said. Dealers said Chinese demand for low-grade cadmium had risen to meet domestic demand from oxide and nitrate makers to feed its growing battery sector. "Demand for high grade is slightly higher but the prices are the same," the first trader said. Japanese and South Korean battery firms have shifted plants to China, where production costs are much lower. European supply has fallen in recent years, notably with the closure of France's Metaleurop in 2003. About 95 percent of world production is traded under long-term deals, leaving a slim market for spot business that has seen prices gain almost 200 percent in six months. China, and to a lesser extent India, are the main players in the world spot market for cadmium, a by-product of zinc mining that is soft and bluish-white and can be easily shaped and cut. World consumption has fallen in recent years because of environmental concerns and potential health hazards, with cadmium presenting dangers similar to those from lead. Yet its use in nickel-cadmium batteries is robust, accounting for some 80 percent of world offtake. The metal is also used in pigments, stabilisers, coatings, cadmium alloys and electronic compounds such as cadmium telluride. World refined production rose to 16,588 tonnes in 2004 from 15,388 in 2003, while consumption fell to 15,860 tonnes from 17,917, according to data from the World Bureau of Metals Statistics (WBMS).



### 3) Cadmium continues to climb

Metal Pages 13/06/05

Cadmium prices have climbed higher and are now in the range of \$1.70-1.90/lb, depending on quantities and quality. Producer sources are well-sold (having committed most of their output on long-term contracts) and there is little material available in the spot market. What material that becomes available is finding its way into the trade's hands, with several major participants taking long positions. One trader, who has "jumped onto the coat-tails" of the rally, admitted that he has gone long and that the price will, more than likely, reach \$2/lb. He told Metal-Pages that the market had been helped along but there was still availability, including material from investors, Bulgaria and the Mexicans. The latter, he said, are becoming wise to the market and are pinning their prices to the western published quotations, which are, of course, rising. A European producer confirmed the bull trend and said that the price is "climbing every minute". "There is not much availability. People we've never heard of before are phoning us. We, inevitably, have to say no, even though some say they're not interest in price. We are sold out." Chinese buying, according to some sources, has slowed slightly since the price breached \$1/lb. However, this hasn't stopped the Chinese producers from increasing their own domestic prices, with Huludao 4N ingots now 51,000 (\$2.71/lb), up from was 43,000 (\$2.32/lb). Although the European producer didn't expect the price to rise to \$2/lb, there is a fair amount of pressure on cadmium to do so. Few people would bet their last dollar on cadmium stopping in its tracks now, despite the summer slow-down.

### 4) Cadmium soars to \$1.90-2.10/lb

Platts Metals Week 13/06/05

The cadmium market has been jolted out of its pre-summer slumber, as rising demand for the metal sent prices soaring in recent weeks. Merchants have reported tight supplies in the wake of increasing demand. The MW NY dealer price for 99.95% material last week jumped to \$1.80-1.90/lb from \$1.40-1.50, while the Free Market price for four nines grade rose to \$1.90-2.10/lb from \$1.60-1.70. "There is good demand and material is hard to come by," said a merchant, adding: "Prices were creeping up slowly, then they made a sudden jump over the last couple of weeks." Antimony also has been firming up lately. [...]

### 5) MARKET ROUNDUP - steel slowdown hits nobles

Metal Pages 10/06/05

[...] However, this week, cadmium has been an exception as demand from China has been increasing over the previous weeks lifting the metal out of its extended period in the doldrums. Prices have been moving up in Europe as demand from China for production of Ni-Cad batteries, where about 75% of material is used, has been drawing in supplies which have subsequently become tighter. Good demand is also reported to be coming from Japan adding to the pressure on supplies. Business for spot material has been reported at around \$1.70/lb in Europe up to \$1.90/lb for shipments to Asia though some parcels are said to be still being picked up at closer to \$1.40/lb. As the offers move up, there are reports of resistance from China to the higher numbers. As one trader commented, "There is more demand than supply so the price has to go up". [...]





## 6) Talks at Trail are optimistic

Metal Pages 10/06/05

Union leaders representing workers at the Trail plant of Teck Cominco Ltd are reported to have said that current labour negotiations are progressing well. The company has had talks with both the United Steelworkers of America local 480, representing about 1,035 production and maintenance workers at Trail and USWA local 9705, representing about 150 office and technical workers early in the month. Doug Jones, president of United Steelworkers Local 480, said that the union was optimistic of a positive outcome. Commenting on a previous strike vote in which over 98% of the workers voted to give the union the power to call a strike in the event talks broke down, he said that this was premature and another poll would be taken before any strike would occur. According to a source at Teck Cominco, the key issues are monetary and pensions which will be addressed at critical meetings during 13 - 15 June next week. Fundamental changes to the company pension plan are said to have been proposed by the company. The workers are currently working under an extension of their latest four year contract which expired on 31 May. In the last two rounds of bargaining at Trail, contract talks continued for months beyond the contract expiry dates. In 1999 and 2001 workers stayed on the job and new collective agreements were reached without strikes. One of the world's largest zinc and lead refining zinc production capacity at the Trail complex is about 290,000tpy, with lead capacity around 120,000tpy. The plant also produces other metals, such as indium, germanium and cadmium.

## 7) Teck zinc plant jobs talks to go on after deadline

Reuters.com 30/05/05

Two labor contracts will expire on Tuesday without new agreements in place at Teck Cominco Ltd.'s large zinc refinery in Western Canada, the firm said on Monday, but talks will carry on after the deadline and employees will remain at their posts. The world's biggest zinc miner and the United Steelworkers of America union will meet again on June 2 and talks might still continue for several weeks as monetary proposals haven't been tabled yet, said company spokeswoman Carol Vanelli. "We are making progress and we are continuing to meet. So I would take that as a good sign," Vanelli said. The Trail complex is one of the world's biggest refining operations of zinc and lead, two metals whose prices have surged in the past year because of strong demand from China. One four-year jobs contract at the plant in southeastern British Columbia covers 1,100 production and maintenance workers while another lays down employment terms for 200 clerical employees. Both expire on May 31. In 2001, labor negotiations had also run on beyond the contract expiry date with employees continuing to work. Workers last went on strike at the Trail facility in 1990. Vanelli said the union planned to ask its members for a strike mandate. This is a traditional bargaining tool that gives union representatives permission to call a strike if they feel talks are not progressing and if they give the company 72-hours notice. The union could not immediately be reached for comment. Trail produced 296,000 tonnes of refined zinc and 84,300 tonnes of refined lead in 2004. It also produces a variety of specialty metals such as indium and germanium. The site contributed 12 percent, or C\$135 million (\$107 million), of Teck Cominco's operating profit in 2004.

## 8) The A380 to be equipped with Saft batteries

Saft Press Release 13/06/05

Rechargeable ULM® nickel-cadmium batteries will supply APU starting and electrical system backup power. Saft, leader in the design, development and manufacture of highend industrial batteries, has been selected by Airbus for its expertise in the aeronautical field. Two out of every three of the world's Ni-Cd equipped aircraft use Saft batteries, notably the entire Airbus fleet. The new generation of batteries to be used on the A380 is already in use on aircraft all over the world and, in particular, the most recent Airbus models, A330 and A340. Use of Saft's ULM® batteries



allows significant cost savings to be achieved. The plastic-bonded negative electrode, used in conjunction with a specific separator and a classic sintered positive electrode, results in reduced battery weight and lower over charge current that leads to reduced water consumption. Lower battery weight means this technology allows payload to be increased. Above all, the interval between maintenance operations can be doubled - thus resulting in significantly lower operating costs. The ULM® battery meets the A380's specific needs as it provides continuous, round-the-clock operation. The battery must also be able to withstand extreme temperatures as the A380 superjumbo will be operated in a wide range of climatic conditions. It has therefore been equipped with temperature sensors to regulate its operation over a wide temperature range. Saft's ULM® nickel-cadmium technology is the standard battery technology for new aeronautical programs. More than 11,000 units have been produced since 1992 and put into service on civil narrow, mid and wide body aircraft as well as on military programs.

### **9) Electro Energy Inc. Signs Letter of Intent to Acquire Major Facilities for Manufacturing Advanced Rechargeable Batteries**

[Biz.yahoo.com 16/05/05](http://Biz.yahoo.com/16/05/05)

Electro Energy Inc., a developer and manufacturer of advanced rechargeable batteries, today announced that it has signed a non-binding Letter of Intent (LOI) to acquire equipment and an option to lease facilities formerly owned by Energizer Power Systems. Electro Energy Inc. ("EEEI") has confirmed the basic terms and conditions of the LOI for entering into a definitive agreement to acquire manufacturing equipment for lithium and nickel batteries and an option to lease industrial space located in North Central Florida near Gainesville. The facilities that would be covered by the proposed transaction are now managed by a Long Island-based private equity firm Topspin Partners, LP ("Topspin"). The completion of the transaction is subject to the negotiation and execution of a definitive purchase and sale agreement, as well as due diligence by both parties and EEEI's obtaining additional investor funding to execute a commercialization plan for the Company's innovative batteries. Martin Klein, Chairman and CEO of Electro Energy Inc., stated, "This transaction, if completed, will give EEEI one of the largest facilities in the United States for the manufacture of advanced rechargeable batteries. The facility has all of the necessary permits for the proposed manufacturing operations. The site contains a significant amount of manufacturing equipment that can be utilized by EEEI. As a result of previous battery operations in the area, the location also provides access to a highly experienced and diverse battery work force. This location is certainly ideal for a pilot facility and is an obvious candidate for high volume production. We will also be evaluating alternative locations in the Southeastern and Middle Atlantic states that are looking to attract the hundreds of good paying manufacturing and engineering jobs our operations will provide. Some upgrading and modification of existing equipment and acquisition of new equipment will be required to produce EEEI's version of bipolar batteries. However, we believe this transaction will give us the high volume capability that we have been seeking to produce batteries on a commercial scale." Leo Guthart, Chairman and CEO of Topspin Partners L.P., stated, "Topspin has been looking at a number of opportunities to maximize the value and the usefulness of our investments in the battery industry. As a result of these considerations, we have concluded that the technology under development at EEEI represents an exciting opportunity to build a viable battery business. We are pleased to invest in this endeavor with them." The major terms of the Letter of Intent provide for the exchange of 5.5 million newly issued unregistered EEEI common shares to Topspin for all of Topspin's lithium battery, nickel battery and water treatment equipment in Alachua, Fla. The terms also include incentive warrants to Topspin and the option for EEEI to lease approximately 200,000 sq. ft. of space at discounted rental rates, offset by additional warrants to Topspin. Topspin will also grant to EEEI the option to purchase the facilities at fair market value. Mr. Klein noted, "The replacement value of the equipment we are acquiring is well in excess of \$100 million. Since its inception, EEEI has been developing a unique bipolar design, initially for nickel metal hydride batteries and more recently for lithium batteries. As the technology has matured, we have planned on expanding our manufacturing capability. We have looked at a number of alternatives to execute our commercialization plans for high-volume manufacture and have concluded that acquiring the Gainesville facility will give us a unique, major capability." It is EEEI's intent to continue its operations in Danbury, Connecticut, for the development and



manufacture of specialty nickel metal hydride batteries and in Colorado Springs, Colorado, for the development of lithium batteries and thermal batteries and the production of specialty nickel cadmium batteries.

## 10) World's most powerful battery created

[New Scientist magazine 14/05/05](#)

What do you get if you connect 13,760 rechargeable nickel-cadmium cells weighing a total of 1300 tonnes? The world's most powerful battery, according to Guinness World Records. Known as a battery energy storage system (BESS), the massive storage device has been installed by battery maker Saft of Bagnolet, France, for an electrical cooperative in Fairbanks, Alaska, to bridge the frequent electricity outages from the local grid. With temperatures as low as -50 °C, being without power can be a big problem for the area's 90,000 residents. So the BESS has been designed to provide 27 megawatts for 15 minutes - long enough for the utility company to bring back-up generation online. The previous biggest battery delivered 21 megawatts for 15 minutes at the Puerto Rico Electric Power Authority at Sabana Llana.

## 11) First Solar prepares to boost output as cost crunch hits rivals

[Toledoblade.com 24/05/05](#)

"We think demand is going to strengthen in a number of markets," said Ken Schultz, marketing vice president for the Scottsdale, Ariz., company whose majority shareholder is Wal-Mart heir John Walton. Thanks to massive subsidies of solar and wind power by the German government that are being eyed elsewhere in Europe, First Solar expects to book its first-ever profit in 2005, on sales of more than 300,000 panels. The new investment by the company, whose research arm and operations are in the Cedar Business Park in Perrysburg, occurs as rivals using an alternative technology face a raw-material and cost crunch. The price for silicon, an element used in the dominant technology, has nearly tripled in the last two years as rising demand gobbled up supplies. Additionally, company officials believe they are about to lay to rest environmental concerns about their technology, which uses cadmium telluride instead of silicon. The metal can be harmful to the environment and humans. The company plans to formally announce in late May a first-of-its kind warranty program as part of which it will pre-arrange to recycle the metal at the end of the First Solar panels' 20-year lifespan. A portion of the revenue received on the sale of each panel will be paid to an insurance company that will issue a policy to cover recycling costs, Mr. Schultz said. "It is novel," said Paul Maycock, a solar energy consultant who heads PV Energy Systems Inc., in Warrenton, Va., said of the program. "I think they'll find that the market will accept them." Mr. Maycock praised the timing of the firm's expansion. "First Solar is coming in at a very good time," he said, noting that the price of solar panels has risen to \$3.25 a watt from \$2.60 because of the silicon shortage. He was unconcerned that Germany's Social Democrats, who approved so-called "green energy" subsidies, could be toppled in elections called yesterday by Chancellor Gerhard Schroeder for as soon as September. The subsidies have become so entrenched that they are unlikely to be overturned by the rival Christian Democrats, who tend to be more conservative, the consultant said. About 95 percent of panels produced locally go to Germany. Spain also subsidized solar energy, and Italy and the European Union are studying such programs. Additionally, California legislators are considering a subsidy program backed by Gov. Arnold Schwarzenegger. When the local project is completed in 2007, the capacity of First Solar's Perrysburg Township complex will triple to nearly 1 million panels a year capable of producing 75 megawatts of power. Depending on moves by rivals, the plant could catapult the firm into the top 10 producers of panels worldwide. The leading producer now, with a capacity four times that planned locally, is in Japan. As it stands, First Solar has an insignificant share of the \$7 billion market for panels, related equipment, and services worldwide, company officials concede. The project is expected to eventually double the firm's 195-person local workforce. That pleases the Wood County Economic Development Commission. "This is the kind of high-tech business that everybody is looking for in the region," said Wade Gottschalk,



associate director. The expansion will boost the company's payroll by more than \$7 million, or roughly \$35,000 a job, he said. Besides its local workforce, First Solar employs 30 in Scottsdale and at a sales office in Germany. The expansion will include \$11 million for a building, \$60 million in machinery and equipment, and \$3.3 million in inventory. The state of Ohio is providing a \$15.5 million loan for the project as well as tax credits. Perrysburg Township has agreed to property tax abatements. Last year, First Solar spent \$20 million in Perrysburg to replace its lone production line in a bid to boost efficiency and quality.

## 12) Scientists Find Unusual Use Of Metals In The Ocean

[ScienceDaily.com](http://ScienceDaily.com) 10/05/05

Cadmium, commonly considered a toxic metal and often used in combination with nickel in batteries, has been found to have a biological use as a nutrient in the ocean, the first known biological use of cadmium in any life form. Scientists have discovered cadmium within an enzyme from a marine diatom, an algae or plankton common in the ocean and a major source of food for many organisms. The finding, reported in the May 5 issue of *Nature*, suggests that certain trace metals, found in very low concentrations in the ocean, are utilized by enzymes that have not been found in organisms from terrestrial environments. Enzymes containing metals not typically found in biology may be more common in marine than in terrestrial organisms and could be important for the cycling of trace metals in seawater, which has implications for global carbon cycling and climate change. Mak Saito, an assistant scientist in the WHOI Marine Chemistry and Geochemistry Department and co-author of the *Nature* study, says the oceans might be an important reservoir of novel genomic material because of the unusual chemistry of the surface oceans. "Trace elements are extremely scarce in the ocean," Saito said. "Major regions of the surface oceans, for instance, are known to be limited by iron, rather than by nitrogen or phosphorus as in lakes and coastal waters. This fact has created a selection for novel metalloenzymes and biochemistries that utilize metals that wouldn't otherwise be used in terrestrial or near-shore environments." Saito notes that in the past few decades the importance of zinc as a micronutrient has become apparent in terrestrial life, but its scarcity in the oceans likely created the need for a cadmium enzyme that performs the same function. The enzyme is a common protein that regulates carbon dioxide levels in the cell. Marine diatoms can use cadmium, cobalt or zinc interchangeably for optimal growth, but this is the first use of an enzyme from a marine diatom, or from any biological system, that carries cadmium in its metal-binding site in native form. "The phytoplankton ecology of the oceans is likely influenced by the relative abundance of these very scarce metals, particularly cadmium, zinc, and cobalt - all of which have been shown to substitute for some of the same biochemical functions," Saito said. The team studied the marine diatoms *Thalassiosira weissflogii* and *Thalassiosira pseudonana*, purifying and sequencing a protein in the single-celled organisms that contains cadmium. Sequencing of oceanic DNA is already underway to find more genes from this unique chemical environment. "This discovery provides a long-awaited explanation for the nutrient-like behavior of cadmium on the oceans," Saito said. "This enzyme is involved in carbon uptake in diatoms, and is probably an important component of carbon cycling in the surface oceans. That has implications for our understanding of the global carbon cycle."

## 13) Art turns to thermodynamics

[Physicsweb.org](http://Physicsweb.org) 13/05/06

A new technique for dating paintings has been developed by a scientist in the US. The method, which relies on thermodynamic simulations of how the chemicals in paint deteriorate with age, might also help distinguish between real works of art and fakes. Paintings age for a variety of reasons, such as exposure to high temperatures, humidity and light. Ageing is mainly caused by changes in the chemical and structural compositions of pigments in the paint as they gradually interact with each other and their environment over time. Now, Boris Zilbergleyt of the Systems Dynamics Research Foundation in Chicago has developed a new dating technique that simulates



these interactions. Zilbergleyt analyses how various commonly used pigments, such as "yellow cadmium" (which contains cadmium sulphide) and "lead white" (lead carbonate), react with each other at room temperature and pressure. Typical pollutants such as carbon dioxide and hydrogen sulphide are also included in the simulations. According to Zilbergleyt, the results of the simulations agree well with colour changes observed in real paintings as they age. "My method successfully predicts the chemical ageing of paintings and could therefore be used to relate a painting to a certain time or place -- or even to a particular painting school," Zilbergleyt told PhysicsWeb. "In some cases this could be a way to tell between real works of art and fakes that have been artificially aged -- like the famous Han van Meegeren forgeries, for instance." Zilbergleyt says he would now like to create special simulation software with its own specific database for art professionals.

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