



2005 Q1/Q2 Quarterly Report: WilderHill Index Clean Energy Index. June 30, 2005

This marks the first, of what will be regular Quarterly Reports for the WilderHill Clean Energy Index (ECO). These Quarterly Reports highlight relevant news and topics regarding clean energy in general, and more specifically the WilderHill (WH) Index. They should as well, help illuminate the intellectual vision behind this Clean Energy Index.

For this lengthy Report only, we're reporting on two Quarters, They are 2005 in the 1st Quarter (January - March, noted as Q1) - and the 2nd (April - June, as Q2). The Q1 opened with the Index at 166.2, and it ended at 154.1. Q1 thus had a negative return of -7.9%.

Q2 began with the Index at 154.1, and ended at 156.5. Thus 2005 Q2 thus had a positive return of 1.6%. As expected in tracking a volatile sector, ECO as well showed typical volatility for both Quarters. Period-end figures alone obscure wide-ranging swings typical over any Quarter: at one point ECO was down over ~20% during Q2, from its high in Q1.

Notable Events

For a newsworthy item that helps illuminate some ways a company may be evaluated in the WilderHill (WH) Index, consider Zoltek (ZOLT). Zoltek makes carbon fiber; notably they're a producer of the composite materials used in many large wind turbine blades. Their materials generally lighten and strengthen products. Zoltek was placed in ECO earlier in 2004, and is in the important 'Renewable Energy, Harvesting' sector.

The issue that's of concern here arose when ZOLT announced in mid-May, that they'd be late in filing their required 10-Q statement of Quarterly finances. That immediately resulted in their being down-listed by the SEC, changing their symbol from "ZOLT" to "ZOLTE" to denote SEC review. (The change didn't present problems for tracking their symbol in the WH Index, since automated systems followed it without hitch. And also just parenthetically, it also didn't create issues for the specialists at the tracking fund).

But that said, seeing an "E" appended at the end of a stock symbol is a warning signal to market investors. Not surprisingly, there was an immediate downturn in stock valuation for Zoltek with an impact on Index valuation, although muted, since they were just one of the 38 stocks then in ECO. Until that time, ZOLT often moved upwards to a prominent-weighting, usually being above 3.0% in the Index. (Weightings float by their individual stock prices starting at each rebalance, when all are reset to the maximum of 3%).

After speaking with the Zoltek CFO about their 10-Q filing, we were satisfied that these were likely resolvable issues of debt characterization, and they could be fixed within 10 days. Unlike past dismal loss-making at ZOLT a decade ago, when the carbon fiber industry had collapsed with declining military orders, ZOLT was now booking orders. For the Quarter ended March 31, ZOLT's net sales increased 37% to \$15.8 MM; operating losses were \$2.0 MM due in large part to capacity growth. One issue for Zoltek was delay restarting an Abilene, Texas facility idled due to prior lack of carbon product demand;

that plant can produce 2,500 tons of carbon fiber. Another was expanding precursor acrylic production in Hungary; if done right, that can potentially help contain costs.

With the company delaying its 10-Q filing, their symbol temporarily 'ZOLTE', and their price therefore declining, we gave thought to what action if any, should be taken vis-à-vis ZOLT and the WH Index. Of considerable importance however, is the fact ECO is purposefully designed as an Indexing instrument, rather than an active-managed fund.

Importantly, Indexes are passive-managed. That means that unlike turnover in an active managed, say, technology mutual fund (which may have 100%+ turnover in a year) – the components in an Index are more 'sticky'. Putting aside a decline in ZOLT stock, we had to ask ourselves whether the ZOLT issue is: *Unrelated to its clean-energy relevance, *Likely to be only temporary, *Perhaps not uncommon for small firms in technology, and *Not one creating bankruptcy concerns. Our Index Rules generally do not allow intra-Quarter removal of a stock, except in exceptional circumstances like bankruptcy.

Importantly too it's worth considering that historically, most active-managed funds do not out-perform their comparable passive Indexes. In part, this seems due to the rather higher transaction costs associated with more active management. It may also be due to difficulty predicting stock movement: hence those associated with the 'random walk' school of thought may stress advantages of low costs, market, & tax efficiencies, and often prefer indexing. Plus there's risk that selling *after* price declines may mean buying near the top, and selling near the bottom, with a consequence of poor absolute returns.

Because the problem seemed rectifiable within days, we didn't contemplate removing ZOLT at Index rebalancing. Indeed, the next week, their revised 10-Q filing was accepted and their stock rebounded; with the full SEC compliance their symbol returned to ZOLT.

Zoltek's growth in wind blade material had made it remarkable to clean energy, and so to the WH Index. The growing wind industry is moving inexorably towards larger turbines, needing ever-larger rotor blades. In 1994, average capacity of the turbines from Germany was about 250 KW. In 2004, it was about 1,700 KW (1.7 MW). Presently, wind turbines have blades roughly 60-100 meters in size, and they're only becoming larger. As 1.5 MW, or 3+ MW and larger machines develop and blade lengths grow past 150 meters like on 10 MW+ turbines, then carbon fiber can be a material of choice to stiffen and lighten blades standing many stories high. Already a 10 MW offshore turbine with a 160 meter two blade rotor blade is being contemplated (and that too, may some day seem small).

Adding in lightness also helps. At Vestas, of Denmark, they reduced the mass to only 12.6 tonnes (British units) in their newer 59-meter blades. Using a wood+carbon fiber epoxy, the total head mass (THM) is only 210 tonnes (nacelle is 145 tonnes, and rotor 65 tonnes). A lighter THM with transformer placed at the base permits less pricey towers, built on foundations that are cheaper and smaller to boot. In this way, cost-savings can snowball.

Here in the U.S., wind power's growth has followed every renewal by the Congress of the crucial production tax credit (PTC). PTC renewal for 2005 has recently pushed for a re-energizing of existing wind sites, and for growing emplacement of new ones. Given that a 45 meter turbine blade delivers about twice the power of a 30 meter one, and carbon is important in extending blades to 45 meters and beyond, ZOLT has been notable for ECO.

Importantly too, ZOLT stock is moved by news of its wind blade sales. This was clearly seen following its \$80 - \$100 million sale to the largest wind firm, Vestas. And ZOLT stock rose again on announcement of another agreement to supply carbon fiber and CF-related materials for blades, to Gamesa Eolica's Spanish unit, Fiberblade, worth \$65 - \$75 million. Because newly-installed wind capacity has been growing by some 20%/year and larger machines are increasingly helped by the carbon fiber product, Zoltek's success in becoming a major carbon supplier for wind rotor blades made it Index-appropriate.

We note that while Gamesa is the world's second-largest provider of wind turbines using carbon-reinforced blades, Gamesa itself isn't a candidate for potential inclusion in ECO since it's not traded on major U.S. exchanges per Index Rules. But, because Gamesa (like Vestas) is growing its U.S. wind presence, at least 'capturing a piece of wind growth' by including Zoltek in ECO had some attraction. Lastly, while ZOLT may also grow revenues from an increase in their sales of aircraft brakes parts (due to loss of competition there), that aspect is not relevant to us at the WH Index. We are, though, interested in growing carbon sales of parts for 'lightening' vehicles significantly, since that application substantially increases fuel efficiency improving energy conservation.

In other news, a thornier issue arose with regard to Magnetek (MAG), a component of the WilderHill Index in the 'Power Delivery and Conservation' sector. That company sells their 'Aurora' line of inverters changing photovoltaic solar DC power into AC such as for homes, business etc, They also make wind and solar multi-input inverters as well as converters for wind; they sell small and large fuel cell inverters too, which may be interesting should that field ever come to fruition. They've sold some of the latter for use on UTC (United Technologies) approx. 200 kW fuel cells, and they make inverters for approx. 50 kW microturbines in military applications. All that renewables experience is notable, since inverters for alternative wind, solar and fuel cell power must be especially sophisticated – for instance correcting extremes for variability and frequency. MAG is rather well suited to the universe of candidate clean energy companies for ECO.

The issue for the WH Index, however, arose from a patent infringement case that was decided against MAG by binding arbitration May 4th. That \$23.4 million judgment against MAG was large. The outcome was unexpected by Magnetek's management, both for the decision going against them, and the large size of the award. Potential risks in litigation had been noted by the company, as is commonly done in prior annual reports. Yet, this was very significant for the company. On the one hand, viewed optimistically, the case regarded a product that MAG no longer sold, wasn't core to its clean energy business, and MAG has sufficient size and options, that bankruptcy wasn't an immediate concern.

But unlike the 10-Q filing issue at Zoltek, this problem for MAG can't go away as readily or soon. The company generally didn't keep sizable cash assets on its books, and MAG was unable to meet a 10-day payment schedule. The result was significant impact on MAG share price, still evident as of June. As an Index Provider, a major concern for us is that MAG must remain significant to clean energy. We've noted that problem wasn't directly related to their clean energy technology, and MAG is solvent. We do however monitor for the \$50 million market capitalization Index Rule; MAG stock must remain above that floor as a Quarterly average. Any stock that does not is removed at rebalance. The issue is fluid at this rebalancing. It may resolve itself, should MAG announce a payment agreement among all parties – potentially, their share price may rebound. If this issue lingers through next Quarter, it may be addressed in the Q3 Index Report.

Additions of IRF, ORA, CREE, to the Index

Three additions to the WilderHill Index in 2005 Q1/Q2 are next notable: International Rectifier (IRF), Ormat Technologies (ORA), and Cree (CREE).

IRF makes chips and systems emphasizing energy efficiency. These are used in products from air conditioners, lights, cars, electronics, to big industrial motors. Their integrated platforms help save energy in appliance motion controls, such as optimizing speeds at which washing machines spin clothes in wash cycles. Their IC electronic ballasts in lights can deliver energy savings over magnetic ballasts, and MOSFETs and components are used in hybrid cars, new 42-volt systems, and in power management, AC to DC, or DC to DC conversion and so can offer energy efficiencies for many diverse products. They also participate in a consortium for energy efficiency based in China, where much of the world's white goods are produced, and increasingly consumed. An emphasis at IRF on power-management has helped boost gross earnings by 44%. That growth was preceded by the company's move away from making simply commodity parts, and into proprietary innovative technologies for conserving energy. This has partly become their 'brand'.

Next, was adding Ormat Technologies (ORA) to the 'Renewable Energy, Harvesting' sector of the WH Index. This company has decades of experience in capturing heat, to make power. Their plants from 200 KW to 130 MW use geothermal, or waste heat capture (recovered energy generation); they also operate in biomass and solar. They now have geothermal plants in several countries and are expanding. Their work too in recovered energy cogeneration is an example of industrial ecology (such as their plant in Louisiana). They make gen sets built around sealed Rankine-cycle engines; these are automated and suitable for remote applications, While the latter are the far end of what we desire for Index components, since they can (as with microturbines) be fueled by various 'dirtier fuels' like natural gas or even LPG, or diesel, we added ORA to ECO *for* their geothermal and waste-heat capture – and *despite* their less-pertinent devices that could use non-renewable, 'brownier' fuels. Given the value of geothermal in generating power without greenhouse gases or other pollutants, and sometimes in finding a middle ground on the Index (we cannot let 'perfect become the enemy of the good'), we added pure-play ORA.

Another addition is Cree (CREE), which rather like IRF, helps to conserve power: hence it is also in the 'Power Delivery and Conservation' sector of the Index. They manufacture semiconductors including most notably light emitting diodes (LEDs) and utilize silicon, silicon carbide, gallium nitride, and related compounds. For 2005, they aimed to double their LED production from the year before. In 2004, their revenue increased 34% to \$307 million; gross margins grew 48% with cash flow from operations ~\$152 million.

Their high-power, super-bright, energy efficient LED may lead towards applications in clever new devices like better lights, solid-state illumination appliances, automobile headlamps, displays, etc. It's perhaps surprising, but they state about 20% of energy use in the U.S. is for lighting; this doubtless is an area ripe to enable energy efficiencies (especially when one considers still-dominant incandescent light bulbs are mainly little heaters, requiring additional air conditioners to counteract consequences of their sparse output in the visible spectrum and so running hot). Cool white LEDs do not have such spurious output and are indeed far more efficient at lighting overall.

Some customers are using CREE blue LEDs in combination with phosphors, to create desired white light. In response to keen demand for high-power LEDs, their larger LEDs are about nine times larger than industry standard producing ten times more light; as packaged products these operate in the useful one-watt range. Other LEDs are designed for a 1/2 watt power range. While CREE also has other products like near UV Laser diodes for DVDs with shorter wavelenths that may allow higher data storage than red Laser diodes today (proposed blu-ray DVD's are significant here) – it's their work in LEDs and thus an important new clean energy technology that brought them into the Index.

Consider an article in *Science*, "The Spectre of Fuel-based Lighting" (27 May 2005, p. 1263) for potential benefits of solid-state, white light-emitting diodes (WLEDs) as in populous India and China. The enormity of this is difficult to grasp from the vantage-point of wealthy nations, but consider that one in four people – 1.6 billion globally, are without electricity today. In China, 20,000 villages are without power. In India, nearly 600 million people go without power. Many still need illumination at night, sometimes for eye-straining matters by candlelight, or using wick and fuels like kerosene. Classic candlelight is exceptionally dim and inefficient: industrialized nations now provide illumination on the order of 500 lux, yet a wick lantern offers only 1 lux at one meter.

The consumptive penalties of wick-based fuels add up. In aggregate, fuel-based lighting uses about 1.3 million barrels of oil per day. Annually, a wick lamp gives 12,000 lumen-hours, yet a 100-watt incandescent bulb does that in just 10 hours. Imagine then, poorer nations largely leapfrogging over incandescent bulbs, or even over relatively-efficient compact fluorescent lamps, to instead adopt WLEDs. The WLEDs have come a long way. Ten years ago, WLEDs gave just five lumens per watt. Today they're near 100 lumens using simple diffusing optics, and providing 10 to 100 times more light than a candle or wick light. An important thing too is these one-watt WLEDs can now be packaged with a small solar cell & AA battery, so they re-power over and over – and for free. Using 80% less power than a small compact fluorescent bulb, the one-watt solar/battery-powered WLEDs can be brought to market for about \$25, and used off-grid with ease. We use versions here at WilderHill/WilderShares, LLC, and are very impressed by the technology.

The economics are starting to make sense. Currently, costs of fuel-based lighting are very significant to Earth's impoverished people, at about \$77 per household equivalent. Solar WLEDs could pay for themselves in a year or less. Afterwards, the fuel savings (in the payments for fuel foregone) offer an annuity roughly equal to one month's income over every year, for a startling 1 billion people living on less than \$1 dollar per day. But, on current trends if poor populations instead adopt wasteful incandescent bulbs, and forego soft energy paths, then greenhouse gas emissions will rise sharply as well.

In sum, as energy conservation technologies like WLEDs come to be better understood, they'll likely be considered as simply making economic sense. Financially speaking, with clean energy companies so steeped-in-emerging technologies, some observers are a bit surprised to see P/E ratios for many equities within the WilderHill Index, are 25 or lower. For CREE it was 22; for both IRF and ORA it was 24 at the time of this writing. This perhaps indicates some (welcome) lack of froth in these technologies that's likely attributable to several factors, including importantly that most tech stocks are now 'post-bubble-bursting' in early 2000 (many indeed had P/E figures irrationally exuberant at over 100 then). There are also the more 'staid' utilities in the WH Index, large industrial gas makers, and some stocks within traditionally less-speculative sub-sectors.

Solar news and the WH Index

Moving to solar, which is a major component of the WilderHill Clean Energy Index (ECO), there's some interesting news here. In the course of 2005 Q1/Q2 (and especially before, during 2004 Q4) the market capitalization of WH Index component Evergreen Solar (ESLR) rose notably. Some general, and some technical factors may have contributed to this. A leading cause is that their sales increased rather a lot, especially in Europe (ESLR sells 2/3 of its modules in Europe) and Evergreen simply participated in this like other pure-play solar PV makers. A second factor unique to Evergreen, is that its special string ribbon™ process makes laser-cut silicon wafers from Gemini II furnaces at half the thickness of competitors, under 150 micrometers. A result is that only one-third as much silicon is needed for their PV wafers processed into solar cells and panels. ESLR estimates they can produce about twice as many wafers, per ton of silicon, as competitors.

This is an issue in the solar industry globally now, because of shortages in the silicon that's needed to grow new facilities and production lines. Like when there's an absence of the tax credit for wind power, or when poor transmission capacity slows wind power, the lack of silicon has been an unneeded obstacle that's now hindering PV.

With its ribbon capability and desiring to open a European facility, ESLR contemplated whether to build a factory there at a cost of \$100MM, or find a partner in Germany. It chose the latter. In Q1/Q2 they announced a new joint venture with large German solar PV maker Q-Cells AG. This combines scaling-up skills, module efficiencies (suited to high latitude sites) of Q-Cells, with more efficient silicon manufacturing of ESLR.

Interestingly for the Index, ESLR share price had already risen so fast and reached such weight (at around 6%) in a Quarter within ECO, there was some concern an inevitable regression to the mean and price correction at ESLR, may unduly impact the whole Index. However this highlights another facet special to Indexing: all components must be left to reach their own level, without Index managers trying to guess an exact time to sell and so reduce position in that stock. Indeed rebalancing ECO each Quarter and a 3% cap helps prevent undue influence from any individual stock, which might otherwise reach double-digit weight in the Index. Ultimately, passive-management tends to perform well.

In our case, a different frustration felt in 2004 & 2005 was over an inability to include stocks listed outside the U.S., particularly German solar PV makers. Because Index Rules require component stocks be listed on major U.S. markets (NYSE, AMEX, NASDAQ NM) and have adequate trade volume, we were prevented from holding them in a time German solar was thriving. For instance Solar World AG is expanding wafer capacity from 120 MW to 150 MW. Solar-Fabrik AG went from 17 MW, to 40 MW of capacity. Alfasolar GmbH was 4.5 MW in 2004 and aims to expand to 20 MW (if it can get the silicon supply). Heckert B.X.T. Solar GmbH made 5 MW in 2004, and aims to grow to twice that in 2005 (with enough silicon). Well-known Q-Cells grew from 48 MW of capacity in 2003, to 150 MW capacity in 2004 (its production too was limited by silicon supply). Despite silicon shortages, stock performance of European PV makers was remarkable in 2004-2005.

Yet, silicon shortage may mean opportunity. One component held in the Index, Energy Conversion Devices (ENER) makes thin-film solar PV modules made of amorphous silicon that allows them to make more panels despite shortages faced by others (but overall

profitability there has been an issue); their subsidiary, United Solar Ovonic, seeks to expand capacity. As noted, ESLR is robustly growing; they're planning 40-50 MW more capacity with the Q-Cells venture to perhaps start producing around 2006. And Belgian company Photovoltech makes both regular cells and fascinating new cells with backside-contacts only; this importantly allows high efficiencies (>17%) since contacts on the front of panels are absent. That permits more sunlight/photons to directly reach each cell. For 2006, they'd like to increase their PV manufacturing capacity to 75-85 MW.

This silicon shortage now vexing PV makers may be rather short-lived, perhaps lasting one to three years. The PV industry normally buys its surplus silicon from semiconductor manufacturers: they produce roughly 30,000 tonnes per year. In 2004, however, a third of this supply went into producing a surprising 1 GW of solar PV. Such tight markets were not foreseen, by the few producers of high-purity-grade silicon. Overall, this situation is a bit ironic since silicon is widely found on Earth, and surely can be remedied as production ramps up. At any rate, making PV more efficiently is always a good outcome.

Solar PV growth so far is most concentrated in Europe, the U.S., and Japan. The leading PV maker at present is the Sharp Corporation. They've grown from 197 MW production in 2003, to 315 MW production capacity in 2004 and they're seeing strong demand for their products. (Our facility here at WilderShares, LLC is solar powered: we use 3.85 KW of Sharp PV plus a matched 3.5 KW three-string inverter). Sharp's growing robustly in 2005 as well. They might have been a candidate stock for the WH Index, since they do have an American Depository Receipt (ADR) on U.S. stock exchanges, but that ADR doesn't have sufficiently volume & liquidity to be an Index component. Japan's MSK Corporation is a lead supplier of solar modules as well, but isn't an available stock for the Index.

An alternative company for the WilderHill Index, and one we indeed have in ECO, is the Kyocera Corporation (KYO). They've opened a facility in Mexico and are opening one in Czech Republic to help ramp up PV production further. In 2004, they made 110 MW of cells and modules; they plan 200 MW output total in 2005 and aim for 240 MW, or doubling of production capacity by this August. They're concentrating on making thinner wafers and getting higher PV conversion efficiencies; KYO believes they may be the only full-integrated manufacturer producing all of their products internally. That integration captures much of the solar industry, and it helped make them a candidate for ECO (despite the substantial business of KYO outside clean energy). Japan's METI aims for 4,820 MW of nationally installed PV by 2010, for 29% annual growth rate since 2003.

In the U.S. an important PV maker has been BP Solar, and it deserves a word for (perhaps surprisingly) not being in the WH Index. In its own right, BP Solar is a major renewables player: they seek to double capacity, from 90 MW to 200 MW by end of 2006. Their 2004 solar revenues of \$400 million are about 30% larger than 2003. And importantly, they're on track to deliver profits for the first time, recouping years of R&D plus other expense. They're thus notable for not being eligible for ECO. The basic reason for this, is since their solar aspect is a small subsidiary of a very large oil company (BP), their inclusion is prohibited by WH Index Rules, which disallow companies primarily in fossil fuels.

The Rules similarly prohibit Shell Oil from inclusion in the WH Index, despite that oil giant renewables work. However, the Rules were crafted in such way that subsidiaries of conglomerates (like SunPower in Cypress Semiconductors, or Kyocera solar in that large conglomerate) can potentially be included, if then parent company isn't deeply involved

in activities antithetical to clean energy (hence mainly the fossil fuel giants are excluded). In addition, the work that the subsidiaries are doing must be strongly in clean energy, and must be a sizable & growing percentage within the parent corporation.

An interesting example is SunPower that was added to the Index for 2005 Q3. As noted, they're a subsidiary of Cypress Semiconductors (CY) which three years prior had bought the foundering SunPower, at initiative of Cypress CEO and founder, T.J. Rodgers. CY then invested \$110 million in the solar cell-maker, and now their products released in October 2004 are starting to see some significant demand. For this year, SunPower has \$100 million in orders, and \$200 million more in orders are booked so far for 2006. Part of the interest stems from their unique PV panels: the contacts for the chips (solar cells) are all embedded on the backside – rather than being on both sides as most all other PV cells. This backside-only technique provides advantages: they're more efficient at 18.3% for panels (21.5% for individual cells) since more sunlight reaches the cell rather than being blocked by thin grids on the front of other makers' chips. For instance, Sharp panels on the roof of this building where I'm writing (powering this computer), are quite good at a measured 14.2% efficiency, yet they're eclipsed by newer panels from SunPower.

To be sure, Sharp has achieved higher figures for PV in the laboratory but like most competitors, Sharp commercial PV products are behind SunPower. Another SunPower advantage is their panels have an attractive all-black look, unlike a modular-appearance common to PV panels clearly showing the wafer cells in grid. All-black panels can be aesthetically pleasing and as more efficient to boot, there's little surprise CY is seeing growth at SunPower. They also make new inverters carrying a longer 10-year warranty; these sorts of improved solar products can move CY stock. Like with KYO, CY does not now represent a solar pure-play within the Index to the extent of an ESLR, but these three solar companies are each useful in the 'Renewable Energy, Harvesting' sector.

Recently, SunPower decided to expand its factory line in the Philippines. They'll double production capacity to 50 MW within a present building, and the current capacity has notably sold out. Helpfully, that 225,000 sq. foot facility has room to expand capacity to 100 MW. This allows them to produce roughly 32 million wafers per year.

Another solar component in the Index that should be mentioned is Emcore (EMKR). In terms of efficiencies, they make exceptionally-high achieving cells: their 27.5% advanced triple junction PV is designed to power commercial satellites in space. Obviously it's a cost-is-no-object application, yet the know-how they gain may nonetheless have profitable implications in the broad solar industry. A downside for EMKR, as an Index component, is that they're unusually dependent on business conditions in the space satellite industry, rather than more common growth in PV on roofs. An interesting aspect to EMKR too is that they've been partnering on semiconductor LEDs with GE, since 1999. Their 'GELcore' effort is developing 1-watt high-brightness, light emitting diodes (HB-LEDs; rather like at CREE) which has important technical energy-saving potential.

Another component of ECO relating to solar, and in the 'Renewable Energy, Harvesting' sector, is Distributed Energy Systems (DESC). Unlike ESLR, DESC isn't a solar-manufacture pure-play, yet neither is it like CY, EMKR or KYO as part of an unrelated conglomerate. Their key subsidiary Northern Power is in solar, and in wind, but parent DESC is notably directly working in clean energy and hydrogen a number of ways. About 80% of DESC

revenue comes from Northern, which accounts for roughly 180 of the 300 employees at DESC. Most work at Northern is involving on-grid applications, the rest is off-grid.

Northern utilizes components made by others, to design, build, and install integrated power systems. These may use renewable wind, solar, biofuels, etc. (Fossil fuels can be part of the mix, such as oil and natural gas at some installations). We've noted their distributed generation power systems are available now, and clearly producing profits such as solar and wind. DESC also owns Proton Energy that works in hydrogen and fuel cells. We regard the latter two areas as highly speculative. Yet parent DESC is one way to obtain exposure to solar & wind via distributed generation, as well as to H2 and fuel cells. In Q1/Q2, ESLR, EMKR, DESC all contributed at times to upside pull on the Index.

At DESC their key revenue-generator is subsidiary Northern – a unique case wherein the parent company is perhaps more the speculative 'green energy play' than the subsidiary. At WilderHill, there's no set quantitative threshold wherein the subsidiary must be 'x-percent' of a non-green energy parent company, in part since we've looked at a number of subtly complex situations. But it is important to us that progress at the clean energy subsidiary be able to move stock price of the parent company, and in meaningful ways. That too means that companies like BP and Shell cannot be considered for the index.

The importance of a subsidiary company in clean energy being normally able to clearly move the parent company's stock, has meant General Electric (GE) is prohibited from inclusion, as well as Siemens. Yes, GE is world-class with growing presence in renewable wind, solar and in a number of other clean energy fields: they're a real leader here.

Yet GE is so big, that even major items like its 1,000 MW wind project heralding them as the North American leader in wind, or their being the major U.S. turbine manufacturer, or their selling 3,000+ 1.5MW turbines globally, or benefiting from a weak dollar in new overseas wind sales, simply do not move their stock much at all. Likewise, their solar efforts, or 'ecomagineering' launch with relevance to clean energy had little impact on their stock price. For purposes of a Clean Energy Index, wherein we seek to capture and track fortunes of this sector, to include GE will dampen the responsiveness of the index to daily conditions specific to this sector. We were contacted by GE shortly after the Index launched as to why they weren't in it; as we note, should GE spin-off its sizable wind, solar and clean (non-nuclear) holdings as a separate pure-play company, that might become a prime candidate for possible consideration in our Clean Energy Index.

In sum, the renewables growth such as PV in Germany has been remarkable; 2004 saw 300 MW of solar capacity at 100,000 installations, a 60% gain in sales. Much resulted from a feed-in tariff law of 2000 ('Erneuerbare Energien Gesetz'). And in the United States, initiatives at the state-level are starting to grow solar, like in California. In Asia there's growth, and government support as well. As noted above, and next below, global growth is strong too in wind power. As can be expected, this attracts keen interest in renewables worldwide. We thus note timely coverage of solar, wind, biofuels and other aspects of clean energy in "Renewable Energy World" magazine, from James & James in the U.K. Another useful source of information is NewEnergyFinance.com. We recommend both (but note the CEO at New Energy Finance also sits on our WH Index Advisory Board). These sources are handy ways to be up to date in this field daily, for those interested.

Superconductors

In superconductivity, a recent story in *Science* (15 April 2005, p. 348) aptly sums-up much news in 'New Wave of Electrical Wires Inches Closer to Market'. Noting that first-generation (1G) high-temperature superconductors (HTS) cost 100+ times more than copper wire, with little market penetration the result, it focuses on the developments in second-generation (2G) HTS. These hard-to-manufacture 2G wires are now made of Yttrium, Barium, Copper, Oxygen (YBCO) and a significant thing, is that recent advances are starting to enable 2G HTS to be made around 100 meters long, much better than one meter for past 1G. To reach 100 meters, researchers are much closer to being able to produce whole spools of reel-to-reel YBCO wire in long lengths – and at costs below 1G.

Because readily available liquid nitrogen could be used, instead of costly liquid hydrogen for cooling the 'high temperature' superconductors to 77 kelvin, 2G HTS may potentially find robust commercial uses, such as in special high-powered magnets like the magnetic levitation for trains, in powerful motors, and as noted in wires carrying great utility current without resistance. However, for desired broad use of HTS by utilities, a problem that's foreseen is that utilities are in an inherently conservative industry that does not seek first-mover advantage, nor experimental innovative technologies. (We note though a June announcement of HTS sold to a large utility in Mexico, which moved AMSC).

Should 2G costs ever be lowered enough to achieve real market penetration, and HTS grow to proven technology, then utilities may begin to move a bit towards adoption. The goal of the U.S. Department of Energy for 2G wire, is to carry 300 amps over 100 meters by 2006, and carry 1,000 amps over 1 kilometer by year 2010. Citing the work by American Superconductor (AMSC), a component of the WilderHill Clean Energy Index (ECO), that *Science* story points to nearly 30 meters of 2G HTS wire achieving 186 amps.

Interestingly, citing another company that's also a component of the WilderHill Index, the story looks as well at SuperPower, a subsidiary of Intermagnetics (IMGC). Here it notes 100 meters of 2G HTS carrying 100 amps achieved by SuperPower. The latter recently built a YBCO factory in Schenectady, New York for its wire-production, and hopes to begin producing as much as 1,000 kilometers of 2G wire next year. AMSC has raised \$45 million towards a "pre-pilot" production plant in Ayer, Massachusetts.

There's no certainty at all that any of these products will ever achieve cost reductions to make them profitable. Nor, that the two companies can even stay afloat through costly R&D to come. Worryingly, there's also subtle lack of interest by utilities in the possible product. That said, one function of Indexing is it helps to mitigate for single stock risk. For instance, if only one of several companies thrives, while all others fail, a misplaced single 'bet' on unprofitable ones could be loss-making. But with an Indexing approach – although here a tiny HTS basket of only two stocks – all are included in diluted form.

A word on superconductivity in the Clean Energy Index: as stated often, we at WilderHill believe that saving power through efficiency, conservation, and preventing unnecessary loss of energy can be as important as generating clean power in the first place. To paraphrase Ben Franklin, a 'watt saved is a watt earned.' Remarkably, a potential of 2G HTS to conduct power long distances without loss, or move trains without inertia-sapping wheel to metal contacts, or in super-efficient motors, are all means of furthering energy

conservation. Tied as it is with futuristic innovative ways to generate power cleanly in the first place, there's some natural affinity here.

On the other hand, with costs of superconductivity still 10 to 100 times too dear, rather like with fuel cells costs that are 1 to 2 orders of magnitude too dear, even though they certainly 'work': this part of the WilderHill Index is very, very far from economical today. Quite unlike wind-power stocks in ECO such as ZOLT (for its carbon fiber used in blades), or in SPI (for its PPM Energy wind farms, below), it's unclear HTS will go anywhere. Meanwhile, wind is profitable today and is growing strongly.

As superconductors illustrate, the WilderHill Index (ECO) tracks clean energy over a real variety of significant and relevant technologies. While new techniques like wind or solar are proven profitable today for manufacturers, other areas are highly speculative. This remarkable uncertainty produces sector volatility, and therefore Index volatility. Because we capture and reflect this sector, we do not shy away from volatility – but rather we expect it. We judge our performance, in part, by how closely ECO mirrors the fortunes of clean energy stocks – including both in their downwards & upwards movements.

Capstone

Looking ahead, Capstone Turbine (CPST) may potentially fall below an average price of \$1.00/share (or \$50 million market capitalization) over a coming Quarter: if it does, then the WH Index Rules will require its deletion. At this writing, CPST was just above that average floor. Because microturbines can (if desired) use 'brownier' fuels like propane, or kerosene, it's not a basic equity in the WH Index, in the same way pure-play solar, wind power, fuel cell makers etc, are core. On the other hand, their very small units (often stacked) can represent a cleaner approach to energy in certain settings. For instance they received an order from Soffimat in France for 2.8 megawatts worth of microturbines to be fueled by biogas. Using biogas that otherwise will have been flared at four landfills, is better reflective of the Index. In this case, Index Rules will determine the outcome.

The Thorny Matter of Nuclear Power, and 'Clean Energy' Stocks

In developing the WH Index, a thorny question early-on was if a company that's a leader in 'green' power, like wind, should be in ECO, if they also have nuclear-power exposure. For instance, should a leading U.S. wind power supplier like a utility with wind farms but that also owns nuclear plants, be an ECO component? Basically, the views expressed at our Board have fallen into three camps: one holds that nuclear power whatever its faults, doesn't produce carbon dioxide, or conventional pollutants; thus incidental presence of nuclear shouldn't prohibit a stock from ECO. Plus if climate change becomes of greater importance, then all zero-carbon options anyway should be reviewed anew.

A second viewpoint also expressed strongly, stated that equities with any nuclear power at all absolutely should not be considered for the Index – even if incidental to a company with otherwise brilliant wind, or solar assets. As Board Members taking this view argued, reasonable expectations will be that there should be zero nuclear exposure in a "Clean Energy Index". Further, they emphasized radioactive fuel security / terrorism concerns, the waste dilemma, and the fact one catastrophe might render billions of dollars of

capacity into costly liabilities. They pointed out how far removed costly nuclear plants are, from distributed wind or solar generation that's easily made renewably.

Basically, a third viewpoint was also highly skeptical of any nuclear within ECO, even if in a stock with also exceptional wind-generating capacity. But rather than be as absolutist – they'd instead look at the matter on a case-by-case basis. This third view, mindful of a thorny scientific debate over nuclear and also strongly biased against it, characterized the consensus position taken in early decisionmaking for the WilderHill Index.

Over time, however, and prior to launching the ETF fund (PBW) tracking ECO, the Board's consensus hardened against allowing any incidental nuclear power, even where the utility is America's wind power leader. Thus Florida Power & Light (FPL) - the lead supplier of wind power in the United States (owning 3,100 MW and 40% of the installed wind base), an equity in ECO backtest history - was deleted (along with DTE) from the Index in 2004.

By 2005 Q2, one equity remained in the Greener Utilities sector with nuclear exposure. This was Central Vermont Public Service (CV) and due to its partial (1.7%) ownership of one nuclear plant. In addition, however, nearly half the of the power supplied by CV was nuclear-generated, but it came from outside plants they didn't own or manage. CV had severed other past nuclear-ownership: they were in ECO mainly for their notable biofuels work including innovative "cow power" and for their subsidiary, Catamount wind, which was increasing its wind power while divesting non-wind assets. At the March 2005 launch of the fund (PBW) tracking ECO, that equity was the sole 'nuclear' aspect in ECO.

We'd received many unsolicited comments regarding nuclear - both strongly for, and determinedly against it. After considering this matter at length, we decided by consensus that while their work at CV on biofuels and wind was pertinent, we should eliminate all exposure to nuclear, by deleting the last equity. We did so for the 2005 Q3 rebalance.

In sum, we will not include wind, solar, etc components that also own nuclear power plants. Nuclear ownership has been excluded from the WilderHill Clean Energy Index.

The Greener Utilities (GU) sector, 2005 Q1 & Q2

As might be inferred from the discussion above, some of the most difficult compromises we've faced were in the Greener Utilities (GU) sector. Though a thorny sector today, GU may see growing significance in years to come. We expect renewable portfolio standards (RPS) could one day lead utilities to supply more 'green power' – and their stock prices may then better reflect the state of clean energy production. But that day has not yet come, and so today, GU is the least-weighted Sector at only 5%: there's two stocks @2.5% each as of 2005 Q3 rebalancing, reflecting a lack of substantial clean energy here.

One of two stocks populating this sector, at the 2005 Q3 rebalance is Idacorp (IDA). They own and operate 17 hydroelectric plants; IDA also owns one gas-fired plant, and it has a partial-interest in three coal-fired generating stations. We do have preference in the WilderHill Index for stocks reflecting scaled-down *micro*-hydro, given the small-scale there and low impact for marine biodiversity. (At the scale of utilities, this renewable energy source notably involves substantial hydrologic and so ecological impacts). IDA has engaged in hydrogen and fuel cell research as well. They own no nuclear plants.

The other utility stock that populates GU is Scottish Power (SPI) due to its wind power and its U.S. subsidiary, PPM Energy. In 2005 Q1, we removed the largest wind provider utility in the U.S. (that was FPL, taken out because of its large nuclear exposure as noted above) – and replaced it with SPI, as roughly the next largest wind provider and a utility free from nuclear ownership. The switch was far from perfect: problems included SPI's large carbon-laden portfolio of coal, etc (besides the more benign CCGT natural gas); also wind and PPM comprise relatively small parts of SPI power overall ('nuclear-generated electrons' may travel their grid in U.K. due to Britain's national system).

Because SPI is a growing wind provider which doesn't own nuclear plants, and has adequate trading volume in the U.S. via depository receipts, SPI represented potential exposure to wind portfolios in the U.K., as well as PPM Energy (and PacifiCorp) in the U.S. Overseas, SPI has for instance wind farms of 30 MW at Beinn and Tuirc in Scotland, 15 MW at Barnesmore in Ireland, 45% stake in the 9.6 MW at Coal Clough wind farm in England, and joint ownership in Penrhyddlan & Llidiartywaun 30.9 MW wind farm in Wales. While these aren't grand on scales of largest utility generation (i.e., think of a 1,000 MW nuclear plant) and are smaller than PPM's newer big U.S. farms, they are significant as the 'thin edge of a wedge' as wind generation ramps up.

PPM Energy is a subsidiary of SPI and is a competitive energy business in the U.S. It owns output of a sizable 263 MW wind farm at the Washington/Oregon border. It also has a 484 co-generation CCGT (combined-cycle gas turbine) plant with net efficiencies of 55%; a more common CCGT plant fired by natural gas is only of some note to us, but we were impressed waste steam is used nearby in wood-products manufacturing, as industrial ecology (IE) and pollution prevention (P2). Often in clean energy, preventing pollution and conserving in the first place, makes economic & ecological sense. Moreover PPM is aiming to create of 15-20 new renewable energy projects in the near/mid-term. They are growing green energy expertise too, that may generate profitable consulting.

Notably, SPI had had a third major segment, PacifiCorp, which we found an interesting business when we were first contemplating adding SPI to the WilderHill Index. PacifiCorp is a regulated utility (unlike PPM) that retails power to ~1.5 million people. It produces 8,300 MW and has growing carbon-free wind, hydro, and geothermal – but as expected, those renewable sources are far overshadowed by its carbon-laden coal plants.

We were more intrigued by the SPI targeting investments in wind, and in PPM, than in PacifiCorp alone. This is worth noting, since in May, it was announced Warren Buffet would be paying \$5.1 billion cash to buy PacifiCorp. No purchase so large, had been made by Berkshire Hathaway since 1998, when they bought Swiss Re for \$16 billion. Here, MidAmerican Energy in Iowa, will be the holding company taking also \$4.3 billion in debt (MidAmerican is notably growing its wind assets in Iowa and elsewhere). Buffet is rather closely watched, and known to hold onto assets for the long-term (and SPI may not have been getting the returns it hoped to see). A sale of PacifiCorp didn't warrant deleting SPI from the Index, since it's incidental to PPM and to other SPI holdings in clean energy.

SPI has stated that they will give new attention to PPM. They are buying the 150 MW Shiloh wind farm in California, and as added 574 MW of new wind capacity assets are anticipated for SPI in 2005. Their total may reach 1,400 MW by end of 2005.

A less happy event, however, in the GU sector in 2005 Q2, was a sharp drop in the share value of Calpine (CPN). Although CPN had been in the Index for some time due to its relatively large geothermal holdings, a member of ECO Board previously was mindful CPN debt might create excessive overhang. Unfortunately, as it turned out, the price of CPN indeed plunged in May 2005 perhaps over debt concerns - impacting the Index.

This unusual case highlighted two issues that we normally will only consider tangentially. One was the outsized compensation package paid the CEO at CPN. Another was their large debt. In general, our mission is to focus on clean energy technologies at candidate companies. Yet a dilemma was at what point governance issues may potentially argue for a stock to be dropped from ECO, apart from clean energy alone. The 850 MW 'Geysers' project at CPN was significant as being large for geothermal; on the other hand, that one well-publicized resource was dwarfed by their huge non-renewable energy portfolio.

In 2005 Q2, Ormat Technologies (ORA) was added to the Index and put in the 'Renewable Energy, Harvesting' sector, providing significant new 'pure-play geothermal' exposure. A question posed in Q2, was whether arguably the less-compelling geothermal story as a small part at CPN – combined with some attention to their debt and governance issues (and erratic stock activity) – were enough for potentially removing CPN at the rebalance. As stated, we focus on a company's significance for clean energy, their technological influence here, impact for low-carbon solutions, and relevance to preventing pollution in the first place. Stock performance is not the major criterion. Index Rules will remove a stock below \$1.00/share, or a \$50 million cap Quarterly average – but that was not applicable here. Here, relatively greater relevance of ORA as a geothermal pure-play, and secondary issues of governance, led the Board to look at removing CPN for 2005 Q3.

Website Stability and Development

In the past 2 Quarters, the service provider hosting the Wildershires.com website had two general downtime events through their system, of more than 60 minutes each. One case resulted from a node failure; another was from DDoS protocols instituted across their servers. Their servers also suffered some brief but non-negligible outages, lasting several minutes apiece. We richly value robust stability in our website, and will thus monitor this status to confirm they improve that stability in months ahead. While all instances of downtown at the wildershires website are significant issues (to us) – importantly, these do not impact the WH Index in any way. Also, an innovative solar PV monitoring system we've incorporated into our website is performing satisfactorily, and we hope it's of interest: we welcome comments on our website. Finally, all Index calculations for ECO are done via AMEX, completely independent of our website.

Environmental Conservation, and Marine Biodiversity

We're proud of our expertise crossing environmental policy, renewable energy, climate change, and marine biodiversity, which were essential heritage to the WilderHill Index. As the Index grows, we feel our broad technical expertise across disciplines including renewable energy, policy, mathematics, finance, engineering, ecology, law, and complexity theory, will further this exciting work.

Synopsis for ECO, 2005 Q1/Q2

A major event in this period was the launch of a tracking fund for ECO, the PowerShares WilderHill Clean Energy Portfolio (PBW). That marks the first opportunity to trade ECO, and the start of PBW on March 3, 2005 should help grow attention to the WH Index.

An interesting but small coincidence worth mentioning, is the new fund (PBW) closed its first trading day with the Index (ECO) at nearly the same number, as it had started the year January first: at 166.2. Thus, the year-to-date figures for 2005 will be similar for both ECO and PBW, despite PBW having a starting date three months later into the year. One other small coincidence is the first day of the year – and PBW launch – followed a run-up in the Index; each was near a temporary high and followed by brief declines.

For ECO in Q1/Q2, notable factors included downward price pressures exerted by CPN, an arbitration award against MAG and its pricing decline, stock declines generally in fuel cells especially after run-up in 2004 Q4, and lastly the late Q2 move upwards. Some of the upward pressure was exerted by ESLR from its growing solar PV production and sales, also from ITRN, EMKR, and DESC. Introduction in the U.S. Senate of an energy bill with many incentives for renewables, may have added to upward pressure in Q2. Overall the Index mainly declined sharply the first Quarter. This continued into the first half of Q2, and was followed by upward movement in latter half of Q2 for a slight gain there.

Conclusion

We appreciate and welcome your suggestions and feedback. We review ideas that are sent us regarding the Index, may discuss them in staff meetings, and are always interested in ways we can further improve our service. As the Index provider, we always pay attention to refining the WilderHill Clean Energy Index (ECO).

Sincerely,



Robert Wilder
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Disclaimer: The following is a reminder from the friendly folks at the WH Index who worry about liability. Performance figures quoted represent past performance only, and are no guarantee of future results. The views expressed here are those of just one of the managers of the WH Index. These views are not meant as investment advice, and they should not be considered predictive in nature. Any favorable or unfavorable description of a holding applies only as of June 30, 2005. Positions within the Index can and do change thereafter. Discussions of historical performance do not guarantee, and are not indicative of future performance. The Index covers a volatile sector, and thus is volatile too, and subject to above average changes in value.

*Following are Index weightings, at roughly 2 weeks before 2005 Q3 Rebalance:
After rebalancing, every stock floats according to its share price over a Quarter.*

WilderHill Index (ECO) Components as of: 06/14/05

Company Name	Symbol	% Weighting
Emcore Corp	EMKR	4.48%
Itron Inc	ITRI	3.81%
Medis Technologies	MDTL	3.55%
Quantum Fuel Sys	QTWW	3.43%
Scottish Power Ads	SPI	3.41%
Distributed Energy Sys	DESC	3.41%
Ormat Technologies Inc	ORA	3.33%
Maxwell Technologies	MXWL	3.31%
Evergreen Solar	ESLR	3.31%
Cree Inc	CREE	3.25%
Kyocera Corp Adr	KYO	3.13%
Plug Power	PLUG	3.05%
Intermagnetics Genl	IMGC	3.00%
Power Integrations	POWI	2.88%
International Rectifier	IRF	2.81%
Ultralife Batteries	ULBI	2.80%
Active Power	ACPW	2.79%
Fuelcell Energy	FCEL	2.78%
Echelon Corp	ELON	2.69%
Zoltek Co	ZOLT	2.56%
Energy Conv Devices	ENER	2.56%
Ballard Power Systems	BLDP	2.51%
Amer Power Conversion	APCC	2.44%
Hydrogenics Corp	HYGS	2.42%
Calpine Corp	CPN	2.41%
Capstone Turbine	CPST	2.34%
Mechanical Technology	MKTY	2.25%
Amer Superconductor	AMSC	2.25%
Idacorp Inc	IDA	2.16%
Uqm Technologies	UQM	2.10%
C&d Technologies	CHP	1.95%
Impco Technologies	IMCO	1.93%
Central Vt Pub Svc	CV	1.86%
Mgp Ingredients	MGPI	1.57%
Boc Group Ads	BOX	1.52%
Praxair Inc	PX	1.49%
Air Products & Chem	APD	1.47%
Magnetek Inc	MAG	0.97%