



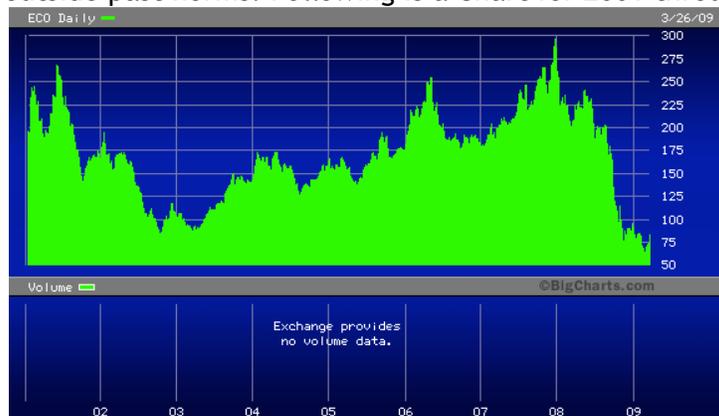
## Q1 2009 Quarterly Report: WilderHill Clean Energy Index<sup>®</sup>, March 31, 2009

First Quarter 2009 opened with the Clean Energy Index<sup>®</sup> (ECO) at 86.36, and closed at 77.46 for a negative return of -10.4%. Robust volatility commonly seen in clean energy has resumed, and Q1 was even more volatile than this end of Quarter loss implies. There were some indications in Q1 of a bit of possible resistance when ECO drops to points around 60; whether the Index breaks through that bit of ‘floor’ ahead and goes down further in Q2 – or builds up some consolidation (or even sees an increase) – will be of some interest.

Over all of 2008, or 4 solid Quarters, this Index had seen a pronounced downturn and that trend only saw a bit of slowing the very last 3 weeks of its 5<sup>th</sup> Quarter in late March 2009. At the same time useful past Non-Correlation as between ECO vs. the major Indexes has largely broken down in Q1 2008 through Q1 2009, as all dropped significantly as one. That this Index (ECO) is mainly composed of clean energy pure plays, which often move in ways quite different from the Dow Jones, S&P, & Nasdaq Indexes has made no difference. Across most asset classes, the story has been pretty much the same. Big declines are being followed by sharp drops, interrupted only by brief bear-market rallies (traps) that lack conviction. Certainly from September 2008 through March 9<sup>th</sup> that’s been the case.

Whether it is commodities or equities, real estate or bonds, art or other assets, a once very-helpful non-correlation that normally separates different investments just fell away – in its place came demand destruction & a prolonged hugely painful credit crunch. Tremendous wealth has evaporated along with risk appetite: animal spirits went missing. Lately a specter has shifted from fear of vexing Deflation nearer-term, to a fear that thorny-in-its-own-right-Inflation comes a little farther out as a consequences of deficit spending, quantitative easing and essentially printing dollars eventually takes hold.

This simple Chart of ECO from 2001 tells a story in clean energy. Over the last 6 months all markets and surely a clean energy sector (hence ECO) which as we oft say can and does ‘drop like a rock’, showed little other than an exceptional volatility downside even outside past norms. Following is a Chart for 2001 through late March of 2009:



In sum, *losses* have dominated 2008-Q1 2009 so far. Alternatively *if* a recent slowing of the decline takes hold, March 9<sup>th</sup> *might* mark part of a *possible* bottoming process.

## **Another Promising Area for R&D: Better Batteries for Applied Clean Energy**

To shift our attention here from those equity markets broadly conceived, to technological R&D in clean energy specifically, we note a research finding by Byoungwoo Kang and Gerbrand Ceder of MIT published in *Nature*, **458**, 190-193 (12 March 2009), ‘Battery materials for ultrafast charging and discharging’. They report on a material that acts like a hybrid of supercapacitors that store/release *power* quickly (but with little *energy density* since power is only stored by adsorption reaction at a surface of electrodes) – And Lithium ion batteries that have far higher energy density by storing energy within the bulk of material but take very long to store the charge. By using LiFePO<sub>4</sub>, they see evidence importantly of joint fast ion-conducting surface phase that might allow both fast & a very deep charge/discharge. One might envision a longer duty cycle and calendar life too.

This is important because energy storage is a fundamental bottleneck in clean energy. From keen need for fast-charging, longer-range electric car batteries that may be cycled thousands of times, to storage of intermittent power from solar & wind for firm power, there’s a gulf between supercapacitors & batteries that if elegantly bridged, might open non-negligible opportunities. Should its patent holders advance that work from lab to commercialization, discharge rates of 10-20 s might be akin to superconductors(!) and in energy dense applications that may make the grid more robust to boot. See <http://www.nature.com/nature/journal/v458/n7235/abs/nature07853.html>

There are definitely applications where better battery range & greater charge/ discharge capability could see immediate commercial use: think of emerging electric vehicles (EVs). That superior range, faster recharge and exciting Vehicle to Grid (V2G) capability might flow from advanced battery chemistries helps explain new government support lately, with stimulus money targeting the development and manufacture of batteries in the U.S. A brief applied discussion of what better batteries could mean for real world electric cars + using solar PV for ‘fuel’ in day-to-day use is also offered for some color below.

## **Passage of the American Recovery and Reinvestment Act of 2009 (ARRA)**

In January & February 2009 a bill passed in the House, Senate (on close vote) and House/ Senate reconciliation that was so very great in scope, in most years numerous parts of it would have proved controversial and so difficult to pass. However being only ‘small’ parts within a huge ~\$789 billion landmark stimulus bill, those clean energy provisions saw pretty speedy debate given a great economic downturn that’s being faced globally.

The American Recovery and Reinvestment Act of 2009 (ARRA) may serve to move federal officials some way towards new U.S. national energy policy. Notably however that passage does NOT automatically mean stocks in this sector will advance; new entrants into the fields of solar, wind, energy efficiency, geothermal, electric vehicles, etc brings competition and pressure on profit margins. Feedstock can bottleneck as manufacturers ramp as one. Despite only sluggish demand, there’s been sizeable supply increases such as of PV polysilicon, while some U.S. stocks are priced optimistically already. Recent absence of credit can also raise execution risk and precipitate stock declines near-term – even while companies like in China grow. Yet look mid and longer-term, and the clean energy sector *could, possibly*, emerge with greater global strength than ever before.

The new law is important and we'll briefly review highlights from the bill's February 11 Conference Report, below. As stated in more normal times, major sections of that bill's language would be ripe for long debate in their own right, but with clean energy part of a pressing package, some parts arguably were given certainly less attention than usual. Fuller text of appropriations provisions from the February 11 Conference House Report (Obey) is found at: [http://thomas.loc.gov/home/h1/Recovery\\_Bill\\_Div\\_A.pdf](http://thomas.loc.gov/home/h1/Recovery_Bill_Div_A.pdf) And tax provisions in a bill can be found in detail on the government's Thomas.gov website at: [http://thomas.loc.gov/home/h1/Recovery\\_Bill\\_Div\\_B.pdf](http://thomas.loc.gov/home/h1/Recovery_Bill_Div_B.pdf)

\* Rather than Congress engage yet again in debate over renewing the Production Tax Credit (PTC), this Agreement recognizes the PTC boost to wind power and extends its sunset deadline from Dec 31, 2009 to Dec 31, 2012. This may help bolster investor confidence by pushing the placed-in-service horizon deadline three years out. By contrast in the past that yearly PTC credit was on occasion allowed to expire; new starts then immediately had slumped as a result. On the other hand, appetite for tax credits has gone off a cliff. Investors no longer have profits to offset with tax credits. As a result, 'tax equity' markets where credits were sold were eviscerated. This is exacerbated by demise of important players such as Lehman Brothers. Moreover one could argue the PTC is good, but it is not the only way to stimulate growth.

\* Another important item is an ability to claim the ITC (Investment Tax Credit) for wind in lieu of PTC only. Importantly this allows a project to get an ITC (that had been for solar only) as a direct single grant from the U.S. Treasury upfront – rather than a tax credit. Instead of waiting for production of wind power and then receiving a PTC at say, 2.2 cents per kWh produced, the bill allows an ITC lump grant providing 30% of a project's qualifying costs (though arguably a figure >30% would be better still).

Not just for solar, ITC now applies to wind, diverse geothermal, marine power etc and so redresses sparse interest in tax losses. It removes a past cap such as \$4,000 on small wind. On the other hand to extend placed in service beyond 2011, to allow local & state participation, and provide more transparent, speedy means of receiving payments could all help as well. China is moving ahead in many ways that can provide ideas, as could German feed in tariffs. But in a current climate in the U.S. where credit is nigh impossible to get, even those might be insufficient to bring growth now.

\* Plug-in Electric Drive Motor Vehicles received a credit; it also allows credit for the conversion of certain vehicles to electric drive. The battery electric vehicle (BEV) credit may importantly help stimulate creation from scratch of whole new industries and jobs over time, something especially important to a start up when credit is tight. And for a growing plug in hybrid electric vehicle (PHEV) market, it can help grow more jobs as entrepreneurs recognize the profit in retrofitting gassers too to more efficient, desirable hybrid electric drive. This is especially so if gas prices again go near \$5, and low-cost Li-Ion battery chemistries arrive that may give value in converting applicable hybrid or other extant gassers to superior plug-in capability.

Putting perhaps-the-too-abstract-sounding language above into a more concrete close at-hand situation, in our case we long ago put down a deposit on an electric car. To our excitement it was recently delivered and put in daily service, so these breaks matter(!).

Looking first at the Federal/State tax breaks on our EV, we might not have been able to afford it today but for these stimuli. Unexpectedly there's now a \$7,500 federal tax credit – plus a more foreseeable check from the State of California from an ongoing program. The latter is for \$5,000, very large because this EV has very big battery capacity at about 50 kW (those funds were gone but this program funds are being replenished). This combined \$12,500 cut is a sizeable % (and by far it was still the most I'd ever paid for a car). Since we won't be buying gas – we're solar powered and are now ever-closer to full payback on our six+ year old solar PV – the economics pencil out even better.

While for any government at all to provide any subsidies – whether for clean energy or for any other purposes – isn't a great thing is discomfiting plus 'rankles the libertarian in us', one must also ponder the state of the playing field. Undeniably coal & oil when compared with renewable energy, are both incredibly dirtier energy sources and our growing dependence on foreign oil in particular is harming U.S. national security to boot. Yet both those continue to receive many billions (trillions?) of dollars in subsidies. That if anything makes ramping clean energy more onerous than it would otherwise be. (Until recently buyers of heavy SUVs like Hummer or Escalade, actually received a tax credit of \$25,000 with subsequent proposals for raises to \$75,000 and \$100,000 per SUV, far more than for clean electric vehicles!). Remove ALL subsidies including for oil & coal and they'd be far more expensive now; clean energy without subsidies can then compete on a level playing field. If we avoid breaks for clean energy, fairness and patriotism arguably dictate removing them for dirty energy as well. But that discussion is outside our scope here.

Back to the bill, there's much more like new \$ billions and more from various bill sections for the U.S. grid. Arguably like highways, a better grid can deliver rewards for decades. America's renewables with a better grid can improve national energy security; together a new smart infrastructure, wind & solar + storage + HVDC transmission might for instance provide firm power at distance. Once again costs here are enormous – but so too are advantages, unlike the un/foreseeable ongoing costs of U.S. depending on fossil fuels.

Advanced batteries are a key aspect in the ARRA and it has \$2+ billion devoted to them. EVs in production and on roads now are helping move conventional wisdom forward from a past merely-theoretical 'if-only' musing that if only batteries today could allow EVs a range of 200+ miles (which is here now), or assuming desirable EVs are decades away, to recognizing EVs are real and better than imagined. Proven innovative chemistries with nanoengineering are boosting battery range / performance to much better levels than Pb-acid, NiCad, and NiMH of the past. It's now a matter of speedily moving EVs forward....

Even so the very best in batteries is still fairly nascent given this important technology. Plus the research done in U.S. labs years ago was put into commercial application not here, but in Japan, Korea, China, Taiwan, Europe etc. Like early solar & wind pioneered here yet allowed to atrophy, the U.S. lost its leadership in advanced batteries. Better energy storage is bound to become critical and clearly so for electric vehicles, so ARRA funds this area specifically. For example develop better electrodes within battery cells, and very large amounts of power could be charged/discharged at much faster rates. Indeed the President in March announced \$1.5 billion for U.S.-companies to produce batteries, \$500 million for related components such as electric motors, and \$400 million for electric infrastructure, charging stations and training technicians to service new EVs.

As one can tell these generous provisions within ARRA slice & dice clean energy in myriad ways. For instance plug-in electric vehicles (BEVs and PHEVs) are at times cited as getting a large \$2 billion in assistance for making better batteries, but the actual figures for ALL assistance may be closer to \$12 billion when one factors in arguably related provisions(!). Figure in for example the \$6 billion previously approved by 2007 EISA but not before funded, \$1.7 billion for “alternative energy investments” that can also be used partly for EVs, and credits for instance for EV purchases etc, and total figures for plug-in electric vehicles grows much higher than \$2 billion devoted to batteries alone.

We’ll just close out this ‘dry discussion’ by noting that two more very important aims are to 1) \*Improve Energy Efficiency such as reducing energy use in buildings and improving our current energy portrait – and 2) \*Significantly Expand Mass Transit & Energy Efficient Transport as both smartly get substantial funding. Perhaps of interest to some readers, the latter are core themes within two other Indexes that are relevant to, yet independent from WilderHill Clean Energy Index (ECO): they are WilderHill Progressive Energy Index (WHPRO), and Wilder Nasdaq OMX Global Energy Efficient Transport Index (HAUL). We parenthetically note more data on those two may be seen at <http://whprogressive.com> and <http://www.greentransportation.com>

### **A Recent Low: ECO Briefly Reaches Just Under 60 in March 2009**

Whether those billions in stimulus funds shall alter clean energy stock prices ahead in 2009 is utterly unknowable today. But what we can do is to take a look *back* at activity including a low back on Nov. 21, 2008, and we post a reprise of our Q4 2008 ECO Report. Moving on to a recent Q1 2009, consider moves up March 10<sup>th</sup>, March 23<sup>rd</sup>, & March 26<sup>th</sup>. First a *possible* (will it be false??) bottoming process began March 9<sup>th</sup> when ECO briefly touched down just <60. In something of a calendaring coincidence March 9<sup>th</sup> stands out as an inflection point too for those with long memories: it was then in 2000 that there was a near-close high for ‘Naz’: NASDAQ the next day hit all-time intraday high of 5,132. (March 9<sup>th</sup> is also a birthday for one of us here and so gets just a bit more notice).

March 9 could soon prove another ‘bear market rally’ with more declines coming in Q2 ahead. On the other hand a bolstering of a bottoming thesis came March 23, when ECO moved up +6 points (8.7%) to nearly 75, while the Dow moved up +500 points with the Nasdaq up nearly 7% that day. Clean energy has shown ability to go down with great vigor in 2008; that it might move up was shown too at least for all-too-three brief days in Q1. Following are sample closing percent moves up in that second up day in Q1, March 23<sup>rd</sup>:

#### **March 23, 2009**

WilderHill Clean Energy Index (ECO)	<b>8.75%</b>	Advanced Battery Technologies,	<b>6.60%</b>		
PS WILDERHILL ENRGY (PBW)	<b>7.17%</b>	Applied Materials, Inc.	<b>8.33%</b>		
WilderHill Progressive Index (WHPRO)	<b>7.96%</b>	American Superconductor Corpora	<b>8.79%</b>		
PWRSHRS WILDERHILL (PUW)	<b>8.10%</b>	AIR PRODUCTS CHEM	<b>1.27%</b>		
Wilder NASDAQ Global (HAUL)	<b>5.51%</b>	Amerigon Incorporated	<b>30.03%</b>		
PowerShares Global (PTRP)	<b>2.84%</b>	Ascent Solar Technologies, Inc.	<b>13.79%</b>		
WilderHill New Energy Global In (NEX)	<b>4.97%</b>	Beacon Power Corporation	<b>7.50%</b>		
PS Global Clean Energy (PBD)	<b>8.77%</b>	Ballard Power Systems, Inc.	<b>1.77%</b>		
NASDAQ Composite	<b>6.76%</b>	China BAK Battery, Inc.	<b>10.67%</b>		
Dow Jones Industrial Average	<b>6.84%</b>	Comverge, Inc.	<b>13.64%</b>		

CPFL ENERGIA SA ADS	5.86%	Universal Display Corporation	9.19%		
CALPINE CORP	10.82%	Plug Power, Inc.	18.67%		
Cree, Inc.	6.14%	PORTLAND GEN ELEC	3.28%		
COSAN LIMITED CL A	6.72%	QUANTA SERVICES INC	8.64%		
Echelon Corporation	8.70%	Quantum Fuel Systems Technologies	12.70%		
EMCORE Corporation	8.62%	Rubicon Technology, Inc.	5.04%		
Energy Conversion Devices, Inc.	7.03%	RASER TECH INC	14.33%		
Evergreen Solar, Inc.	16.79%	RENESOLA LTD	17.87%		
FuelCell Energy, Inc.	12.83%	Spire Corporation	19.35%		
First Solar, Inc.	8.85%	SunPower Corporation	10.37%		
Fuel Systems Solutions, Inc.	11.48%	SOCIEDAD DE CHILE SC	5.31%		
GUSHAN ENV EGY ADS	3.01%	SUNTECH POWER HLDGS	15.20%		
Ener1 Inc	6.84%	TRINA SOLAR LTD ADR	13.89%		
US GEOTHERMAL INC	10.00%	Ultralife Corporation	9.83%		
IDACORP INC HLDG CO	1.85%	Valence Technology, Inc.	7.74%		
INTL RECTIFIER	5.18%	Verenium Corporation	1.21%		
Itron, Inc.	7.30%	MEMC ELECTRONIC MTRL	10.75%		
JA Solar Holdings, Co., Ltd.	12.12%	YINGLI GRN ENGY ADR	10.08%		
Maxwell Technologies, Inc.	10.27%	Zoltek Companies, Inc.	7.75%		
OM GROUP INC	7.26%				
Ocean Power Technologies, Inc.	3.80%				
ORMAT TECHNOLOGIES	6.18%				

While in theory making an entry into clean energy at recent lows (with tracker PBW under \$6.00 or even near \$5.8) was possible, that particular window lasted just 2½ days. Of course as we repeatedly emphasize, the tracker may well drop below \$6.00 again and move strongly down far lower plumbing new deeper depths ... it's completely unknowable where true bottom will eventually be for broader markets, ECO (and its tracker PBW). (Using a 10 adjusted basis, the U.S. market has a still-sizable P/E of 12 and while that is now far down from 44 in 1999, it is still well above the low of 5 reached in 1921; so it is impossible to say that stocks are moving maybe higher because they are now 'cheap'). All *might* drop much further ahead. However staying *with what we do know*, we return to a perhaps plausible *potential* past bottoming process as seen for the Index tracker (PBW):



Looking at all March, a slowing for now *in the rates of decline* occasions 2 related points. One point is the distances that Indexes/ stocks are now at from 52 week Highs, are great; a second and related point is if/when there's an occasional 1-day move up these can, we see, be of some size even if soon reversed. We post some data below illustrating depths equities reached (compared to 1 year ago) in Q1 even after close on that 1-day move up March 10. Note the Column at far right: this shows **in red** the % Percentages then Down from 1-Year highs *after* a March 10<sup>th</sup> jump. Starting with PBW then down a significant **-73%**, so too is PUW down **-61%**, PTRP **-50%**, and PBD **-69%**. Thus even after the very first March move back up on March 10<sup>th</sup>, ALL were far, far(!) down from 52 week Year Highs.

After a second 1-day move March 23<sup>rd</sup>, a third and latest came March 26<sup>th</sup> and percents for the latter are shown 3<sup>rd</sup> column from right. Whether a long dive downwards soon resumes or there is a bottoming is entirely open to debate. But arguably scope is there for bold moves down (or up) with ECO now far from previous levels (especially from highs, but lows too). These data indicate moves down, or up may happen with surprising size:

<b>March 10 &amp; March 26, 2009 data:</b>		<b>March 10</b>	<b>% 1-day</b>	<b>% 1-day</b>	<b>(March 10)</b>	<b>(March 10)</b>
<b>Symbol</b>	<b>Name</b>	<b>Closing price</b>	<b>Change on March 10</b>	<b>Change on March 26</b>	<b>% From Yr Low</b>	<b>% From Yr High</b>
ECO	WilderHill Clean Energy Index	64.57	9.9%	11.3%	--	--
PBW	PowerShares WilderHill Clean Energy Port.	6.34	8.0%	10.9%	9%	73.54%
WHPRO	WilderHill Progressive Energy Index	110.60	6.9%	3.3%	--	--
PUW	PowerShares WilderHill Progressive Energy	12.16	6.6%	3.3%	10%	61.13%
HAUL	Wilder NASDAQ Global Energy Efficient Transport Index	127.40	4.9%	4.4%	--	--
PTRP	PowerShares Global Energy Efficient Transportation Portfolio	13.96	1.3%	--	1%	50.11%
NEX	WilderHill New Energy Global Innovation Ind.	139.91	0.1%	0.4%	--	67.93%
PBD	PowerShares Global Clean Energy Portfolio	9.30	6.5%	6.0%	9%	69.62%
IXIC	NASDAQ Composite	1,358	7.0%	3.8%	--	46.76%
DJI	Dow Jones Industrial Average	6,926	5.8%	2.2%	--	47.49%
ABAT	Advanced Battery Technologies,	1.73	3.8%	5.5%	47%	72.97%
AMAT	Applied Materials, Inc.	9.22	7.4%	5.7%	18%	57.61%
AMSC	American Superconductor	15.29	15.1%	11.0%	86%	67.83%
APD	AIR PRODUCTS CHEM	48.39	6.2%	3.9%	16%	54.37%
ARGN	Amerigon Incorporated	2.48	8.7%	1.1%	15%	85.57%
ASTI	Ascent Solar Technologies	2.86	16.7%	12.8%	30%	84.45%
BCON	Beacon Power Corporation	0.42	20.0%	17.7%	31%	80.73%
BLDP	Ballard Power Systems, Inc.	0.855	1.7%	6.9%	0%	82.00%
CBAK	China BAK Battery, Inc.	1.06	19.1%	6.4%	23%	80.66%
COMV	Comverge, Inc.	4.80	6.9%	1.2%	104%	69.50%
CPL	CPFL ENERGIA SA ADS	37.65	5.1%	3.3%	7%	51.72%
CPN	CALPINE CORP	5.33	11.5%	8.0%	11%	77.18%
CREE	Cree, Inc.	19.39	6.8%	4.4%	54%	39.03%
CZZ	COSAN LIMITED CL A	2.65	6.0%	6.3%	30%	82.36%
ELON	Echelon Corporation	5.99	13.0%	3.1%	21%	63.83%
EMKR	EMCORE Corporation	0.69	30.1%	19.0%	38%	93.45%
ENER	Energy Conversion Devices	18.32	12.6%	12.9%	13%	78.02%
ESLR	Evergreen Solar, Inc.	1.21	21.0%	16.5%	21%	90.43%
FCEL	FuelCell Energy, Inc.	2.21	7.8%	1.0%	11%	78.54%

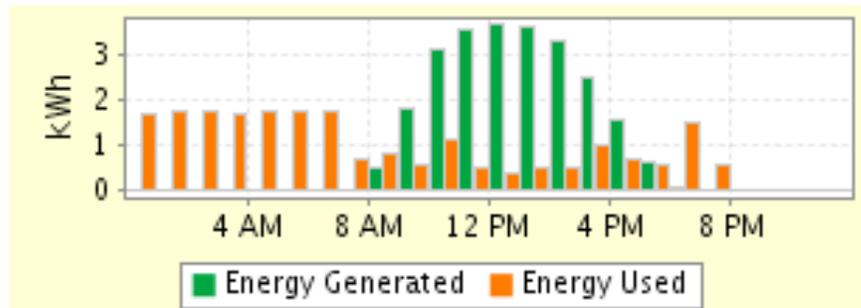
<b>FSLR</b>	First Solar, Inc.	120.24	10.9%	14.7%	40%	62.07%
<b>FSYS</b>	Fuel Systems Solutions	11.71	1.0%	14.7%	19%	80.88%
<b>GU</b>	GUSHAN ENV EGY ADS	1.28	0.7%	26.7%	4%	92.87%
<b>HEV</b>	Ener1 Inc	2.61	9.6%	11.1%	55%	71.75%
<b>HTM</b>	US GEOTHERMAL INC	0.88	15.7%	9.0%	--	81.59%
<b>IDA</b>	IDACORP INC HLDG CO	21.53	2.4%	2.2%	2%	36.47%
<b>IRF</b>	INTL RECTIFIER	12.41	5.9%	6.6%	33%	50.99%
<b>ITRI</b>	Itron, Inc.	45.39	10.9%	6.2%	32%	57.28%
<b>JASO</b>	JA Solar Holdings, Co., Ltd.	2.21	6.7%	41.7%	42%	91.81%
<b>MXWL</b>	Maxwell Technologies, Inc.	5.28	7.7%	4.3%	32%	64.20%
<b>OMG</b>	OM GROUP INC	16.13	10.5%	5.9%	32%	74.04%
<b>OPTT</b>	Ocean Power Technologies	4.33	0.9%	14.2%	14%	68.35%
<b>ORA</b>	ORMAT TECHNOLOGIES	24.74	7.2%	3.6%	13%	57.12%
<b>PANL</b>	Universal Display Corporation	5.55	10.1%	1.4%	14%	67.31%
<b>PLUG</b>	Plug Power, Inc.	0.75	10.2%	4.2%	17%	79.28%
<b>POR</b>	PORTLAND GEN ELEC	16.84	4.0%	0.8%	25%	37.21%
<b>PWR</b>	QUANTA SERVICES INC	20.71	10.2%	6.9%	96%	41.48%
<b>QTWW</b>	Quantum Fuel Systems Tech.	0.72	14.2%	14.0%	35%	77.64%
<b>RBCN</b>	Rubicon Technology, Inc.	4.24	8.1%	7.5%	69%	87.86%
<b>RZ</b>	RASER TECH INC	2.95	6.8%	4.2%	37%	74.98%
<b>SOL</b>	RENESOLA LTD	2.36	11.3%	40.6%	16%	91.99%
<b>SPIR</b>	Spire Corporation	4.47	6.9%	15.0%	52%	76.16%
<b>SPWRA</b>	SunPower Corporation	25.56	15.2%	10.9%	38%	76.11%
<b>SQM</b>	SOCIEDAD DE CHILE SC	25.34	6.2%	0.6%	95%	57.38%
<b>STP</b>	SUNTECH POWER HLDGS	6.38	21.2%	43.8%	25%	87.67%
<b>TSL</b>	TRINA SOLAR LTD ADR	7.62	11.8%	40.7%	35%	85.76%
<b>ULBI</b>	Ultralife Corporation	8.58	12.3%	6.6%	69%	40.54%
<b>VLNC</b>	Valence Technology, Inc.	1.23	12.8%	6.6%	12%	74.64%
<b>VRNM</b>	Verenium Corporation	0.46	12.6%	8.8%	84%	88.86%
<b>WFR</b>	MEMC ELECTRONIC MTRL	14.77	11.8%	10.5%	47%	82.98%
<b>YGE</b>	YINGLI GRN ENGY ADR	4.18	10.8%	44.8%	67%	85.05%
<b>ZOLT</b>	Zoltek Companies, Inc.	6.17	18.8%	7.5%	43%	81.65%

We'll next move from these data to a *practice of clean energy*, and aiming to use a sample 6 kW solar PV system to power buildings (and fuel cars rather than by gasoline).

### Some Practical Knowledge Gained from Daily Use of PV + Electric Vehicle Technologies

Many emerging energy options within the Wilderhill Indexes (includes ECO, WHPRO, NEX – and newest HAUL) are technologies we not only address in a technical or theoretical sense, but also utilize everyday. We believe that practical knowledge gained from everyday use can assist in discussing clean energy ahead. For example we are intimately familiar with how solar photovoltaics (PV) may be sensible today. This is more than theoretical; at our 1-acre San Diego site, we utilize two PV systems to for instance \*Generate electricity from mono & polycrystalline PV; and two Thermal systems to \*Provide building hot water. Solar power is integral to our building's 'daily energy respiration', and lately too for aiming to move beyond gasoline for transport.

So a great new addition is our 100% Electric Vehicle (EV) for transportation. This 2008 EV is both quick and lovely; importantly too it utilizes our solar photovoltaics (PV). By simply plugging into this building, it dovetails elegantly with our solar generation and becomes in essence a sort of virtual ‘solar EV’. But we’ve also learned some interesting lessons in how PV interacts in a practical sense with EVs. Consider first a snapshot of our building energy PV production (green) and energy use (orange) taken just before 8 pm at night:



This example from a typical day shows how adding even one electric vehicle can change patterns of energy generation & use in a building, whether its solar powered or not. In our case over many years we’ve seen that our generation patterns for solar electricity are basically fixed and rather predictable – they match when the sun shines, which nicely is when utilities charge most for consuming power. But any keen-eyed follower on the web looking at our energy demand may notice this recent pattern with EV is different from what it was before (these live data are all displayed real time on the web, <http://wildershares.com/solar.php> ).

Unlike before, our heaviest consumption automatically starts 8 pm (this start time varies) – when the car’s charger timer turns on to charge some 6,700 small battery cells. That is a constant drain to top off a big ~50 kWh battery pack, until around 7 am the next morning when shut off. This **energy use** is evident in the high, nearly 2 kWh orange bars in a Chart above at left (shown here since midnight). We charge nightly because our Time of Use (TOU) metering charges customers (like us) ‘only’ 18-20 cents / kWh at night for electricity. By contrast a six-months summer day peak rate is much higher: 30 cents / kWh from 12 pm to 6 pm – when our PV nicely makes (sells!) our surplus power from the sun.

High peak rates give us a big credit **energy generated** at a hefty 30 cents / kWh (seen in **green parabolic** bars above). Hence one kWh made at 1 PM and put into the grid does not equal one kWh bought at 1 AM at night. By shifting our own heavy demand/use from day to night, TOU paying us a handsome rate for ‘making green electrons’. We as consumers with PV+EV come out ahead as does the utility plus wider owners of a more stable grid.

But there are still problems and so lessons we learned. For instance in the Chart above, note this car’s charger is about to turn-on again right at 8 pm at night (after 11 hours charging the night before) when power from the grid is lowest-cost. However the EV’s big battery could only be partly charged the night before: it ‘wants’ more charge time than TOU allows per night because to charge @12 amps is currently so slow. After spirited driving earlier (heater on because it was cool out, consuming juice), to have ‘only’ 11 hours overnight isn’t enough to top off using a common 120V outlet at 12-15 amps. Similarly if out on the road and needing to charge on a common 120V outlet, this may only give about 4-5 miles worth of driving range per hour charging. Instead happily to hook to a socket giving 240V @30 amps may deliver say 20+ miles of driving range per hour.

We're thus switching here where we're habitually parked to fast 240V @30+ amps (a 14-50 4 wire connection as we just await 30amp 240V connector); that shortens from >24 hours, to around 8 ½ hours on TOU. While common household amps won't give super-fast charge, a few hours to top off after spirited driving *can* be done at 240V. For instance changing to 240V @70 amps allows full charge in 3 ½ hours, or 50 miles-range per hour of charging. (Or extant wiring at commercial or industrial settings permits faster charging still; maybe 480 volts is conceivable for full charge in an hour(?!). As batteries gain greater range and larger PV arrays give a virtual solar PV 'fuel', EVs can clearly show themselves as better, faster and more fun too than the (arguably primitive) gasser automobile of today.

To improve further however a bottom-line is batteries still need faster charging, greater range and more life than say 500 discharges. An EV with innovative batteries whether that bridges superconductors/Li-ion or by far different breakthrough chemistry, could add Vehicle to Grid (V2G) capability and let an owner arbitrage the differences in price for power. With sufficient solar PV, one might charge their EV in day with their surplus solar – or store power from night with cheaper electrons – and their car just sells it back to grid at higher rates whenever demand is there. This can happen seamlessly; notably that can strengthen our national grid, and America's own energy security to boot.

Because 6 kW PV making electricity for our building plus virtual fuel for our car is distributed generation, it makes right-sized power and fixed costs since 2003 pencil out nicely. Rather than PV compete too against wholesale rates from dirty thermal fossil fuel plants that sell power to big utilities only and at say around 4-8 cents /kWh (subject to outages, fuel hikes, transmission losses etc), our PV is measured against true Retail rates a utility charges at meter. So PV need only compete with the retail rates of 30 cents /kWh peak in summer (& more) – rather than misleading wholesale figures. And unlike water guzzling, high-carbon-dependency-making, mountaintop-removal requiring, mercury & pollution-laden big thermal fossil fuel plants, our solar PV is 100% good for America.

Presently state of the art EV batteries still limit however, so envision possibly snowballing benefits should storage technologies improve, spinning off new possibilities. Lastly please permit us a personal observation on how very fun & different it is driving EVs in daily use. We often hardly touch brakes due to the neat, fun, regenerative braking; our car recaptures energy (instead of needlessly heating brake pads) and that too makes driving even more enjoyable. The support we get from other drivers who recognize it is electric is palpable, and virtual 'solar PV fuel' by using TOU peak time credits is icing on the cake.

Torque from its electric motor is more intuitive & useable throughout its range, than a gasser needing gears often hidden by automatic transmission. It is remarkably faster than nearly any gasser on the road (it can do 0-60 in 3.9 seconds in sports mode), or it can get 240 miles per charge in range mode (but not both). However the standard mode is a good compromise and kick in the pants fun with a fine 180-mile range. Being no longer beholden to noxious polluting fossil fuels, nor to whims of hostile oil nations is a real joy. This (virtual solar) EV is proving a wonderful car: it's faster, better and much more fun than a gasser. Our aim is to move soon to having a few EVs/PHEVs severing reliance on oil. Like varied PV harnessing power from the sun, we look forward to adding EV makes (we long ago ordered two other types) and gaining experience with new batteries ahead: we'll monitor performance including with added PV to power them all. For anyone interested, a few older posts from elsewhere are <http://www.teslamotors.com/blog5/?p=59>  
<http://www.teslamotors.com/blog5/?p=48>

## Batteries, Batteries, Batteries ....!

Though the above thoughts have all started from differing places, they probably render it apparent batteries and wider energy storage issue, is an Achilles heel for clean energy. Solve that nut through a host of better new technologies and fresh ways of doing things may be possible: solutions that will appeal, are greener, and oft much more enjoyable. We don't mean to imply a single line of early research like the hybrid just noted above with traits of supercapacitors and energy-dense batteries, is any "be all and end all". There's widening nascent work going into various novel energy storage options – an area crucial to clean energy – and it seems likely that methods we can't imagine shall emerge. That said we'll take a bit of time for that one sample battery path noted above, just to go somewhat deeper into that interesting piece of science & technology.

To achieve supercapacitor/battery hybridization, Kang & Ceder as reported in *Nature*, **458**, 190-193 (12 March 2009) first created a unique starting material working in an appropriate "off-stoichiometry" (think of it as reactants & products sitting together in an unbalanced reaction). They used LiFePO<sub>4</sub> (lithium iron phosphate) as fairly recent energy-storing lithium battery material with a good thermal stability that resists overheating and 'thermal events' that are problems for some other lithium battery types. With nanoscale engineering they significantly improve lithium ion/electron transport and find evidence that new batteries could show extremely high electrochemical discharge rates consistent with supercapacitor rates of surface transport. By intentionally using a poorly crystallized and disordered amorphous surface layer, they achieve high ion mobility and a limiting factor of the ion/electron transport to surface (rather than bulk diffusion) is mitigated. Hence they see evidence battery charge/discharge rates may be radically improved.

Supercapacitors charge/discharge blindingly fast but are sparsely used in EVs because they hold relatively little energy, as compared with batteries: melding their traits with Lithium batteries (much slower to charge, with limited life, but more energy dense) makes sense. And it joins positives since supercaps while being far less energy dense, can be rather power dense as they charge/release far more quickly than batteries; by mixing differing traits, small or big battery hybridization is of interest. The *Nature* authors aptly note

The ability to charge and discharge batteries in a matter of seconds rather than hours may make possible new technological applications and induce lifestyle changes. Such changes may first take place in the use of small devices, where the total amount of energy stored is small. .... On the other hand, the rate at which very large batteries such as those planned for plug-in hybrid electric vehicles can be charged is likely to be limited by the available power: 180 kW is needed to charge a 15 kWh battery (a typical size estimated for a plug-in hybrid electric vehicle) in 5 minutes.

Electrode materials with extremely high rate capability will blur the distinction between supercapacitors and batteries.

We should expect no matter what technologies gain traction (unknowable today and part of the reason for an Index as a basket of differing technologies), traits we desire will be pursued with vigor. One can suggest small predictions, such as lithium being so low on the periodic table (Atomic number 3, weight 6.9), it may be part of some solution. An array of testing in labs around the world is ongoing; which pathways may prove better than others in the years ahead may yet be one more item (here fun) of some interest.

## Rebalance Changes for the Clean Energy Index® (ECO) for the start of Q2 2009

Returning to WilderHill Clean Energy Index and rebalance changes for the coming Quarter, there was 1 Addition for the start of Q2 2009, SOLR; there was 1 Deletion of VRNM.

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Next, we reprise a recent Q4 2008 Report and text from ‘Diary of a Bear Market’, since that seems relevant today! How long it stays relevant, is of some interest...

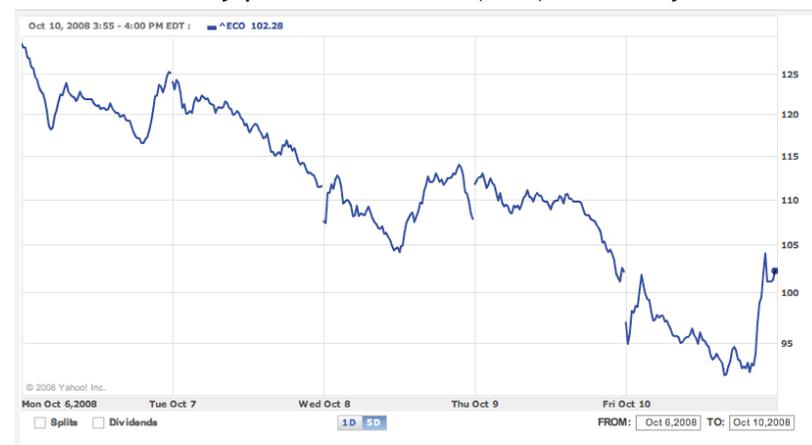
### Looking Back and reprising portions from Last Quarter’s Q4 2008 Diary of Bear Market: Repost of a still-relevant Viewpoint

Awful, ugly, prolonged-yet-must be expected-bear-markets occur from time to time and we are clearly in one now. It may require feeling very dramatic, gut-wrenching broader markets declines – with sheer drops often here amplified too by clean energy’s sharper moves; these can mean just terrible falls before this sector begins to bottom.

Some are worse than others and the very bad ones hugely painful. Nor is experience salve; *they’re always highly vexing to live through!* ... unlike just cozily looking back after. Being in this field for 20+years the frightening 1987 crash, 1997-1998 Asian crisis, 2001 dotcom bubble, and now this meltdown are seared memories. Crises mean huge declines, falls far lower than seemed possible – and potentially too they may mean opportunity.

Whether Q4 2008 has put in, or is near some bottoming process is a question of keen interest. Are recent strong declines in stocks particularly within clean energy, mainly over? That’s utterly unknowable today. In a ‘diary of a bear’ below, we’ll revisit classic bear traps/ false bottoms seen Q4 2008, each ending on a Friday and visible in hindsight before giving way down again. A first came Friday, Oct. 10<sup>th</sup>, when from a 125 on Monday, ECO plummeted to <95 by Friday mid day, declining over -25% in a memorable 5 days.

Interestingly a climax selling pushing ECO so far down one week, *might*, based on recent history, *conceivably* have triggered entry into a fund tracker on that Friday. If the entry signal were, say, the Index dropping <100, not in the live data since it had begun in 2004, then the first selling wave to Friday was *perhaps* notable. Here’s a chart for that fairly remarkable 5-day period and Index (ECO) that early week in Q4:



As it soon turned out, it was a false signal and thus ‘bear trap’ (false signal implying rising trend—when in fact things will soon resume heading down again). Look at this same week in \$ terms for the tracker fund (PBW): by 3 pm on Friday Oct. 10, 2008 the tracker had dropped to \$9.10. Yet just one hour later, the tracking fund would close up to \$9.90, a change in the last hour by +8.7%. (Highlighting Intraday aspects of ETFs, the fund earlier dipped to \$8.96 that day, so even buying <\$9.00 that Friday was in theory also possible).

Capturing gains in ultra-active intra-day moves is pretty close to impossible. Anyway the chimera gains soon vanished; after an Oct. 10 move and briefly after, the tracker was heading soon down again to <\$10.00, next plumbing much lower depths. The point is bear traps abounded in Q4; while crises may potentially mean opportunity, it’s also nearly impossible to ‘catch a falling knife’. Also human nature is to Sell! Sell! Sell(!) – and not buy(!) so it’s a brave soul who ventures in at lower levels, even though risk & reward *may* go hand in hand. (Parenthetically while the tracker would soon move <\$9, and the Index ECO too go below 90 – an Index “90” seeming to match “\$9” is just coincidence. A tracker might aim to broadly mimic an Index, but these two do not match up 10:1).

Exactly two weeks later on Friday Oct. 24 as seen in a Chart below, there was again a 2<sup>nd</sup> possible, *potential* Friday opportunity after another week of sharp selling. Here a notable threshold was the tracker going from >\$11, to below <\$9 over a week. ‘Scary’? Absolutely! Declines seemed to be going on and on without end, yet it soon proved a bear trap; on the other hand it was impossible to know that at the time. Paraphrasing Warren Buffet, ‘be greedy when others are scared, and scared when others are greedy’ and here clearly was a time of real fear, as the tracker marched forcefully next to below \$9:



Bottoming was again not to be; the next week selling resumed without pause: perhaps a next Q4 threshold might be the tracker breaking <\$8.00(?): could ECO’s tracker touch below such remarkable figure, and/or go down into the \$7s? Yes indeed, this move to below \$8 would next happen by end of a remarkable October: the tracker intra-day traded at a notable \$7.98/share with the Index (ECO) also near 80. This was a lowest level seen so far then to date. Arguably it may have suggested possibly BIG declines ahead (or perhaps some possible bottoming process might begin in the next weeks/months??)

Recalling Intra-day aspects of ETFs that can be sold/bought through the day, we just note a brief floor came again on a Friday. (Yet the tracker moved up to \$8.62 that afternoon, a gain of +8% within a day once more showing volatility – though mainly all to downside). To be sure we'd emphasize an entry at true bottom is practically-speaking, pretty much mortally impossible. It's identifiable ONLY in hindsight, anyway in the next few weeks ECO would drop dramatically again, leaving another bear trap. While yes, moving into this sector now might helpfully be a low entry point by historical standards, the volatility downside was presenting gut-wrenching risks – albeit maybe possible reward in future.

Soon resuming a downward march and after just brief respite, on Nov. 13<sup>th</sup> the tracking fund re-passed below a prior nadir. The tracker dropped next below \$7.0: the trend too made it feel rather possible that this tracker might soon be trading into mid/low 6s(!)

Finally a 3<sup>rd</sup> and notable Friday (below) exhibited the strongest yet intra-day lows. After a week of declines, on Friday the 21<sup>st</sup> of November this tracking fund achieved an intra-day record low of just \$6.18. Like previous Friday lows, this too moved swiftly back up in the last hour. Similarly the Index (ECO) reached down to a remarkable 63.41 late that Friday.

It would after rapidly jump back up to close at 86 by the next Wednesday (a day before Thanksgiving) – a significant rebound from the bottom of +35% over 3 ½ days. Since markets would then be closed Thursday for Thanksgiving Holiday, and open only part-day Friday, this 3 ½ day week and 35% 'Thanksgiving Rally' across Clean Energy and hence ECO seemed to put in perhaps a floor, just before several days' break. It importantly served at least to arrest the (Q4 and all) 2008 freefall. Perhaps it helped too to restore at least some bit, the single most important factor missing the past months... Confidence.

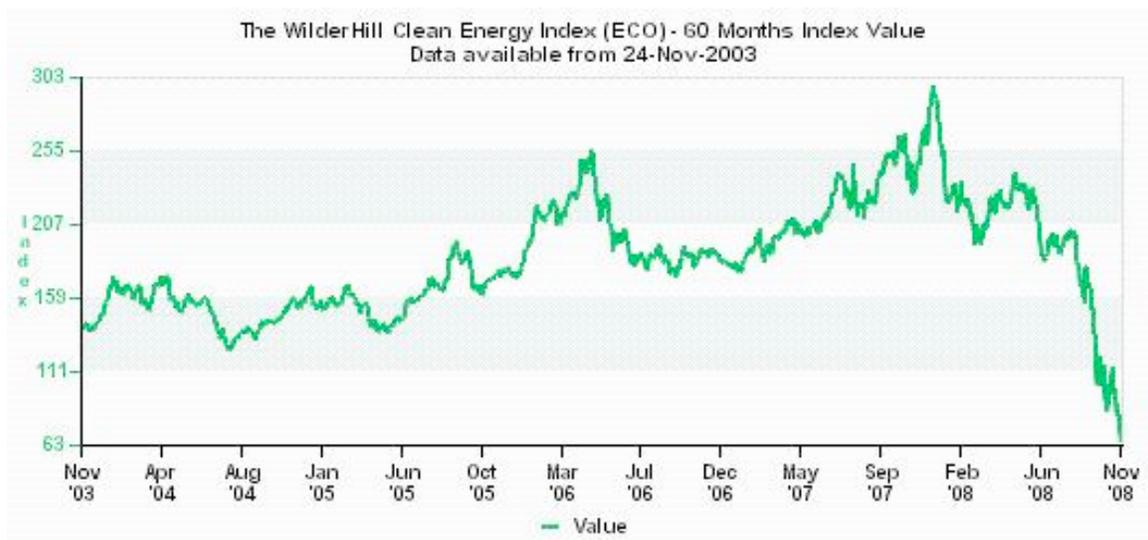
If instead of intra-day hourly values, one looks in this 'diary' at coarser daily closings when a fund might be entered into at more leisurely pace, the tracker Q4 closing low came @\$6.23 on Nov. 20, 2008. To be sure it would take real courage to move into the fund at such eye-popping lows on that evening - but as we've noted, risk & reward *might* go hand in hand. The following Chart (PBW) reflects the queasiness of trading that week down to around \$6.2, recalling rather throat-tightening emotions then being felt:



In a ‘Thanksgiving Rally’, ECO & tracker unsustainably yet notably sprang off a Nov. 21 bottom in a V-shaped rebound over a few days. (Again by coincidence, the tracker hit a bottom around \$6.2, and the Index (ECO) also hit bottom by intra-day values at roughly 63, which just happens to be nearly @10:1). Importantly however, a sharp +35% move cannot be sustained; it must first be digested. To visualize, this Chart shows ECO after the bottoming, ascending by an *unsustainable* +35% move to over 85 in the next 3 days:



We’d expect after climbing remarkably in three days, there’d next be a period of consolidation, as gains can need to be ‘digested’ over a period of time (and it here where by coincidence ECO ended the year). In a snapshot just to capture that bounce we’ve posted the individual gains off their 1-year bottoms (many were set on Nov 20 and 21) in Appendix III below, just to show that bounce to December 14<sup>th</sup>. But more broadly since we like to step back and put ECO in truer context of many years – those much, much larger declines beginning from near 280, on January 1, and moving nearly straight downwards are prominently seen at below over 5 years. (Shown here only to declines/ lows reached *before* this bounce, reaching a noted low of 63 in late-November):



Possible entry <\$7 was not a level considered likely one year ago. And yet consider consequences of entering the tracker at say \$8 (since it was here longer than a briefer bottom); that means the tracker doubling before re-attaining initial 2005 levels. From say, \$9 it will rise three-fold(!) if it is to re-reach \$27 at beginning 2008 (coincidentally near a high). Although it may take a long time (if ever) to re-top a prior \$28 – to start from say \$18 or less still allows room upwards with regression. With some regression to mean and despite enormous volatility, some bottoming and non-negligible ascent *might* be seen *albeit with severe drops along the way*. Of course the opposite may be seen ahead too: that tracker may yet dip far down again, move down into low \$5s or go lower still(!). There's always great risk here, no way to know if it ever is going back up, and difference of opinion is what makes a market. Hence first half of 2009 shall be of keen interest.

### **Tax Implication in a Down 2008: Tax Efficiency of ETFs vs. Mutual Funds**

Differing Tax implications of ETFs (Exchange Traded Funds) vs Mutual Funds deserves perhaps brief mention, given dramatic stock market losses in 2008. Generally speaking unlike an ETF that typically does not present tax obligations when there's no redemptions, with a Mutual Fund, one might instead see year-end capital-gains distributions and so a 15% tax bill on those – despite no redemptions. This may apply to investments in Mutual Funds even if an investor does nothing, and doesn't sell any of their Fund(!).

To be sure down the line one might recoup taxes, if the Mutual Fund is sold higher – or increase losses for tax purposes if sold eventually lower. But having to pay taxes sooner and especially if one sees a Mutual Fund drop in value, can arguably sting. That surprise may cause new attention to be paid the keener tax efficiency broadly of ETFs, as opposed to Mutual Funds. This was recently noted in the Wall Street Journal of 12/1/2008:

“It's going to be the January surprise for a lot of people,'....

Still, there's a potential benefit from the unwelcome tax news: It may prompt investors to think more about fund-related taxes at a time when the topic is likely to increase in importance. *That may include pursuing a smarter tax strategy or seeking out more tax-efficient funds, such as index funds, exchange traded funds and tax managed funds.*” [Italics added].

....

Tax efficiency is also a feature of many exchange traded funds. ETFs are generally similar to index-linked mutual funds in that most passively follow indexes. But they can be even more efficient because unlike mutual funds, ETFs are traded on an exchange. When investors pull out of a fund, they just sell their shares, rather than forcing the fund manager to raise cash to pay them out.

....

It's just another feather in the cap of ETFs', ....”

One recent Lipper study found in 2007, mutual funds paid out around 3% of their market share in capital gains to shareholders, and that may be expected to increase in 2008, as redemptions forced many fund managers to liquidate positions, creating cap gains.

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Moving on we return back to end of Q1 2009, and briefly to 3 independent yet relevant more 'WilderHill Indexes' for themes in growing cleaner technologies:

**The recent *Wilder Nasdaq OMX® Energy Efficient Transport Index (HAUL)* – and the *WilderHill Progressive Energy Index (WHPRO)* also rebalance for start of Q2 2009.**

In addition to the *WilderHill Clean Energy Index® (ECO)*, we note an independent yet relevant *Wilder Nasdaq OMX® Energy Efficient Transport Index (HAUL)* has recently been created as a first ever “Energy Efficient Transport Index”™: more on the HAUL Index is at <http://www.greentransportation.com> Also we note that another independent Index, the *WilderHill Progressive Energy Index® (WHPRO)* is the first to capture opportunities in improving energy efficiency, uses of, and reducing CO2 from dominant energy sources today, <http://www.whprogressive.com> The rebalances for those independent, separate Indexes are in Appendixes for anyone potentially interested in themes beyond clean energy-alone. Plus greater global emphasis for new energy outside of the U.S, is seen in the *WilderHill New Energy Global Innovation Index (NEX)* and more on that is at <http://www.nexindex.com> The three trackers for those 3 Indexes are PTRP, PUW, PBD.

One advantage to an Index being a basket of stocks is a range of technical approaches can be seen. And looking at a few Indexes brings together an even broader range. In a prior Report for ECO we had paid attention to solar and touched on new polysilicon, multicrystalline, monocrystalline and thin film research work in those fields. In this ECO Report we touched on batteries and so note that when looking across WilderHill Indexes (we include the latest HAUL Index), one can find a usefully wide range of companies that are working in cutting-edge energy storage such as in lithium, in other chemistries and even mechanically-based alternative like flywheels. These WilderHill Indexes in Q1 include a very hearty range of advanced battery firms, Advanced Battery Technologies; Beacon; BYD; China BAK; Ener1; EnerSys; Energizer; Energy Conversion Devices; Exide Technology; GS Yuasa; Maxwell; Saft Groupe; Sanyo Electric; Ultralife; Umicore; and Valence. As the field of energy storage grows we look forward to considering new possibilities ahead.

**Might Useful Non-Correlation Begin to reappear in the next few Quarters?**

One fundamental tenet of investing is one should consider assembling a basket of assets showing useful non-correlation. Doing that delivers utility because when one unique type, say the large ‘blue-chip’ stocks move one direction (lately down), a basket should in theory be buffered as other assets small cap growth stocks may in theory go another way. In the past year however that traditional assumption was challenged: all asset types have dropped and mightily fast around the world. That causes past non-correlation to break down and so has vexed both professional money-managers and citizens alike.

We continue to look for something subtle and not much seen lately: non-correlation. As noted we pointed to 3 up-days for ECO, on March 10<sup>th</sup>, March 23<sup>rd</sup>, & March 26<sup>th</sup>. Those first two days occurred when the major Dow Jones, Nasdaq and S&P 500 Indexes also rallied very strongly, showing an ongoing non-correlation. But on the 3<sup>rd</sup> rally, March 26<sup>th</sup>, ECO rose up +11%, on a day broader markets were not up very strongly: ECO had moved on a possible China subsidy for solar that was highly specific to the clean energy sector. This can be regarded a one-time occurrence, yet perhaps harbinger of possibilities. If ECO can begin to show stirrings of non-correlation as against major Indexes, whether ECO moving more strongly downside (as next happened a subsequent few days of Q2) or more upwards in relation to major Indexes, to resume non-correlation could potentially aid return as a function of risk when a small part of a bigger basket.

Lastly we recall Roy Scheider's famous first sight of the shark in Jaws, and exclaiming 'we're gonna need a bigger boat!' Looking the first time at huge readouts for our building energy-use since bringing home a new electric car, we feel that way about our solar PV! With a live system for energy-use/generation we see our profile has changed dramatically. Over the past six years we were careful about energy demand, and mindful to draw as little power as practical within reason since we generate our PV power from the sun. Staying within limits of our solar PV production was easily done. Now however, it is clear 'we're gonna need much more solar PV panels!' (with apologies to Mr. Scheider). Besides having more panels than 6 kW of PV to power this EV plus 2 more plug-in vehicles we plan to have, we may add small wind turbines to capture renewable nighttime energy that blows and beckons us as it is attractive and yet still utterly untapped around here.

### Summary

First Quarter 2009 opened with the Clean Energy Index® (ECO) at 86.36, and closed at 77.46 for a negative return of -10.4%. Robust volatility commonly seen in clean energy has resumed and Q1 was even more volatile than this end of Quarter loss implies. There were some indications seen too in Q1 of a bit of resistance when ECO drops to points around 60; whether the Index breaks through that bit of 'floor' ahead and goes down further in Q2 – or builds up some consolidation (or even sees an increase) – will be of some interest. There was 1 Addition for start of Q2 2009 of SOLR, and there was 1 Deletion of VRNM.

As always we welcome your thoughts & suggestions.

Sincerely,



Dr. Rob Wilder  
[rwilder@wildershires.com](mailto:rwilder@wildershires.com)

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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 WilderHill Index (ECO). Views are not meant as investment advice and should not be considered as predictive in nature. Any descriptions of a holding, applies only as of March 31, 2009. 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 highly volatile sector and thus it is volatile too, and subject to well above-average changes in valuation. WilderHill Clean Energy Index® (ECO) is published and owned by WilderShares, LLC. No financial instruments or products based on this Index are sponsored or sold by WilderShares LLC, and Wildershires LLC makes no representation regarding the advisability of investing in such product(s). WilderHill® and Clean Energy Index® are registered marks and the property of WilderShares LLC; all rights reserved.

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**Appendix I: Index (ECO) Past Q1 2009 Components and Weights, as of 3/17/2009:**

Following were the Q1 weightings at about 2 weeks before rebalance to start Q2 2009; after rebalance, every stock floats according to its share price over the coming Quarter. (\*Stocks below \$200 million in size at the rebalance are banded with a 0.5% weight).

<b>Company Name</b>	<b>Symbol</b>	<b>% Weighting</b>
Cree	CREE	4.38%
Trina Solar Ltd	TSL	3.93%
Sociedad Quimica y Minera de Chile SA	SQM	3.66%
Quanta Services	PWR	3.56%
Air Products & Chem	APD	3.46%
Applied Materials	AMAT	3.26%
MEMC Electronic Materials	WFR	3.17%
Ormat Technologies	ORA	3.12%
Om Group	OMG	3.08%
Zoltek Cos	ZOLT	3.06%
First Solar	FSLR	3.05%
International Rectifier	IRF	3.03%
CPFL Energia S.A.	CPL	2.95%
American Superconductor	AMSC	2.90%
Portland General Electric	POR	2.80%
Ultralife Batteries	ULBI	2.66%
Echelon	ELON	2.65%
Calpine	CPN	2.62%
Yingli Green Energy Holding Co Ltd	YGE	2.61%
Cosan Ltd	CZZ	2.57%
Raser Technologies .	RZ	2.50%
JA Solar Holdings Co Ltd	JASO	2.49%
Idacorp	IDA	2.36%
Suntech Power Holdings Co Ltd	STP	2.33%
Itron	ITRI	2.27%
Energy Conversion Devices	ENER	2.14%
FuelCell Energy	FCEL	2.13%
Sunpower	SPWRA	2.10%
Universal Display	PANL	2.09%
Valence	VLNC	2.00%
SOLA International	SOL	1.90%
Evergreen Solar	ESLR	1.72%
Evergreen	HEV	1.69%
U.S. Geothermal	HTM	1.24%
Fuel Systems Solutions Inc	FSYS	0.92%
Spire Corp	SPIR	0.71%
Rubicon Technology Inc	RBCN	0.66%
Amerigon Inc	ARGN	0.65%
Maxwell Technologies Inc	MXWL	0.58%
Ascent Solar Technologies Inc	ASTI	0.57%
Comverge Inc	COMV	0.56%
Plug Power Inc	PLUG	0.48%
Emcore Corp	EMKR	0.48%
Beacon	BCON	0.48%
Gushan Environmental Energy Ltd	GU	0.40%
Advanced Battery Tech Inc	ABAT	0.39%
Quantum Fuel Sys Tech	QTWW	0.38%
Ocean Power Technologies Inc	OPTT	0.36%
China BAK Battery	CBAK	0.34%
Ballard Power	BLDP	0.31%
Verenium	VRNM	0.28%

## Appendix II: Index (ECO) Components & Weights at the latest Rebalance:

### INDEX (ECO) SECTOR & STOCK WEIGHTS FOR THE START OF Q2 2009. 51 STOCKS.

Each stock freely floats according to its share price after rebalance.

\*Stocks below \$200 million in size at rebalance are banded with a 0.5% weight.

#### **Renewable Energy Harvesting** - 31% sector weight (10 stocks @2.90% each; +4 banded stocks)

\**Ascent Solar*, ASTI. Solar, early-development stages for thin film CIGS flexible PV.

\**Emcore*, EMKR. Solar, Concentrating PV, CPV for terrestrial uses, also for satellites.

*Energy Conversion*, ENER. Thin film, amorphous flexible PV panels; also batteries.

*Evergreen* ESLR. Solar, builds string-ribbon PV with reduced silicon-demand.

*First Solar*, FSLR. Thin film, CdTe solar panels reduce silicon need, and costs.

*JA Solar*, JASO. Solar, China-based sells PV modules in Asia, Europe, U.S. etc.

\**Ocean Power Technologies*, OPTT. Wave power, in speculative very early-stage.

*Ormat*, ORA. Geothermal power, works too in areas of recovered heat energy.

*SunPower*, SPWR. Solar, Efficient PV panels with all-rear-contact cells.

*SunTech Power*, STP. Solar, major producer of PV and is based in China.

*Trina Solar*, TSL. Solar, produces ingots, wafers, solar PV modules; China-based.

\**U.S. Geothermal*, HTM. Geothermal, site acquisition, PPAs, development-stage.

*Yingli Green Energy*, YGE. Vertically-integrated solar PV manufacturer, China.

*Zoltek*, ZOLT. Wind, makes carbon fiber for wind blades, product 'lightening'.

#### **Power Delivery and Conservation** - 35% sector weight (12 stocks @2.79% each;

+3 banded stocks)

*Applied Materials*, AMAT. Upstream PV fabrication, manufacture thin film & crystalline.

*American Superconductor*, AMSC. Wind power control; also superconducting 2G HTS.

\**Comverge*, COMV. Demand-side energy management, building smarter grids.

*Cree*, CREE. LEDs for efficient lighting, manufacturer for power-saving lights.

*Echelon*, ELON. Networking, better management of whole energy systems.

*GT Solar*, SOLR. Solar, PV manufacturing lines with automated fabrication.

*International Rectifier*, IRF. Efficiency-enabling electronics producer.

*Itron*, ITRI. Energy monitoring, new measurement and management systems.

*MEMC*, WFR. Producer of polysilicon used in many crystalline solar PV cells.

*Quanta Services*, PWR. Infrastructure, modernized grid, smarter power transmission.

*Raser*, RZ. Speculative small licensing firm, small geothermal & electric motors.

*ReneSola*, SOL. Wafers, for silicon PV, mono and multicrystalline, China-based.

\**Rubicon*, RBCN. Maker of substrates used in production of LEDs and lighting.

\**Spire*, SPIR. Upstream PV fabrication equipment, also nanotech, semiconductors.

*Universal Display*, PANL. Organic light emitting diodes, OLED panel displays.

#### **Energy Storage** - 15% sector weight (4 stocks @3.12% each; +5 banded stocks)

\**Advanced Battery*, ABAT. Batteries, China based makes Li-ion for diverse applications.

\**Beacon*, BCON. Flywheels, non-chemical firm power alternative; also inverters.

\**China BAK*, CBAK. Batteries, large China based OEM manufacturer of Li-ion cells.

*Ener1*, HEV. Batteries, diverse in Li-ion power storage, nanotechnology; fuel cells.

\**Maxwell*, MXWL. Ultracapacitors, alternative supplement to batteries, in hybrids, UPS.

*OM Group*, OMG. Cobalt and other precursors, producer for Li-Ion batteries, FCs.

*Sociedad de Chile*, SQM. Lithium, major Li supplier for batteries; also STEG storage.

\**Ultralife*, ULBI. Batteries, lithium cells for a variety of mobile and stationary uses.

*Valence*, VLNC. Batteries, phosphate-based lithium cells address thermal events.

**Energy Conversion** - 6% sector weight (1 stock @3.50%; + 5 banded stocks)

\**Amerigon*, ARGN. Thermoelectrics, subsidiary is in conversion waste heat to power.

\**Ballard Power*, BLDP. Mid-sized fuel cells R&D, PEM FCs such as for transportation.

\**FuelCell Energy*, FCEL. Large fuel cells as stationary high-temp flex-fuel MCFCs.

*Fuel Systems Solutions*, FSYS. Gaseous fuels integrator for cleaner-fuel vehicles.

\**Plug Power*, PLUG. Mid-sized fuel cells for distributed generation, home power.

\**Quantum*, QTWW. Alternative fuel vehicles & propulsion systems; also solar nexus.

**Cleaner Fuels** - 5% sector weight (2 stocks @2.25% each; +1 banded stock)

*Air Products & Chemicals*, APD. Hydrogen, is a supplier of industrial gases.

*Cosan*, CZZ. Biofuels, Brazil based uses sugarcane feedstock, an ethanol exporter.

\**Gushan*, GU. Biodiesel, vegetable oil, used-cooking oil etc feedstock; China based.

**Greener Utilities** - 8% sector weight (4 stocks @2.0% each)

*Calpine*, CPN. Geothermal: a major North American producer; low-carbon assets.

*CPFL Energia S.A*, CPL. Brazil Utility with both large and small hydroelectric.

*Idacorp*, IDA. Hydroelectric, Utility with sizeable hydroelectric, some small hydro.

*Portland General Electric*, POR. Utility with hydro & thermal, growing renewables.

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**Appendix III: the Q2 2009 Rebalance for Independent yet relevant, HAUL Index™**

**Wilder NASDAQ OMX Global Energy Efficient Transport Index (HAUL)**

For the start of Q2 2009. 32 stocks total.

(tracker for this Index is PTRP).

**Alternative Vehicles.** 7 stocks. 25% Sector weight; stocks @3.50% each (1 \*banded stock).

HEV – *Ener1 (U.S.)*. Lithium ion, battery maker for electric cars, plug in hybrid vehicles.

\*MXWL – *Maxwell (U.S.)*. Ultracapacitors, rapid energy discharge/storage useful for EVs.

NFI:TSE – *New Flyer (Canada)*. Hybrid electric buses, alternative fuel systems in buses.

SQM – *Sociedad de Chile (Chile)*. Lithium, for electric & plug-in hybrid vehicle batteries.

1211:HKG - *BYD (Hong Kong)*. Manufacturing innovative new electric cars, batteries.

6674:TYO – *GS Yuasa (Japan)*. Mass producing Li-ion batteries for EVs & hybrids.

7309:OSA – *Shimano (Japan)*. Leading manufacturer of bike components, gears, shifters.

9921: TPE – *Giant (Taiwan)*. Bike manufacturer, also developing hybrid electric bikes.

**Rail & Subway Systems.** 9 stocks. 25% Sector weight; stocks @2.77% each.

BBD:B:TSE - *Bombardier (Canada)*. Manufacturer of more efficient locomotives, light rail.

BNI - *Burlington Northern Santa Fe (U.S.)*. Lower-torque bearings, better aerodynamics.

CNR – *Canadian National Railway (Canada)*. Rail can average 3x more efficient than trucks.

CSX - *CSX Corp (U.S.)*. Invests \$1 billion in efficient Tier II locomotives; EPA SmartWay.

NSC - *Norfolk Southern (U.S.)*. Software optimizes rail car movement; SmartWay partner.

UNP - *Union Pacific (U.S.)*. 3,000 fuel-efficient locomotives added to fleet; SmartWay.

VOS:FRA – *Vossloh AG (Germany)*. Makes European diesel-electric, electric locomotives.

7122:TYO – *Kinki Sharyo (Japan)*. Shinkansen Bullet Train; light mass transit vehicles.

9020:TYO – *East Japan Railway (Japan)*. Advanced efficiency railcars, regen braking.

**Sea, Land, Air & Intermodal.** 8 stocks. 25% Sector weight; stocks @3.12% each.  
CLNE – *Clean Energy Fuels (U.S.)*. Advancing centralized fleets using natural gas/CNG.  
FGP:LON – *FirstGroup plc (U.K.)*. Public transportation; in buses, rail and logistics.  
HHFA:FRA – *Hamburger Hafen und Logistik AG (Germany)*. Better transport logistics.  
MRTN – *Marten Transport (U.S.)*. Modern temperature-sensitive, long haul truck carriage.  
OSG - *Overseas Shipholding (U.S.)*. Bulk shipping, VLCCs, diversifying in LNG, CNG.  
SAFT:EPA – *Saft Groupe SA (France)*. Advanced batteries in trains, subways, trams.  
SGC:LON - *Stagecoach Group plc (Scotland)*. Trains, buses, trams: in U.S. and U.K.  
9101:TYO - *Nippon Yusen KK (Japan)*. Energy efficient marine transport, terminals.

**Transport Innovation.** 7 stocks. 25% Sector weight; stocks @3.57% each.  
ALO:EPA – *Alstom SA (France)*. More-efficient transport infrastructure, high speed TGV.  
BG:LON – *BG Group (U.K.)*. Natural gas, for CNG, LNG used as transportation fuels.  
FSYS – *Fuel System Solutions (U.S.)*. Enables natural gas, new alternate fuels in transport.  
LSTR – *Landstar (U.S.)*. Advanced logistics, information technology in hauling goods.  
RS – *Reliance Steel & Aluminum (U.S.)*. Aluminum, used to lighten modern vehicles.  
STS:BIT – *Ansaldo STS SpA (Italy)*. New information technology, subways and rail.  
WBC – *Wabco (Belgium)*. Control systems and telematics for better operating efficiency.

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**Appendix IV: Q2 2009 Rebalance for independent: WilderHill Progressive Energy Index.**  
(for theme of reducing CO2 in a browner yet still dominant energy portrait of today).

**Sectors & Stock Weightings: WilderHill Progressive Energy Index (WHPRO)**  
**For start of Q2 2009. 45 stocks total.**  
(tracker for this Index is PUW).

Alternative Fuel - 25% Sector Weight (8 stocks @3.12% each)

*Cameco*, CCJ. Uranium fuel, one of the largest producers; also fuel processing.  
*Chesapeake Energy*, CHK. Natural gas, one of largest U.S. independent producers.  
*Methanex*, MEOH. Methanol, liquid fuel may flexibly derive from organic & fossil fuels.  
*Praxair*, PX. Hydrogen, energy carrier for FCs & ICEs; supplier of industrial gases.  
*Questar*, STR. Natural gas, explores for and produces gas and natural gas liquids.  
*Range Resources*, RRC. Natural gas, produces in Appalachian & Gulf Coast regions.  
*Southwestern Energy*, SWN. Natural gas, produces in U.S. Arkoma Basin, East Texas.  
*USEC*, USU. Uranium fuel, converts Soviet warheads into U.S. nuclear feedstock.

New Energy Activity - 23% Sector weight (9 stocks @2.55% each)

*Eaton*, ETN. Hybrids, better electric and fluid power in truck and auto applications.  
*Foster Wheeler*, FWLT. Infrastructure, engineering services, LNG, Biomass, WtE, CCS.  
*GrafTech*, GTI. Graphite, advanced electrodes, fuel cells, power generation.  
*Hexcel*, HXL. Lighter composites, advanced structural reinforcement materials.  
*Johnson Controls*, JCI. Building control, also in advanced hybrid vehicle systems.  
*McDermott*, MDR. Infrastructure, reducing coal emissions, constructs WtE facilities.  
*Owens Corning*, OC. Materials lightening, building insulation composite materials.  
*Siemens AG*, SI. Conglomerate, highly diversified across energy innovation globally.  
*United Technologies*, UTX. Conglomerate, advances in varied energy applications.

Better Efficiency - 20% Sector Weight (7 stocks @2.71% each + 2 banded stocks)

*Badger Meter*, BMI. Meter reading & control for better power management.  
*Baldor Electric*, BEZ. Better energy-efficiency for advanced technology motors.  
*Emerson Electric*, EMR. Broad work in energy efficiency, storage, lately biofuels.  
\**EnerNOC*, ENOC. Demand response energy management, smarter grid efficiency.  
*Esco Technologies*, ESE. Power grid, advanced two-way metering & communications.  
\**LSB Industries*, LXU. Greater energy efficiency in building end-use, heating, cooling.  
*Koninklijke Philips Electronics NV*, PHG. Efficient LEDs, advanced industrial lighting.  
*National Grid plc*, NGG. Better electric power & natural gas transmission, efficiency.  
*Woodward Governor*, WGOV. Energy controllers, industrial turbines for generation.

Conversion & Storage - 15% Sector weight (4 stocks @3.12% each +5 banded stocks)

\**A-Power*, APWR. Distributed power generation, micro-grid systems; China focus.  
\**Capstone Turbine*, CPST. Microturbines, distributed power, flexible-fuel sources.  
\**Clean Energy Fuels*, CLNE. Natural gas fleet vehicles, integration and distribution.  
*Covanta Holding*, CVA. Incineration, converts waste to energy (WtE); conglomerate.  
*Energizer*, ENR. Lithium, NiMH, various other battery and charger technologies.  
*Energy Solutions*, ES. Spent nuclear fuel storage, fuel recycling and management.  
*EnerSys*, ENS. Battery maker, for telecommunications, utilities, motive power.  
\**Westport Innovations*, WPRT. Enables vehicles' use of natural gas, other fuels.  
\**Exide Technologies*, XIDE. Better lead-acid batteries for motive, traction uses.

Emission Reduction - 8% Sector Weight (2 stocks @2.75% each +5 banded stocks)

*Corning*, GLW. Diverse activity includes emissions reduction, filters, and catalysts.  
\**Fuel Tech NV*, FTEK. Post-combustion, control systems reducing NOx, pollutants.  
\**Headwaters*, HW. Emission reduction from coal, also synfuels, reagents, fly ash.  
\**Peerless*, PMFG. Pollution reduction, effluent separation & filtration systems.  
\**Rentech*, RTK. Gas to Liquids, potential for CO2 emissions reduction & sequestration.  
*Sasol Ltd*, SSL. Syngas to synthetic fuels; potential CO2 capture/sequestration (CCS).  
\**Tenneco*, TEN. Automotive end-of-pipe emissions controls, catalytic converters.

Utility - 9% Sector weight (3 stocks @3.00% each)

*Companhia Energetica de Minas Cemig*, CIG. Brazilian Utility, large hydroelectric.  
*Enersis, S.A.*, ENI. Chile, Argentina, Peru etc. Utility, lower-CO2 large hydroelectric.  
*FPL Group*, FPL. Florida Utility, growth in lower-CO2 nat gas and nuclear, also wind.