Energy
Alternative Sources

United States of America

Energy

Alternative Energy Conference Recap: Multiple Opportunities

Investment Summary

Key takeaways for covered companies

Jeffrey W. Bencik, CFA
(212) 284-2115, jbencik@Jefferies.com

Laurence Alexander, CFA
(212) 284-2553, lalexander@Jefferies.com

Robert J. Schenosky-Industrial Group Head
(212) 284-2120, rschenosky@Jefferies.com

Event

Jefferies Hosted Alternative Energy - Cleantech Conference.

Key Points

- **Solar Energy Is Here to Stay** - Government incentives are likely to continue until solar becomes cost competitive with retail electricity. The industry remains sold out, and, in the near term, we would recommend investing in companies that can expand capacity and grab market share during the current silicon shortage. We believe that Energy Conversion Devices (ENER) and Evergreen Solar (ESLR) are the best positioned to benefit from this increased demand due to their secure silicon supplies. We would be buyers on the recent industry pullback in the shares.

- **New Technologies Challenging Traditional Batteries.** A key takeaway from the conference is that traditional batteries are facing a host of potential game changing technologies including fuel cells, ultracapacitors, and exotic material batteries. We believe there will likely be a continued shift to higher power storage devices. We were impressed with Maxwell Technologies (MXWL, $17.10, NC) ultracapacitor product, and we believe fuel cells are likely to make some inroads in stationary power and motive power (forklifts). However, cost is still an issue that must be lowered before either fuel cells or ultracapacitors can achieve more mainstream acceptance.

- **At Current Levels, Bio-Chemicals Increasingly Viable.** Even in basic ethanol, industry estimates of the cost of production are $0.75/gal (in Brazil) and $0.95/gal (in a corn ethanol plant). Since vehicles require roughly 30% more ethanol than gasoline, US costs are estimated at roughly $1.20/gal, lower than current gasoline prices even without the high-profile $0.51/gal subsidy.

- **Industrial Gas Players Best Way to Play Hydrogen Economy.** Reinforcing our view on the larger industrial gas players such as Air Products (APD, $65.52, Buy) and Praxair (PX, $55.24, Hold), the smaller hydrogen companies are able to support their longer-term investments in the hydrogen economy by targeting the secular growth trends in the $2bn refinery hydrogen market, which is, in our view, one of the best growth stories in the chemicals sector with consistent 7%-10% growth through at least 2020.

Investor interest in alternative energy remains high. Jefferies' CleanTech Conference was well attended throughout the day, with a record level of attendance for a Jefferies conference. While company comments were quite varied, certain key themes were reinforced by the diverse presentations.

Solar Energy

- **Solar Energy is viable now - additional government incentives likely.** California Public Utilities Commission (CPUC) President, Mr. Michael Peevey presented at the Jefferies conference. Mr. Peevey announced at the conference that CPUC wants California to generate 20% of its energy needs from renewable sources by 2010. This is significantly faster than the previously announced goal of 2017. Governor Schwarzenegger's goal is even more aggressive, calling for 33% of energy generation from renewable sources by 2020. While California is leading the way, President Peevey noted that other states including Arizona, New Mexico, and Pennsylvania have new incentive programs pending that could further stimulate demand for solar modules. We believe that solar companies in general will benefit from a faster ramp, but in particular Energy Conversion Devices (ENER) and Evergreen Solar (ESLR) are likely to benefit from this increased demand due to their secure silicon supplies. This should allow these companies to expand more rapidly than the industry.

- **Energy conversion devices.** The company reiterated its plan to expand faster in solar to take advantage of the high demand and the current polysilicon shortage. Previously, the company indicated a plan to increase capacity to 300MW by 2010, we believe the new goal is to get to 300 MW by 2009. We have not adjusted our model, but if the company can achieve this new goal it could add ~$1.00 to EPS in 2009. The company also indicated that it fully expects additional hybrid vehicle announcements over the next 6-8 months. We believe this is likely from the Chevy Malibu and Equinox. We continue to believe that Cobasys is the likely supplier for these vehicles. Importantly, in the conference, Saft (Europe) detailed its plans to supply NiMH batteries for the hybrid market. Importantly, and not very well known, Saft is a licensee of ENER's NiMH battery technology.

- **Opportunities beyond cells.** Several solar cell companies highlighted the need to become mainstream. Evergreen Solar, for example, highlighted the need for solar cells to become quotidian construction materials, rather than unusual (and optional) add-ons. As a way to accomplish this mission, the company is looking to partner with window companies such as Anderson or Pella to take advantage of their manufacturing expertise in windows (similar to module production), but more importantly, their connections in the builders market. DuPont (DD, $44.68, NC), which already supplies eight key materials used in solar panels (e.g. conductive pastes and high-performance films) is investing $100m to further the development of solar technology, and we believe it will leverage its formidable channels to market and well-recognized brands (e.g., Tyvek) to accelerate the consumer adoption of solar cell technology. Carmanah Technologies (CMHXF, $3.10, NC) has taken a similar approach, leveraging its ability to provide innovative, integrated solutions for specific end markets (particularly solutions that integrate solar cells with LED technology) to create a $40m business growing at a 65% CAGR (with management using a "conservative" case of 35%-40%). As more polysilicon supply comes onstream in 3-4 years time, we expect companies with viable end-market brands to begin to capture more of the value in the value chain.

Advanced Battery Technology/ Fuel Cells

- **Challenge is longevity, portability.** Several firms discussed proprietary products intended to provide mobile operators with longer-lasting power. Medis Technologies, Ltd. (MDTL, $28.38, NC), for instance, has a portable fuel cell that can power cell phones, PDAs, and other portable devices for 10x the battery life of existing batteries.

- **Back up power sources.** A recurring theme was the argument that the last hurricane seasons reinforced the need for businesses and households to purchase back-up power sources, preferably newer, more innovative battery technologies.

- **Indirect beneficiaries of wind and solar energy.** Wind and solar energy are more erratic, at the opposite end of the spectrum from nuclear energy. With wind and solar energy, the power supply is intermittent, depending on either the strength of the wind or the time of day and the degree of cloud cover. This can create mismatches with peak electricity demand. With nuclear energy, in contrast, energy tends to be released regardless of demand. At both extremes, demand for batteries increases as a way to better synchronize the timing of energy production and consumption.

- **Much ado about forklifts.** Another recurring theme was the opportunity to shift forklifts to hydrogen fuel cells. In some ways this is more immediately intuitive than consumer automotive applications, as forklifts are typically

Jeffrey W. Bencik, CFA , jbencik@Jefferies.com, (212) 284-2115

constrained to a specific region (i.e., close to the refilling station) and are often indoors (increasing the incentive to use a non-polluting technology). According to Ballard Power (BLDP, $7.75, NC), widespread adoption depends on the ability to deliver energy at the $400-$500/KW range, about half of current production costs. Ballard expects to book 300 units by the end of 2006 and to win roughly 40% of the market as it develops.

- **Ultracapacitors complement batteries or fuel cells.** Maxwell Technologies (MXWL, $17.10, NC) benefits from either batteries or fuel cells in forklifts as the fast charge/discharge cycle of ultracapacitors can provide significantly better power than either batteries or fuel cells. Therefore, a forklift with ultracapacitors can utilize smaller batteries for the base load and utilize the ultracapacitors for the high power lifting operations. Should fuel cells replace batteries in forklifts, ultracapacitors would provide a similar function. Additional applications for ultracapacitors include trimming wind turbine blades, uninterruptible power supplies (providing regulated power), and hybrid vehicles.

- **Hybrids likely to use NiMH batteries in the near term.** While some industry players expect a quick conversion to Li-Ion batteries in hybrid vehicles, the consensus from the conference is that this technology is likely still several years away from commercial application in hybrids. The main issue is the potential for thermal runaway, which could result in a catastrophic explosion. Therefore, we expect NiMH batteries to be the main battery for hybrids for the foreseeable future. Energy Conversion Devices indicated in the conference that it fully expects additional hybrid vehicle announcements over the next 6-8 months. We believe this is likely from the Chevy Malibu and Equinox. We continue to believe that Cobasys (ENER JV) is the likely supplier for these vehicles. During the conference, Saft (Europe) detailed its plans to supply NiMH batteries for the hybrid market. Importantly, and not very well known, Saft is a licensee of ENER's NiMH battery technology.

Industrial Biotechnology

- **Material science increasingly involves all the sciences.** DuPont reiterated its long-standing theme that, going forward, material science will increasingly benefit from the integration of biology with chemistry and physics.

- **Out from the shadows.** Presentations at the conference reinforced our view that industrial biotechnology, particularly biofuels, are rapidly moving out of the shadows. After working on the technology for more than a decade, DuPont now has more than $300m in biofuel sales (vs. $125-$150m in 2001). New biotech traits are expected to further improve the ethanol yields from corn, including drought tolerance, nitrogen efficiency, increased yield and increased ethanol production.

- **Cellulose critical.** DuPont estimates global biofuel requirements could reach 87bn gallons by 2025, up from the current 10.4bn gallons. To get there, Dupont was adamant that cellulosic feedstocks would be critical, particularly once U.S. ethanol supply reaches roughly 5% of total transportation fuels (vs. 3% currently). This implies addressing key issues, particularly collection, pretreatment, processing (new enzymes), fermentation, distribution, and plant optimization. As we discussed in our recent industry primer, DuPont's strong emphasis on the need for cellulosic ethanol technology could signal a longer-term opportunity for companies that own significant amounts of timberland. Some studies apparently suggest that cellulosic feedstocks should also improve crop biodiversity and reduce soil erosion. Indeed, a key theme in DuPont's presentation was that different feedstocks would be viable in different regions, even within distinct regions in the U.S.

- **At current levels, bio-chemicals increasingly viable.** For many investors, DuPont's bio-based materials platform is identified with Sorona, DuPont's new polymer for use in apparel, flooring and engineered resins. DuPont has a $100m, 100m lb/year facility coming onstream later this year. At current energy prices, however, DuPont believes production economics have shifted to the point that bio-pdo and bio-polyols are also viable, creating a significantly wider market opportunity. As a result, DuPont is in the process of setting up partnerships with polymer companies that want to substitute 50%-60% of their polymers with bio-based materials. Even in basic ethanol, industry estimates of the cost of production are $0.75/gal (in Brazil) and $0.95/gal (in a corn ethanol plant). Since vehicles require roughly 30% more ethanol than gasoline, US costs are estimated at roughly $1.20/gal, lower than current gasoline prices even without the high-profile $0.51/gal subsidy.

- **Opportunity likely understated.** DuPont has estimated its bio-based products portfolio has a NPV of $3bn, including north of $150m for materials (Sorona, Polyols, Aromatics) and $1.5bn for biofuels. We believe DuPont's "risk-adjusted" methodology for estimating the NPV is deliberately conservative, suggesting significant upside risk if the end markets evolve as projected.

- **IP essential.** DuPont highlighted its strong IP portfolio in biotech, with its US patent estate second only to the University of California -- and ahead of the U.S. government, Human Genome Sciences, Genentech and Monsanto. We expect both breadth of IP and concentration on key production technologies or techniques to be critical when differentiating the emerging industrial biotech firms.

- **Biodiesel earlier stage than ethanol, opportunity to differentiate.** Imperium Renewables made a strong case for producer differentiation in the nascent biodiesel market. Compared to traditional plant designs, Imperium Renewables estimates its plants are more efficient, produce significantly less waste, have a smaller footprint (occupying 80% less space), and require significantly less capital (25%-33% of a conventional design, or $0.40/gal vs. $1.20-$1.50/gal). Moreover, with biodiesel less expensive than diesel (at least in some regions), and the energy density comparable (7% less using soy, 8% better using palm, 10% better using canola), the company expects its upcoming capacity expansions to be effectively sold out from the start. Importantly, even at this early stage companies appear to be learning key lessons from the oil industry, particularly the importance of feedstock flexibility (plants that can switch quickly between feedstocks), operational excellence (to avoid being shut down by an unexpected mix in the feedstock), and chemical expertise (refining palm oil to improve the cloudpoint).

- **Capturing value upstream?** In our view, the jury is still out whether participants in industrial biotechnology need to be vertically integrated in order to capture value across the energy cycle. DuPont suggests that, much as in the petrochemical chain, the bulk of the profits will be captured closer to the source (i.e., at the seed and grain level, rather than at enzymes, fuel or distribution). For more details on the companies currently involved in the value chain, please see our April 24th primer.

Hydrogen

- **A battery, not a power source.** Speakers who addressed the potential for the hydrogen economy consistently reinforced the distinction between power sources (such as oil, sunlight, nuclear energy) and power storage (batteries and, as a potential replacement, hydrogen).

- **Environmental footprint depends on source.** For a hydrogen economy to be environmentally friendly, the hydrogen supply needs to be powered by sustainable feedstocks. The most enthusiasm in the audience was prompted by the idea of integrating solar energy (as a supply) with hydrogen (as a storage medium).

- **Not as far away as consensus suggests.** We were surprised to encounter one company, Jadoo Power, that has already commercialized consumer products that use hydrogen-based cartridges instead of batteries. Moreover, Jadoo is in the process of introducing new storage media that have 4x the storage density of its current batteries. Similarly, Hydrogenics (HYGS, $3.20, NC) argued that hydrogen supply can deliver $0.50-$0.70/kWH, competitive with off-grid generators. Meanwhile, Quantum Fuel Systems (QTWW, $4.25, NC) argued that, now that its hydrogen engine systems and refueling stations will accelerate over the next couple of years even before auto OEM H2-vehicle production can ramp up in 5-plus years.

- **Refinery hydrogen provides ballast.** Reinforcing our view on the larger industrial gas players such as Air Products (APD, $65.52, Buy) and Praxair (PX, $55.24, Hold), the smaller hydrogen companies are able to support their longer-term investments in the hydrogen economy by targeting the secular growth trends in the $2bn refinery hydrogen market, which is, in our view, one of the best growth stories in the chemicals sector with consistent 7%-10% growth through at least 2020.

Jeffrey W. Bencik, CFA , jbencik@Jefferies.com, (212) 284-2115

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Jefferies makes a market in Energy Conversion Devices, Inc.

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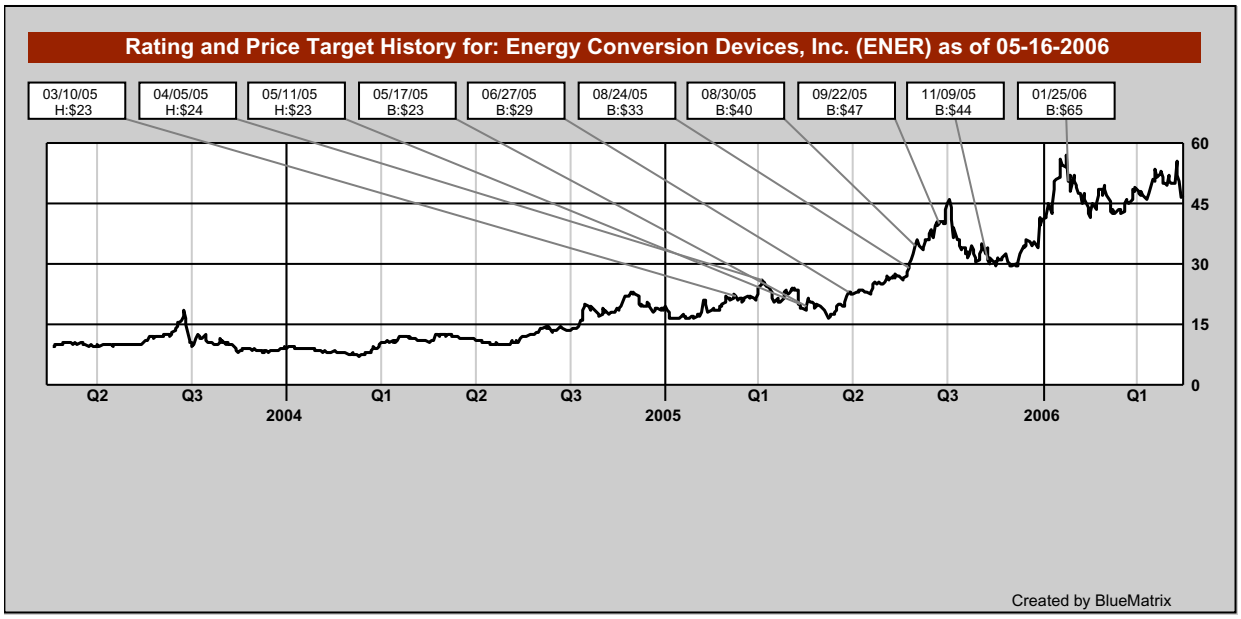
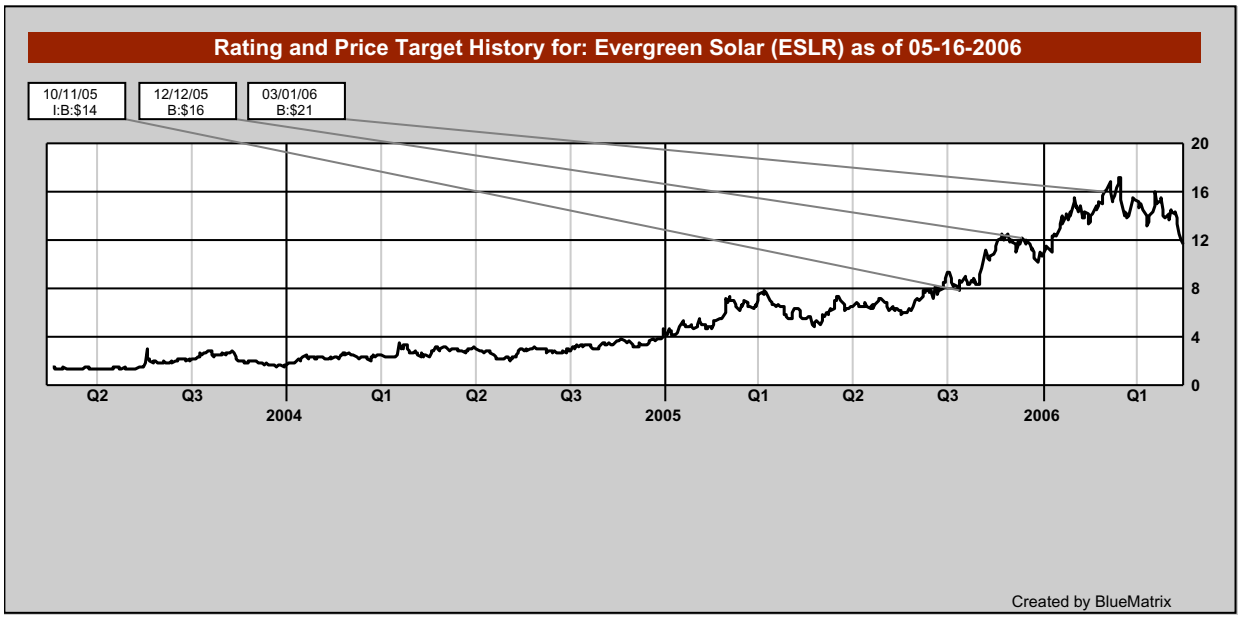
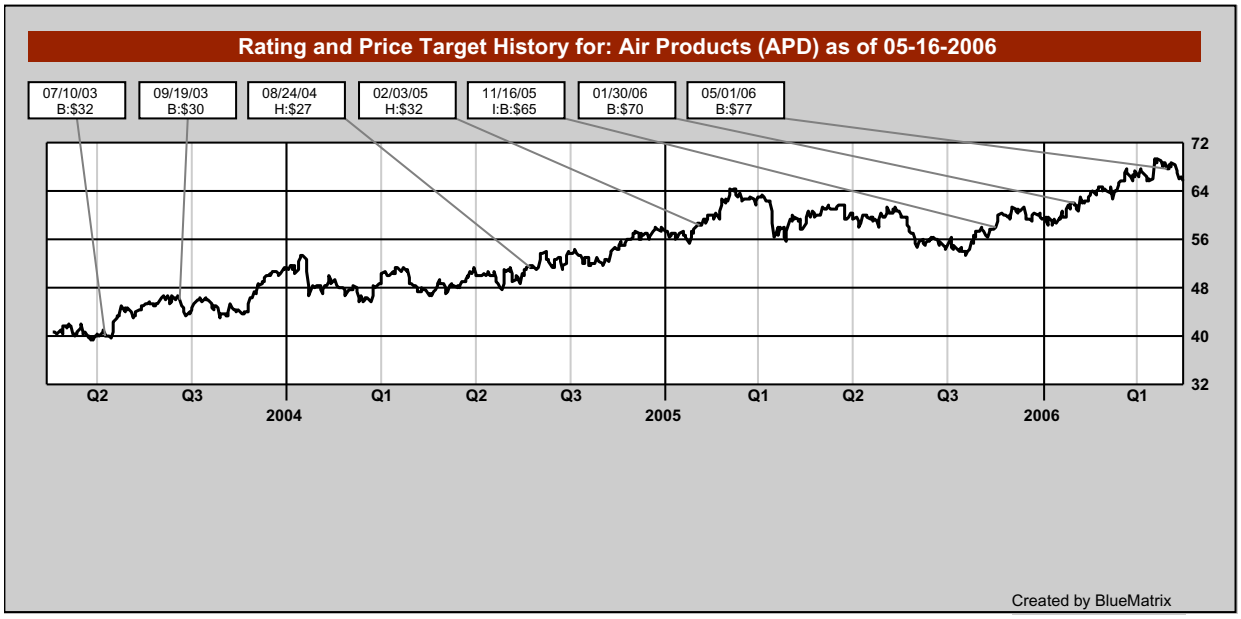


Jeffrey W. Bencik, CFA , jbencik@Jefferies.com, (212) 284-2115





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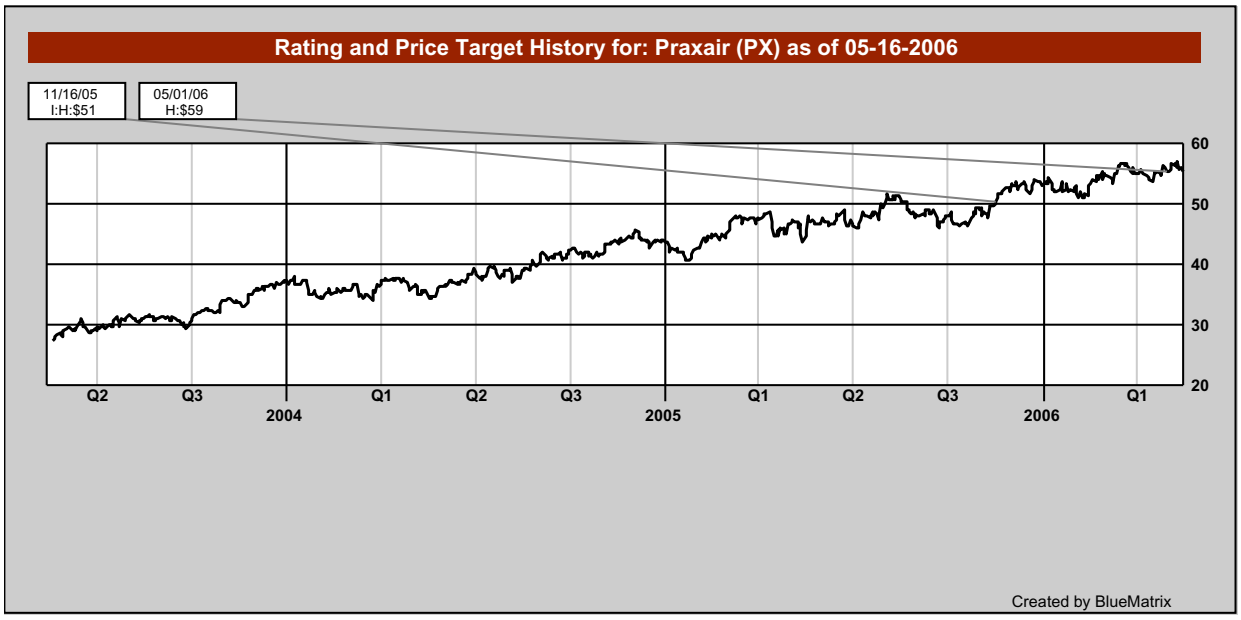

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