



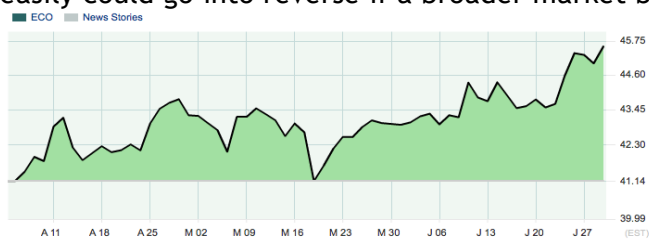
Q2 2017 Quarterly Report: WilderHill Clean Energy Index[®], June 30, 2017

For 2nd Quarter 2017 the Clean Energy Index[®] (ECO) began near 41, and ended at 45 for a gain of about +8.3%; meanwhile first half of 2017 it's well up too about +17.8% year to date (YTD). That's surprisingly more than Dow or S&P first half 2017, even above a hard-rising Nasdaq. And yet look back over the last 3½ years since beginning of 2014 and here the clean energy theme & so ECO Index[®] at first gained in 2014 but then fell and didn't re-test those highs that year with declines only broken by an upturn late 2015; clean energy then fell Q1/Q2 2016, went sideways Q3/Q4 and rose pretty firmly (so far) in 2017 - for a clean energy theme that can clearly drop hard at times and carries much risk. Yet it must also be said all the 'dirty' fossil fuels have fallen even far harder last 5 years than ECO: oil, coal & natural gas all have dropped *much* more than clean energy for instance in the past five year period.

Or there's the Progressive Energy Index[®] (WHPRO) that instead generally excludes clean solar, wind & renewables; WHPRO is a much different theme for reducing CO2 & pollutants coming from - and getting better efficiencies within fossil fuel / dominant energy today. In the Q4 2016 Quarterly Report it was noted WHPRO had gained strongly all 2016 (near +40%), a year when ECO declined; in these 1st & 2nd Quarters of 2017 however, ECO did 'better'. WHPRO was mostly flat 1H 2017 and can clearly move unlike ECO's theme (that 'can and does at times drop like a rock'); meanwhile WHPRO is different too from fossil fuel indexes.

For the WilderHill[®] New Energy Global Innovation Index (NEX) theme capturing new energy *worldwide* mostly outside the U.S. it slightly 'underperformed' ECO in Q1 and Q2 - while YTD it has outperformed WHPRO. Yet for the last 5 years to early Q2, here NEX has done 'best' of the three WilderHill Indexes and is up near +60%, Progressive is up some +15%, and ECO near nil (close to an independent solar-only Index reflecting solar is a drag this period). ECO ends up only around nil here for a last 5 years, and yet fossil fuels are down far, far more in this period - as seen in charts below displaying severe declines of around -50% to -70%.

To sum Q2 / 1H 2017, ECO's theme was 'strong' touching near +20% up; global NEX too saw a robust rise; meanwhile Progressive's previous long rise seen all last year wasn't repeated Q1 or Q2: it's been mainly flat these past 6 months. Below is an ECO Chart in Q2 to late June. Perhaps it's surprising to see clean energy is so firmly up here, given the U.S. election results [plus the President pulling the U.S. out of a Paris Climate Accord in June](#), but then clean energy might have some perceived inertia given its own favorable economics and its fast-declining costs relative to fossil fuels - plus there's ongoing robust policies among States and nations that may play some role here for renewables. Doubtless however, gains first half 2017 easily could go into reverse if a broader market bullishness shifts into pessimism:

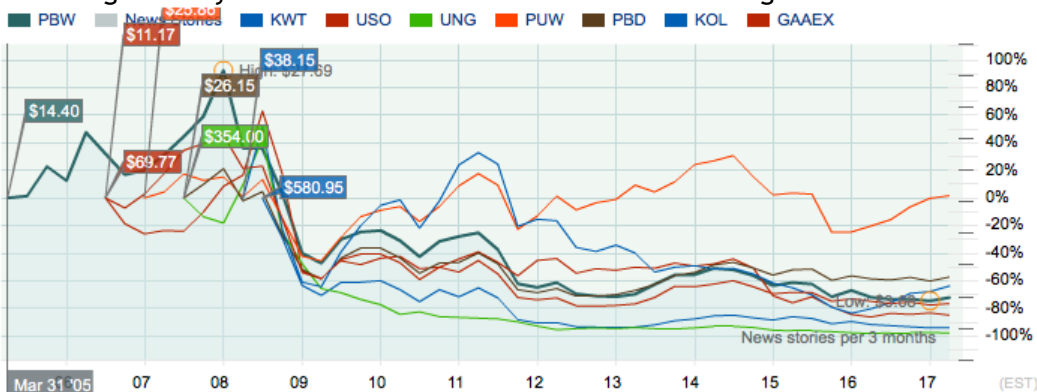


Source: bigcharts.com

For a longer view including an energy crash 2008-2012, we next as usual step-back for what's now roughly ~10 years from about 2006 to start Q2 2017 in a chart below. Fossil fuels are included and most dramatic is Natural Gas (green) sharply down by some ~90%! Seen first lowest at bottom is the **Natural Gas tracker, green**; ascending up just above it is a tracker for **Solar in blue** that's also far down; 3rd from bottom is a tracker for **Oil, red**, once up, but it fell hard. Natural gas, solar, & oil are thus hard down as has been the case for some years.

Next up above those three stories are 3 pretty different themes: one is an **active fund, in burnt red** for alternative energy (showing it's pretty hard for an active-fund to regularly beat an Index). Next and nearly-tied is the passive **ECO Index via independent tracker, bold**; it along with these others are all well down, yet are 'better' (down less) than **Natural Gas, Oil, and Solar**. Noticeably next is Coal that had long before trailed; but its tracker also in **blue** rose strongly 2016 & 1H 2017 to above ECO, perhaps partly on demand from abroad (exports), and a robustly pro-coal new President - despite coal's unfavorable economics. Among these 6 themes then coal is here a bit 'better' in this period - only after big earlier falls.

Higher up above those 6, is the global new energy **NEX via tracker, brown**. Finally far above them all farthest at 'top' is **WilderHill Progressive (WHPRO via PUW, orange)** for reducing CO2 & improving efficiency in major 'dirty' energy today. It ends about nil, only theme near 'up' if starting so early - note however most trackers do not begin so far back as ~10 years ago:



Source: bigcharts.com

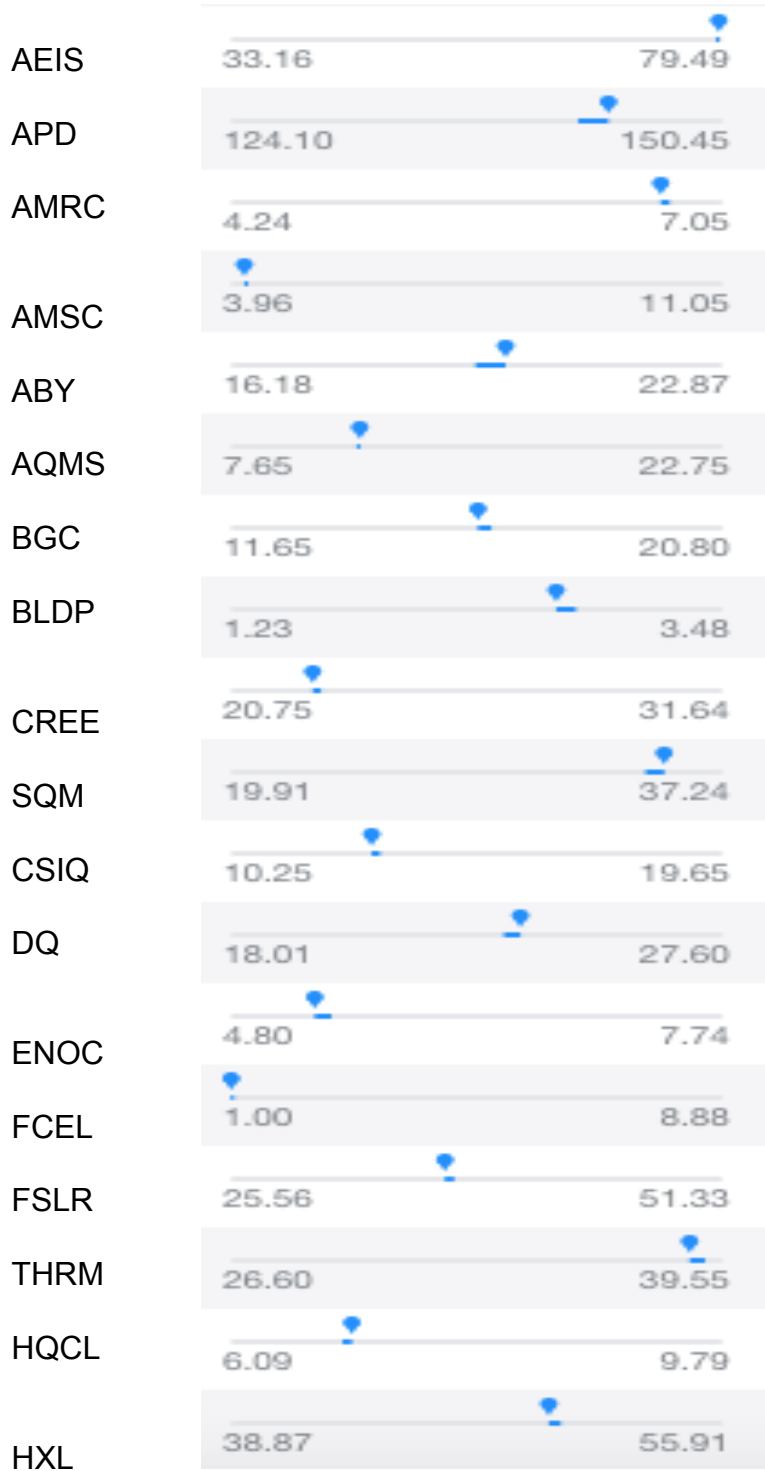
Clearly all energy themes above (but for Progressive) are *far down* here starting at an energy crash; an yet interesting individual stories abound. Take solar for instance: dramatic increases in global PV panel production/supply (especially in Asia) go hand in hand with tremendous declines in price \$/watt and great growth in solar PV installations year on year worldwide. And yet one of the previously-largest, proudest manufacturing brands (German-owned but with some production in USA) declared bankruptcy in 2017 - citing unrelenting competition and downward pricing pressures as from Asia-based suppliers. What was once an 'old world' of branded Japanese, German, U.S. solar manufacturers with good margins not long ago, is lately cutthroat business, a commoditized product sold near cost. Good for downstream installers enjoying better panels at declining prices; but hard on health (and equities) of all solar makers, even those in China. That said it is fueling some amazing growth in solar-use.

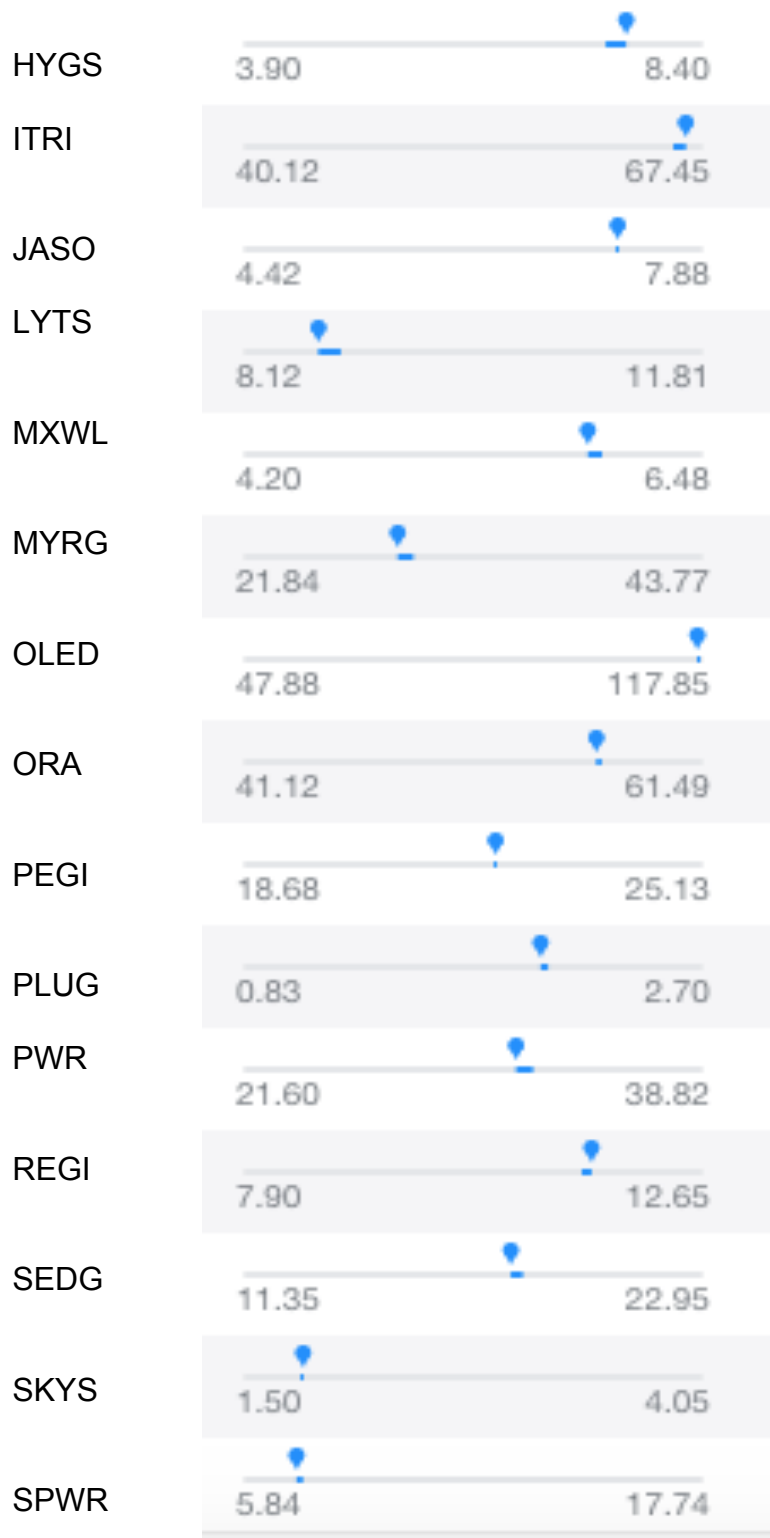
Lastly let's take a look next at 3 topics. First at mid-Q2 is how constituents in ECO & WHPRO have fared looking back at a past 52-weeks: do any sub-themes stand out downside or up on May 15th & then June 15th (hint: a bit, but not acutely). Secondly, what's happening in solar lately given its importance as sub-theme. Third is a glance at practical experience with some solar and optimizer technologies, in an application as solar carport for PV / EV cars.

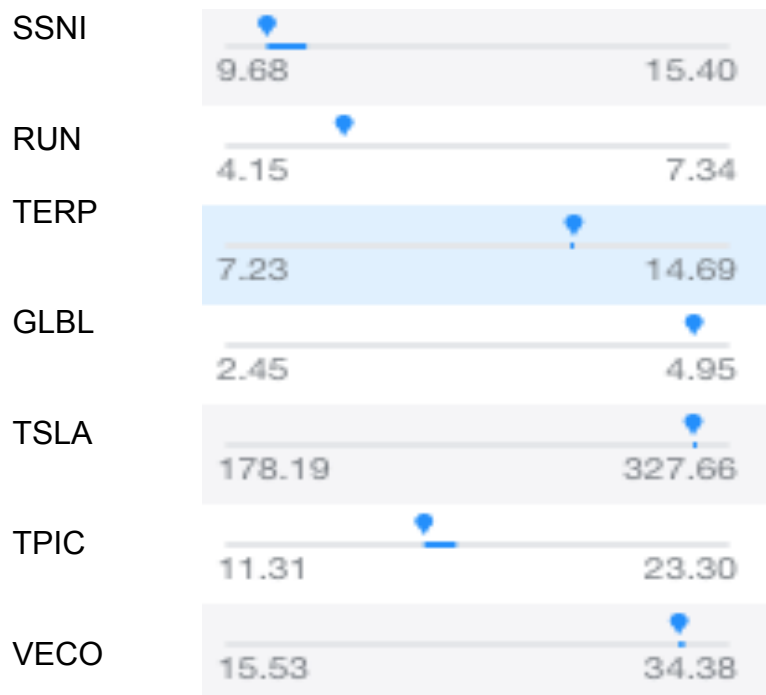
ECO Index individual constituents: ranges this past Year for relative Lows, Highs, or somewhere in between at mid-Q2: May 15, 2017:

Ticker

Past 52 Week Range of individual ECO Constituents as of May 15, 2017







Looking at the above individual returns within ECO, some standouts for being near their *Lows* for past 52 weeks to mid-Q2 on May 15, 2017 include:

- AMSC (in wind power & superconductors; c.f. intellectual property issues)
- CREE (LED lighting, in an area of intense competition)
- FCEL (fuel cells, one-off-demonstrations require special funds like 40 MW RFP)
- SKYS (solar farms, solar PV although dropping in price, is still costly power)
- SPWR (solar manufacturer is US based; PV pricing is highly competitive)
- SSNI (energy networking, an arena not (yet?) capturing intense fervor).

Or looking at above returns, some standouts for instead being nearer their own *Highs* for the past 52 weeks as of mid-Q2 (May 15th) include:

- AEIS (power conversion with some positive earnings revisions)
- THRM (thermal management has potential room for growth)
- ITRI (metering & demand response potentially lowers need for power)
- OLED (organic LEDs potentially a better display in smart phones, TVs)
- GLBL (operates renewable energy plants globally)
- TSLA (electric cars, solar home energy production and battery storage)

Looking at those near *Lows* last 52 weeks, there's some common representation (in Solar) but not acutely so. There's greater diversity among those nearer *Highs* last 52 weeks, coming from more a range of activities.

Briefly, we'll glance next page at these constituents in ECO at 1-month later on June 15, 2017 - there's modest changes; CREE's up off lows; AEIS down a bit from highs for example. After that we'll then look at WHPRO.

Symbol	52-Wk Range
AEIS	35.42 86.25
APD	124.10 150.45
AMRC	4.24 7.25
AMSC	3.88 9.63
ABY	16.18 22.87
AQMS	8.13 22.75
BGC	11.65 20.80
BLDP	1.23 3.48
CREE	20.75 31.64
SQM	23.13 37.47
CSIQ	10.25 16.36
DQ	18.01 27.60
ENOC	4.90 7.74
FCEL	0.80 6.44
FSLR	25.56 50.40
THRM	26.60 39.90
HQCL	6.09 9.79
HXL	38.87 55.91
HYGS	3.90 10.85
ITRI	40.12 71.95
JASO	4.42 7.88
LYTS	8.12 11.64
MXWL	4.20 6.48
MYRG	21.84 43.77
OLED	47.88 130.65
ORA	41.12 61.49
PEGI	18.68 25.13
PLUG	0.83 2.70
PWR	21.60 38.82
REGI	7.90 12.65
SEDG	11.35 21.53
SKYS	1.50 4.05
SPWR	5.84 16.41
SSNI	9.68 15.40
RUN	4.15 7.34
TERP	7.25 14.69
GLBL	2.53 5.10
TSLA	178.19 384.25
TPIC	11.31 23.30
VECO	15.53 34.38

Again looking back - here at WHPRO Constituents, these are ranges over the past Year for a View of relative Lows, Highs, or somewhere in between as of mid-Q2 on May 15th:

Past 52 Weeks: individual WHPRO Constituents as of May 15, 2017

Ticker



ETN

54.30 79.31

ENS

55.72 84.74

EMR

48.45 64.36

ESE

37.67 60.95

FMC

41.80 75.93

GPRE

14.97 29.85

GLNG

14.32 29.18

HCCI

9.70 16.75

HDSN

3.09 8.54

KNDI

3.40 8.09

LXFR

9.28 13.50

LDL

36.50 64.85

MTZ

20.86 47.90

MDR

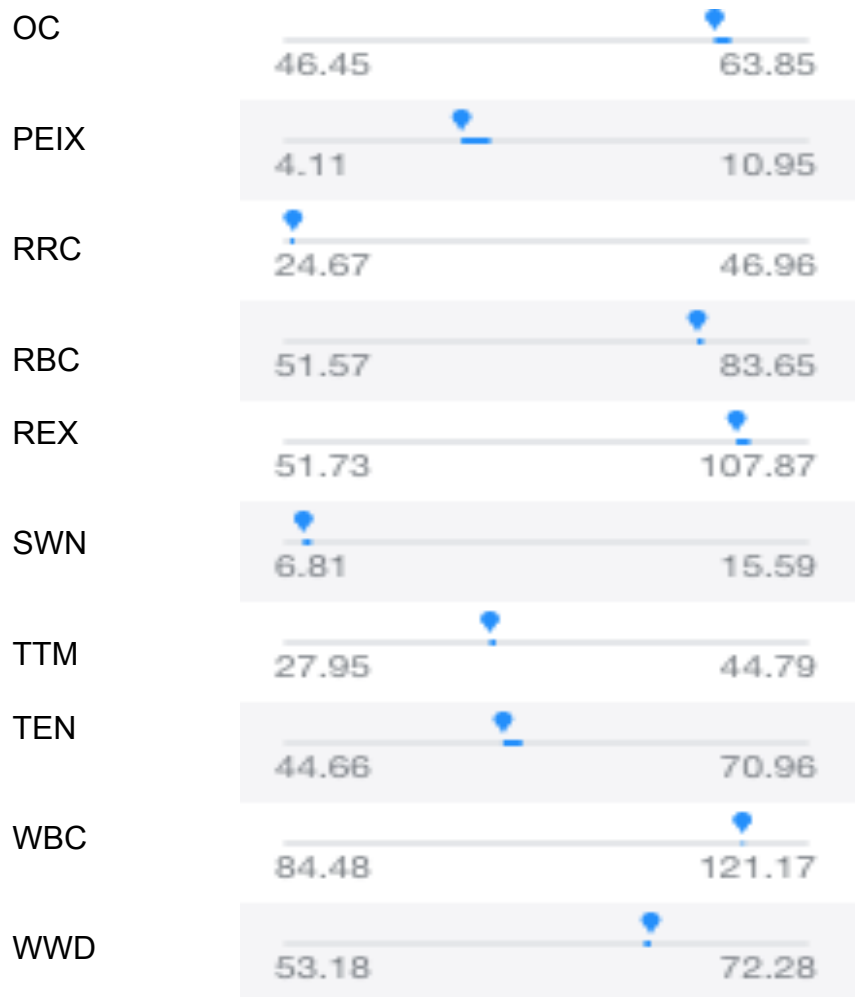
4.17 8.33

MEOH

26.83 53.35

NYLD

13.98 18.56



Looking at individual returns in WHPRO, a few standouts as nearer their *Lows* for the past 52 weeks as of mid-Q2 (May 15, 2017) includes:

- CLNE (natural gas as an alternative fuel for fleets)
- RRC (natural gas producer)
- SWN (natural gas producer)

Or looking at above individual returns some standouts as instead nearer their *Highs* last 52 weeks as of mid-Q2 (to May 15, 2017) includes:

- AOS (energy efficient water heating)
- ALB (chemicals, firming up its lithium business for batteries)
- FMC (chemicals, lithium supplier too for advanced batteries)

Looking over *Lows* for past 52 weeks there is some representation there from a Natural Gas sub-theme; a bit of commonality too among the *Highs* seen for past 52 weeks, in lithium producers particularly.

Here we'll glance just 1 month later, the same constituents in WHPRO on June 15th:

WHPRO constituents 1 month later on June 15, 2017:

AIMC	25.77	46.90
ALB	74.86	116.64
ANDE	31.93	44.90
AOS	40.51	57.22
APOG	39.88	61.00
AGR	35.42	46.74
AYI	157.33	280.89
CPN	9.30	15.12
GTLS	21.80	40.87
CECE	8.16	14.88
CBI	14.80	39.71
CHK	3.93	8.20
CIG	1.45	3.84
CLNE	2.18	4.80
GLW	18.88	29.90
CZZ	5.72	9.50
CVA	13.45	17.16
ETN	54.30	79.31
ENS	55.73	84.74
EMR	48.45	64.36
ESE	38.36	61.40
FMC	41.80	77.38
GPRE	17.26	29.85
GLNG	14.32	29.18
HCCI	11.21	16.75
HDSN	3.09	8.93
KNDI	3.40	8.09
LXFR	9.28	13.49
LDL	37.10	64.85
MTZ	20.86	47.90
MDR	4.32	8.33
MEOH	26.83	53.35
NYLD	13.98	18.56
OC	46.45	65.70
PEIX	4.64	10.95
RRC	21.84	46.96
RBC	51.57	83.65
REX	55.21	107.87
SWN	5.58	15.59
TTM	31.71	44.79
TEN	44.66	70.96
WBC	84.48	126.07
WWD	53.18	72.28

.....

 Secondly due to some importance of Solar as sub-theme in ECO and NEX Indexes - and its relevance to (though not in) WHPRO Index - a few words on it next may be of interest here. Especially given a new President six months into a fresh (and more pro-coal) Administration - yet perhaps somewhat surprisingly the ECO & NEX being so 'strongly up' thus far in 2017.

Note that solar has not paused under a new President; for example solar installations topped 2 gigawatts in Q1. A few big points to keep in mind however include that: *People conflate rising solar installs with solar profitability and so the stocks heading upwards - when instead cut-throat competition and long-declining stocks have occurred even as solar-use expands; *Solar projects are growing in part due to solar's own economics - not federal policy changes (now that ITC solar tax credit was extended through 2021) - so *Installs are going up even as solar module costs are declining; and *Attempts are being made via ideas like trade barriers to put a price floor under falling solar prices; those so far have been unsuccessful.

One result is solar prices continue their long, long harsh slide towards ever more 'attractive-levels' (for consumers - not producers of modules!); for example pricing in China for raw poly product going into crystalline solar PV panels remains just under \$15 / kg (years ago it was many times that). Overcapacity remains a rule such as in China, keeping a lid on potential price increases - despite some attempts at pricing power for manufacturers.

Occasionally there's a threat domestically that America's ITC federal solar tax credit won't be renewed, spiking installations like recently, but each time the ITC comes back on (like the PTC for wind) & thus installations are continuing to grow. Growth is strong in U.S. home solar rooftops - and noticeably very big too in large Utility applications as seen here:



source: Washington Post; SEIA / GTM Research U.S. Soar Market Insight.

Solar+China has been a big part of this story globally. China's gone from near-zero production and no demand not many years ago - to enormous demand appetite & manufacturing/ supply growth in recent years creating jobs and green industries there, as China massively builds its own greentech sectors. There was some retrenching in their solar demand, but now their demand ahead in 2018 might increase again from 19 to 22 gigawatts (GW) in China.

Look at 2017 domestically for the U.S., and there may be 12 gigawatts of new solar installed. That itself is a very big figure, though China is larger. If one considers each gigawatt roughly like a nuclear plant (obviously sunlight is far more intermittent fuel than a nuke, but solar doesn't have enormous cost overruns that are tied to all nuclear plants nor waste issues), then that's a bit like 12 new nuclear plants worth of distributed PV. Yes it's not firm baseload power, just capacity only when sun is shining. Yet very unlike nuclear, this clean solar can go on running nearly free, has no waste, and be maintained or even shut at almost no cost.

It's only a beginning. By end of 2017 solar may be only some 2% of U.S. electricity, near 50 installed gigawatts. But the growth is rapid. Wind too, supplying some 6% is also growing. Those two as clean renewables - along with growing natural gas use (relevant to WHPRO Index and least dirty of polluting fossil fuels) all show increasing installations with declining costs. That's very unlike inherently-dirty coal where yes some metallurgical coal use is growing for steel, but thermal coal-fired power plants are generally not at all a growth industry.

Recently, much attention was given the President's decision to withdraw from the Paris Climate Accord. It's something a few of us in green energy Indexing wrote about. A view too of what rejecting that Accord may mean for energy equities and for clean technology, was expressed by a Banker who observed (Roth Cleantech Banking Weekly; Vol III: 11; June 2017):

“The Paris climate agreement debate captured the attention and criticism of the world. In this humble banker's opinion, the truth often lies somewhere in the middle between outrage for exiting a flawed agreement and outright climate change denial. We believe that despite the ebb and flow of U.S. and worldwide government policy, the technology improvements and resulting cost down of LED lighting, solar, wind and storage is unstoppable and thus we assume that green and sustainable electrons will soon be the lowest cost energy source. With technology out of the box, the debate should revolve around how best to monetize a new energy economy. Also, despite our lack of federal support for Paris, several states have already adopted the elements of carbon reduction targets,”

Indeed, addressing climate change may increasingly shift to private sector, as well as States and Local governments (together acting somewhat akin to Nations) in forming coalitions internationally - as various nations like Germany, even China take robust actions.

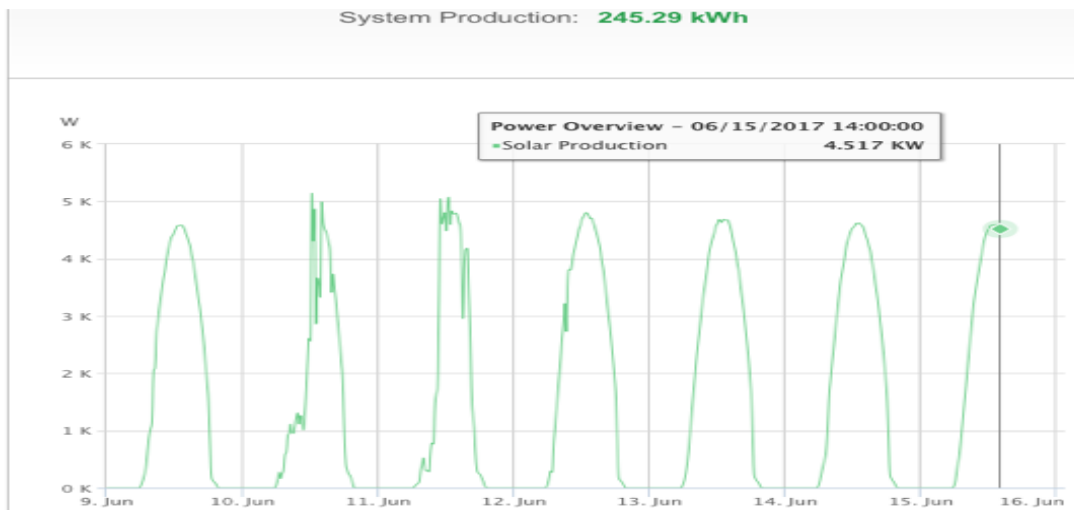
Next let's spotlight in an on-the-ground, granular way practical solar. Here we'll examine new applied combinations of monocrystalline solar PV panels - plus individual optimizers - atop residential carports - these emerging technologies further link electric cars & PV panels.

This is our own 3rd solar PV system and it was just completed to examine recent solar - on a carport. Overall it consists of 20 solar panels rated [290 watts each](#); these panels were made in the USA, of some importance to us in selecting a manufacturer. These were matched to an Inverter company (also U.S. based) whose technology allows individual Optimizers for each panel and a [central Inverter](#). Maximum power tracking and managing voltage are thus handled specifically for each panel, only DC to AC is done by Inverter. This also allows Monitoring each solar panel separately real time which we do here for more in-depth look at every panel - and whole system. And the carport made of pre-fab aluminum & steel - is U.S. made as well. Let's take a look next at this system employing some cutting edge technology:

This solar carport is a one-off design we did to allow us to park electric vehicles in a shaded way out of rain - while its roof makes enough to power to run/fuel both of our fun cars!



So with 20 panels rated at 290 watts apiece, we're expecting this new roughly 5.8 kW system to make around 30 to 40 kWh per day. Here's the first week of power seen in early June:



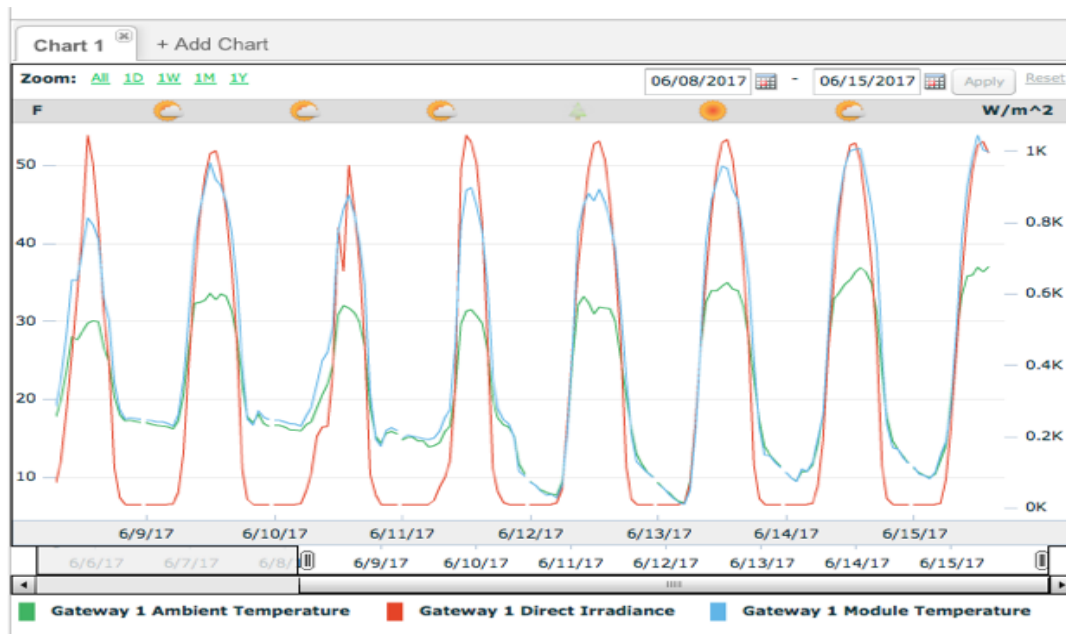
And here's each panel monitored individually for power output (interestingly) - over this same period June 8th to June 15th when there's some 'June Gloom' in coastal Encinitas:



148.31 kWh

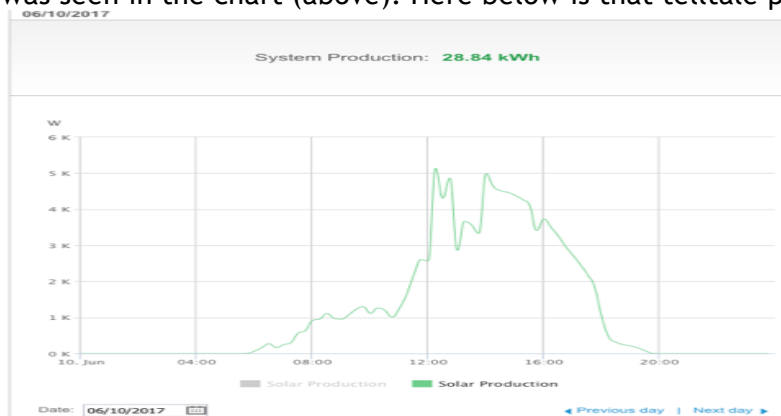
7.36 kWh 1.1.1	7.44 kWh 1.1.2	7.47 kWh 1.2.1	7.48 kWh 1.2.2
7.48 kWh 1.1.4	7.38 kWh 1.1.3	7.41 kWh 1.2.4	7.52 kWh 1.2.3
7.26 kWh 1.1.5	7.43 kWh 1.1.6	7.51 kWh 1.2.5	7.57 kWh 1.2.6
7.58 kWh 1.1.8	7.46 kWh 1.1.7	7.44 kWh 1.2.8	7.56 kWh 1.2.7
7.48 kWh 1.1.9	7.45 kWh 1.1.10	7.51 kWh 1.2.9	7.65 kWh 1.2.10

Digging a bit deeper, consider the added data for Direct **Irradiance** (how 'sunny' as expressed watts per square meter), for **Ambient Temperature** (weather outside measured here in C), and **Module Temperature** (also in C as heated by sun). We can see a foggier first half of the week kept the nighttime **temps** generally much more mild (lows of 15-17 degrees C) -

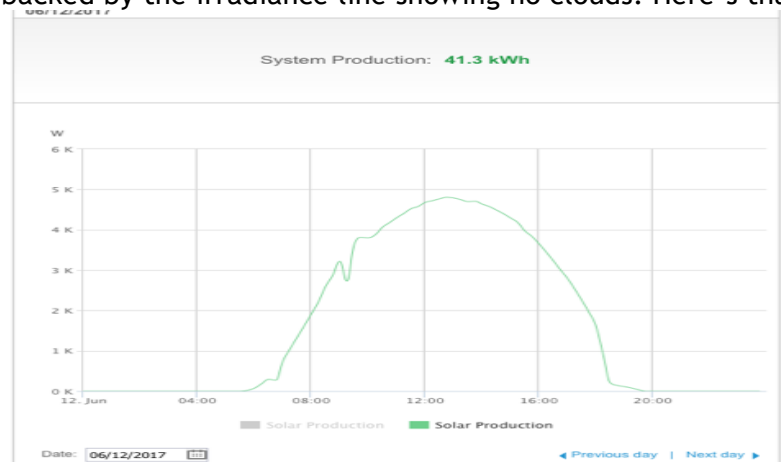


System production each of these days above came to: 30.73 kWh on June 8th; 38.82 next day on 6.9; 28.84 on 6.10 (a low); 29.32 on 6.11; 41.32 on 6.12 (a high); 40.86 on 6.13; and 40.05 on last full day, June 14th. That was just a partial day above June 15th going mid-day to 30.52 kWh. So there's some variability, as expected, in solar production from day to day.

Breaking it down daily for some likely influencing factors effecting varying solar production levels seen above, consider that on June 10th for example the system's production was a weekly low @28.84 kWh and there were some clouds mid-afternoon causing a jagged-output-line then as seen in a power curve (below) as well as some moderate fog both in morning up to 11 am and in afternoon after 4 pm - which all led to a spikey/narrow Irradiance line, and Module Temps going above Ambient Temps in relatively much steeper & briefer manner as was seen in the chart (above). Here below is that telltale power output on June 10th:



By contrast on June 12 we saw the output high of 41.32 kWh, and more beautifully rounded power curve. The chart for that date shows nighttime lows the night before had gotten much lower at under 9 degrees C due to a clear overnight sky (no blanketing fog) - the ambient temps and module temps were nicely separated (panels had heated up considerably) which is backed by the irradiance line showing no clouds. Here's that power curve for June 12th:



So we can figure on making on average say 33 kWh+/day during at least in Summer months based on the above. We know from measuring [we get roughly 3 miles per kWh of driving range](#) from either of our Electric Vehicles. Therefore, we should get about 100 miles/per day of driving range using just sun for fuel. This sums up our brief look at individual PV panels and optimizers combined with residential solar carport roof to further solar-cars.

Conclusion:


For 2nd Quarter 2017 the Clean Energy Index[®] (ECO) began near 41, and ended at 45 for a gain of about +8.3%; meanwhile first half of 2017 it's well up too about +17.8% year to date (YTD). That's surprisingly more than Dow or S&P first half 2017, even above a hard-rising Nasdaq. And yet look back over the last 3½ years since beginning of 2014 and here the clean energy theme & so ECO Index[®] at first gained in 2014 but then fell and didn't re-test those highs that year with declines only broken by an upturn late 2015; clean energy then fell Q1/Q2 2016, went sideways Q3/Q4 and rose pretty firmly (so far) in 2017 - for a clean energy theme that can clearly drop hard at times and carries much risk. Yet it must also be said all the 'dirty' fossil fuels have fallen even far harder last 5 years than ECO: oil, coal & natural gas all have dropped *much* more than clean energy for instance in the past five year period.

Of note the President pulled the U.S. out of the Paris Climate Accord in June 2017, an event written about by some of us deeply-involved in clean energy, see [Wilder R., D. Kammen & Wilder C., Stanford Law & Policy Review 1](#); notably both ECO & NEX Index themes were up (slightly) despite that fact - and were well up Q1/Q2, so this clean theme was unfazed. In sum first half 2017, Progressive WHPRO was mainly flat to just down, while clean energy ECO and global new energy NEX rose strongly YTD. These themes all are volatile however, and while now up, each can be very susceptible to bearishness and yet fall hard in 2017.

Lastly there was one constituent Deleted from ECO to start Q3 2017, ENOC; there was 1 Addition to ECO Index for Q3, HTM. At separate WilderHill Progressive Energy Index (WHPRO) to start Q3 there was 1 Deletion of CBI, and there were no Additions.

As always we welcome your thoughts and suggestions.

Sincerely,



Dr. Rob Wilder
rwilder@wildershires.com

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Appendix I:

ECO Index (via independent tracker PBW) Descending Weights & Components late-Q2 on 6/15/2017, or about ~2 weeks before rebalance to start Q3 2017. 40 stocks:

<u>Name</u>	<u>Symbol</u>	<u>Weight</u>
Universal Display Corp	OLED	3.71
Tesla Inc	TSLA	3.671
Plug Power Inc	PLUG	3.667
SunPower Corp	SPWR	3.623
First Solar Inc	FSLR	3.534
Ballard Power Systems Inc	BLDP	3.348
SolarEdge Technologies Inc	SEDG	3.26
Canadian Solar Inc	CSIQ	3.151
Renewable Energy Group Inc	REGI	3.064
Pattern Energy Group Inc	PEGI	3.023
Ameresco Inc	AMRC	2.981
Sunrun Inc	RUN	2.962
TPI Composites Inc	TPIC	2.955
Itron Inc	ITRI	2.948
Ormat Technologies Inc	ORA	2.94
JA Solar Holdings Co Ltd ADR	JASO	2.887
Sociedad Quimica y Minera Chile	SQM	2.827
Advanced Energy Industries Inc	AEIS	2.803
General Cable Corp	BGC	2.751
TerraForm Global Inc	GLBL	2.734
Air Products & Chemicals Inc	APD	2.7
Hexcel Corp	HXL	2.691
Daqo New Energy Corp ADR	DQ	2.649
TerraForm Power Inc	TERP	2.635
Atlantica Yield plc	ABY	2.613
Gentherm Inc	THRM	2.603
Hanwha Q CELLS Co Ltd ADR	HQCL	2.56
Silver Spring Networks Inc	SSNI	2.558
Veeco Instruments Inc	VECO	2.503
Quanta Services Inc	PWR	2.362
LSI Industries Inc	LYTS	2.282
Cree Inc	CREE	2.265
MYR Group Inc	MYRG	2.068
Aqua Metals Inc	AQMS	1.844
Hydrogenics Corp	HYGS	0.697
EnerNOC Inc	ENOC	0.491
Maxwell Technologies Inc	MXWL	0.468
Sky Solar Holdings Ltd ADR	SKYS	0.451
FuelCell Energy Inc	FCEL	0.376
American Superconductor Corp	AMSC	0.341

Appendix II, ECO Index for Start of the New Quarter:

INDEX (ECO) SECTOR & STOCK WEIGHTS FOR START OF Q3 2017. 40 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 - 27% weight (9 stocks @2.94% each; plus 1 *banded)

Canadian Solar, CSIQ. Solar, vertically integrated solar manufacturer, China.

Daqo New Energy, DQ. Solar, polysilicon/wafer manufacturer; China-based.

First Solar, FSLR. Thin film solar, CdTe a low-cost alternate to polysilicon.

Hanwha Q Cells, HQCL. Solar, integrated from poly through modules.

Hexcel, HXL. Light composites, in wind blades & spars, aerospace, vehicles.

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

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

SunPower, SPWR. Solar, efficient PV panels have all-rear-contact cells.

TPI Composites, TPIC. Wind Blades; also light-weighting for transportation.

**U.S. Geothermal*, HTM. Geothermal, operating & development-stage sites.

Power Delivery & Conservation - 21% sector weight (7 stocks @2.92%; +1 *banded)

Ameresco, AMRC. Energy saving performance contracts, also in renewables.

**American Superconductor*, AMSC. Wind, grid conditioning; superconductors.

General Cable, BGC. Power grid innovation, includes high-voltage offshore wind.

Itron, ITRI. Meters, utility energy monitoring, measurement & management.

MYR Group, MYRG. Transmission and Distribution, includes solar & wind farms.

Quanta Services, PWR. Infrastructure, modernizing grid & power transmission.

Silver Spring Networks, SSNI. Smart grid, two-way communications aids Utilities.

Universal Display, OLED. Organic light emitting diodes, efficient displays.

Energy Conversion - 21% sector weight (8 stocks @2.56% each; +1 *banded)

Advanced Energy, AEIS. Power conditioning: inverters, thin film deposition.

Ballard Power, BLDP. Mid-size fuel cells; R&D, PEM FCs as in transportation.

Cree, CREE. LEDs, manufacturer in power-saving lumens, efficient lighting.

**FuelCell Energy*, FCEL. Large fuel cells, high-operating temps, multiple-fuels.

Gentherm, THRM. Thermoelectrics, waste heat to energy, power harvesting.

LSI Industries, LYTS. Lighting, LEDs, is vertically integrated U.S. manufacturer.

Plug Power, PLUG. Small fuel cells, for e.g. forklifts; drop in replacements.

SolarEdge Technologies, SEDG. Inverters: makes solar optimizers, inverters.

Veeco, VECO. Thin film equipment, for LEDs, energy efficient electronics.

Greener Utilities - 14% sector weight (5 stocks @2.70% each; +1 *banded stock)

Atlantica Yield, ABY. Yieldco, Contracted renewables assets, also transmission.

Pattern Energy, PEGI. Wind farms, solar may be added too for GW sized PPAs.

**Sky Solar*, SKYS. Solar farms, creating & operating utility-scale projects.

Sunrun, RUN. Residential solar systems, lease, PPA or purchase rooftop PV.

TerraForm Global, GLBL. Owns operates renewable assets in emerging nations.

TerraForm Power, TERP. Owns operates solar/wind, developed nations, yieldco.

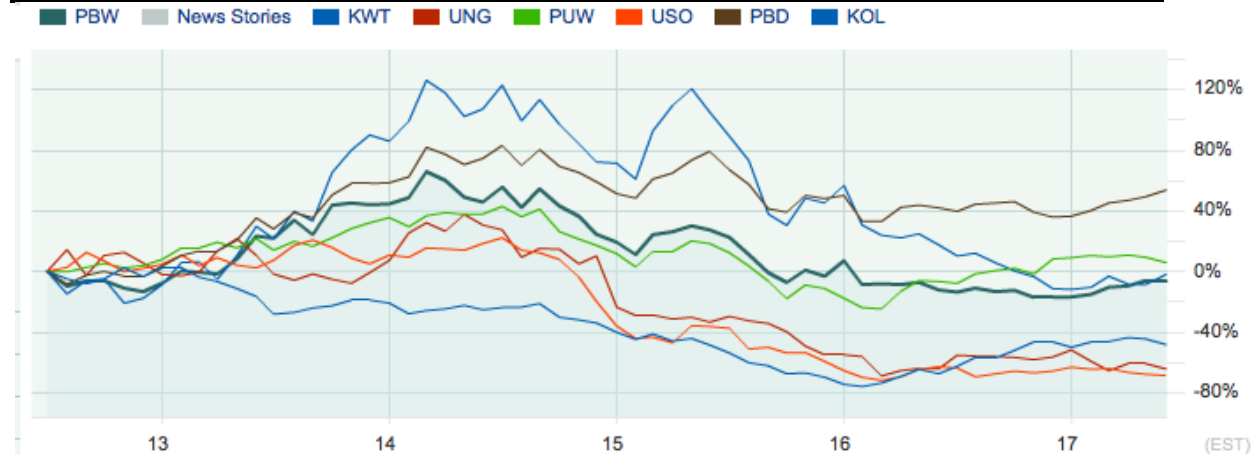
Energy Storage - 11% sector weight (4 stocks @2.75% each)

Aqua Metals, AQMS. Recycling lead acid batteries, eliminating toxic wastes.

Maxwell, MXWL. Ultracapacitors, an alternative to batteries as in hybrids.
 Chemical & Mining Co. of Chile, SQM. Lithium, energy storage, large producer.
 Tesla Motors, TSLA. Electric vehicles, solar; purer-play in EVs & energy storage.

Cleaner Fuels - 6% sector weight (2 stocks @2.75% each; +1 *banded stock)
 Air Products & Chemicals, APD. Hydrogen, is a supplier of industrial gases.
 *Hydrogenics, HYGS. Hydrogen, fuel and electrolysis for fuel cells, H2 storage.
 Renewable Energy Group, REGI. Biodiesel, natural fats, oils, grease to biofuels.

ECO (via independent tracker, bold) plus 'tough time' clean & fossil fuel themes the past 5 years from June 30, 2012 to start of Q2 2017; a period that includes big declines:



Source: Bigcharts.com

As seen by **ECO** (via tracker **bold**) plus several other themes above the last 5 years have been **very rough** for many themes across clean, alternative & traditional fossil fuel energy. For example despite **ECO** falling hard and ending this period down around near nil, this clean energy theme still sits close by a tracker for **Solar-only** (blue) also nearby nil; more notably that clean energy theme is far above **oil's tracker**, in orange at bottom down near some -70%; it's quite above a tracker for **Coal also blue** (was at bottom but rose sharply in 2016/1H 2017) and above too a **Natural Gas** tracker near bottom (burnt red).

So clean energy is only back to where it started 5 years ago, yet fossil fuels are down around -50 to -70% ... much here in energy down even more at the start of 2017! These last 5 years were remarkably tough across many energy themes, including fossil fuels: oil, coal, and natural gas. But Not All of the energy themes suffered so harshly...

Of note above finishing positive with 'better' results are 2 themes: global new energy NEX, **brown at** very top (tracker PBD) - and in **light green** (ironically) the 'browner-themed' WilderHill **Progressive Energy Index** (WHPRO). The NEX tracker is here is up near +60%, Progressive tracker up near +15% over 5 years. It's interesting too to see that Global clean new energy as captured by NEX did relatively quite 'better' than ECO this period above (especially from early 2014) as both are in clean/new energy. And lastly observe that while the NEX tracker is here best of these themes at some +60%, the Nasdaq Index is up by some +120% for the past 5 years to mid-Q2 2017; and up strikingly +150% past 10 years.

Appendix III: WHPRO Index via independent tracker PUW; component weights as seen in late-Q2 2017 on 6/15/2017 or about ~2 weeks before the rebalance to start Q3 2017. 44 Stocks:

<u>Name</u>	<u>Symbol</u>	<u>Weight</u>
Calpine Corp	CPN	3.187
REX American Resources Corp	REX	3.115
FMC Corp	FMC	3.089
Hannon Armstrong Sustainable Infra.	HASI	3.028
MasTec Inc	MTZ	2.943
Regal Beloit Corp	RBC	2.906
Owens Corning	OC	2.87
Altra Industrial Motion Corp	AIMC	2.869
AO Smith Corp	AOS	2.849
Corning Inc	GLW	2.805
Lydall Inc	LDL	2.791
Eaton Corp PLC	ETN	2.768
Avangrid Inc	AGR	2.74
ESCO Technologies Inc	ESE	2.704
Green Plains Inc	GPRE	2.699
Chart Industries Inc	GTLS	2.688
Woodward Inc	WWD	2.685
Chesapeake Energy Corp	CHK	2.679
Andersons Inc/The	ANDE	2.664
NRG Yield Inc	NYLD	2.657
Emerson Electric Co	EMR	2.644
McDermott International Inc	MDR	2.633
WABCO Holdings Inc	WBC	2.619
Albemarle Corp	ALB	2.615
Apogee Enterprises Inc	APOG	2.606
Tata Motors Ltd ADR	TTM	2.561
Methanex Corp	MEOH	2.517
EnerSys	ENS	2.509
Tenneco Inc	TEN	2.403
Covanta Holding Corp	CVA	2.381
Acuity Brands Inc	AYI	2.343
Range Resources Corp	RRC	2.295
Southwestern Energy Co	SWN	2.175
Cosan Ltd	CZZ	2.027
Golar LNG Ltd	GLNG	2.022
Cia Energetica de Minas Gerais ADR	CIG	1.812
Chicago Bridge & Iron Co NV	CBI	1.407
Hudson Technologies Inc	HDSN	0.657
Heritage-Crystal Clean Inc	HCCI	0.563
Kandi Technologies Group Inc	KNDI	0.541
Luxfer Holdings PLC ADR	LXFR	0.528
Clean Energy Fuels Corp	CLNE	0.505
CECO Environmental Corp	CECE	0.451
Pacific Ethanol Inc	PEIX	0.449

Appendix IV: WHPRO Index for the start of the New Quarter.

Sectors & Stock Weightings: WilderHill Progressive Energy Index (WHPRO) for start of Q3 2017. 43 stocks.

Each stock freely moves according to its share price after the rebalance; *Banded stocks are those under \$400 million in size and weighted at 0.5%.

Alternative Fuel - 24% Sector Weight (8 stocks @2.87% each +2 *banded)

Andersons, ANDE. Ethanol producer, corn-based; rail group is in fuel transport.
Chesapeake Energy, CHK. Natural gas, one of larger U.S. independent producers.
**Clean Energy Fuels*, CLNE. Natural gas fuel integration; for use in fleet vehicles.
Cosan, CZZ. Biofuels, Brazil-based using sugarcane feedstock, ethanol exporter.
Green Plains Energy, GPRE. Biofuel, ethanol; using U.S. domestic feedstock.
Methanex, MEOH. Methanol, liquid fuel may be derived from fossil fuels or organics.
**Pacific Ethanol*, PEIX. Biofuels, major U.S. producer of lower-carbon fuels.
Range Resources, RRC. Natural gas, produces in Appalachian & Gulf Coast regions.
Rex American, REX. Biofuels, with subsidiaries is a major U.S. ethanol producer.
Southwestern Energy, SWN. Natural gas, U.S. producer, also midstream services.

Conversion & Storage - 24% Sector weight (9 stocks @2.66% each)

Albermarle, ALB. Lithium & Lithium Compounds; for energy storage, transportation.
Altra Holdings, AIMC. Mechanical power transmission, electromechanical conversion.
Chart Industries, GTLS. Natural gas, LNG; liquefied gas storage/transport, efficiency.
Covanta Holding, CVA. Incineration, converts waste to energy (WtE); conglomerate.
EnerSys, ENS. Battery maker, for telecommunications, utilities, motive power.
FMC, FMC. Lithium producer for carbonate, metal, expanding hydroxide capacity.
Golar LNG, GLNG. LNG, major independent carrier, gas transport, regasification.
MasTec, MTZ. Engineering & construction, distribution of electricity, natural gas.
Wabco, WBC. Mechatronics, better vehicle mechanical/energy/braking controllers.

Better Efficiency - 18% Sector Weight (7 stocks @2.57% each)

Acuity Brands, AYI. LED lights, OLEDs, and controls for indoor & outdoor lighting.
A.O. Smith, AOS. Energy efficiency, innovations for water heating & monitoring.
Apogee, APOG. Advanced glass, for better efficiency, green building designs.
Emerson Electric, EMR. Broad work in energy efficiency, storage, lately biofuels.
Esco Technologies, ESE. Power grid, advances 2-way metering & communications.
Regal Beloit, RBC. Energy efficient motors, in commercial, industrial, homes etc.
Woodward, WWD. Energy controllers, optimization, industrial turbines in generation.

Emission Reduction - 12% Sector Weight (4 stocks @2.62% each +3 *banded)

**CECO Environmental*, CECE. End-of-pipe emissions controls and pollution reduction.
Corning, GLW. Diverse, activity includes emissions reduction, filters, and catalysts.
**Kandi Technologies*, KNDI. Developing small gasoline and urban electric vehicles.
**Luxfer Holdings PLC*, LXFR. Advanced material, reduced emissions, gaseous storage.
McDermott, MDR. Natural Gas; fewer emissions/CO2 vs. coal; EPCI in LNG facilities.
Tata Motors, TTM. Smaller & 'nano' vehicles, India-based with worldwide sales.
Tenneco, TEN. Automotive end-of-pipe emissions controls, catalytic converters.

New Energy Activity - 9% Sector weight (3 stocks @2.66% each +2 *banded stocks).

Eaton, ETN. Hybrids, better electric and fluid power in truck & auto applications.

**Hudson*, HDSN. Refrigerant HFCs reclamation; reduces potent greenhouse gases.
 **Heritage Crystal Clean*, HCCI. Oil re-refining, modern waste reuse and recycling.
Lydall, LDL. Thermal and filtration separation; innovative energy efficiency.
Owens Corning, OC. Materials lightening, building insulation composite materials.

Utility - 13% Sector weight (5 stocks @2.60% each)

Avangrid, AGR. Electricity & Natural Gas, generation, storage, distribution.
Calpine, CPN. Natural Gas & Geothermal, North America, lower-carbon assets
Companhia Energetica de Minas Cemig, CIG. Brazil Utility, large hydroelectric.
Hannon Armstrong, HASI. Energy efficiency, capital & finance for infrastructure.
NRG Yield, NYLD. Contracted power generation and thermal, also some renewables.

Chart for the WHPRO Index via independent tracker (in bold) Past 5 years to May 31, 2017 - versus the ECO Index shown in light blue via its independent tracker:



Source: Bigcharts.com

WHPRO Index here in bold last 5 years mid-2012 - May 31, 2017 seen via a tracker above. This includes a period of WHPRO rising by some +40% from June 30, 2012 to Summer 2014 and hitting a relative high - dropping strongly to nadir early 2016 - then rising over 2016 up to December. It finishes up near +10%; ECO down near -10%. The WHPRO theme for less CO2/pollution from fossil fuels can move rather quite unlike the ECO basket blue tracker that had gained more, then dropped relatively much harder for example 2014-2016.

Another observation is that this chart above differs notably from a 5 years chart to Q2 of 2016 that was shown a few ECO Quarterly Reports ago. That chart to 2016, had shown WHPRO finishing down about -20%, ECO down by nearly -60%. One difference then can be attributed to starting points: Summer 2011 vs Summer 2012. WHPRO here starts out now 'lower' - the ECO tracker too starts 'lower' as well. So sharp declines back some 5 years ago in 2011, have meant the Indexes might display 'better' past-5 year returns now.

That said all 3 WilderHill Indexes are in 2017 far below their previous all time highs. ECO is *much* lower - having been back in 2007 several-fold higher - in some part due to the solar sub-theme having fallen so greatly from its peaks (and all of the fossil fuels have fallen too). As always, past movements are never an indication of future performance.

Appendix V: WilderHill New Energy Global Innovation Index (NEX) seen late-Q2 2017 via independent tracker (PBD) on 6/15/17 or ~2 weeks before Rebalance to start Q3 2017. 99 in tracker:

<u>Name</u>	<u>Symbol</u>	<u>Weight</u>
Universal Display Corp	OLED	2.528
Tesla Inc	TSLA	2.523
Philips Lighting NV	LIGHT	2.423
OSRAM Licht AG	OSR	2.265
Nibe Industrier AB	NIBEB SS	2.147
Hannon Armstrong Sustainable Infra.	HASI	2.083
Itron Inc	ITRI	2.011
Kingspan Group PLC	KSP	1.901
DONG Energy A/S	DENERG DC	1.871
Caverion Corp	CAV1V FH	1.824
Veeco Instruments Inc	VECO	1.816
Vestas Wind Systems A/S	VWS DC	1.807
EDP Renovaveis SA	EDPR	1.803
BYD Co Ltd		1211 1.783
Pattern Energy Group Inc	PEGI	1.772
Gamesa Corp Tecnologica SA	GAM	1.754
FDG Electric Vehicles Ltd		729 1.704
Renewables Infrastructure Group Ltd	TRIG LN	1.697
Meidensha Corp		6508 1.692
Epistar Corp		2448 1.671
Greencoat UK Wind PLC/Funds	UKW LN	1.658
Cree Inc	CREE	1.649
Boralex Inc	BLX	1.642
Acuity Brands Inc	AYI	1.621
NRG Yield Inc	NYLD	1.595
SunPower Corp	SPWR	1.584
TransAlta Renewables Inc	RNW	1.58
GS Yuasa Corp		6674 1.571
First Solar Inc	FSLR	1.554
Nordex SE	NDX1	1.478
China High Speed Transmission Equip.		658 1.436
China Longyuan Power Group Corp Ltd		916 1.434
Huaneng Renewables Corp Ltd		958 1.386
Xinjiang Goldwind Science & Techn.		2208 1.381
Canadian Solar Inc	CSIQ	1.378
SMA Solar Technology AG	S92	1.35
Superblock PCL	SUPER-R TB	1.301
Energy Absolute PCL	EA-R TB	1.212
TerraForm Power Inc	TERP	1.191
Atlantica Yield plc	ABY	1.184
Xinyi Solar Holdings Ltd		968 1.173
Novozymes A/S	NZYMB DC	1.123
Drax Group PLC	DRX LN	1.085
Gigasolar Materials Corp		3691 1.023
Green Plains Inc	GPRE	0.954

GCL-Poly Energy Holdings Ltd		3800	0.888
China Everbright International Ltd		257	0.872
Sao Martinho SA	SMT03		0.869
Canvest Environmental Protection Group		1381	0.851
Verbund AG	VER AV		0.801
Contact Energy Ltd	CEN		0.792
Mercury NZ Ltd	MCY		0.789
Ormat Technologies Inc	ORA		0.783
Energy Development Corp	EDC		0.762
Innergex Renewable Energy Inc	INE		0.755
Saeta Yield SA	SAY		0.585
Ameresco Inc	AMRC		0.578
Kandi Technologies Group Inc	KNDI		0.55
EnerNOC Inc	ENOC		0.546
Odelic Co Ltd		6889	0.531
Credit Suisse Real Estate Fund Green	GREEN SW		0.522
Senvion SA	SEN		0.517
Dialight PLC	DIA LN		0.516
Tanaka Chemical Corp		4080	0.511
Everlight Electronics Co Ltd		2393	0.505
Silver Spring Networks Inc	SSNI		0.496
Meyer Burger Technology AG	MBTN SW		0.494
TPI Composites Inc	TPIC		0.476
Ricardo PLC	RCDO LN		0.471
LSI Industries Inc	LYTS		0.47
China Titans Energy Tech.		2188	0.469
Plug Power Inc	PLUG		0.463
Maxwell Technologies Inc	MXWL		0.461
SolarEdge Technologies Inc	SEDG		0.453
Wasion Group Holdings Ltd		3393	0.452
China Power New Energy Develop.		735	0.446
Vivint Solar Inc	VSLR		0.445
Ballard Power Systems Inc	BLDP		0.423
Panda Green Energy Group Ltd		686	0.399
Sunrun Inc	RUN		0.382
JA Solar Holdings Co Ltd ADR	JASO		0.36
Capital Stage AG	CAP		0.359
West Holdings Corp		1407	0.349
SPCG PCL	SPCG-R TB		0.345
REC Silicon ASA	REC		0.339
Utilitywise PLC	UTW LN		0.338
Advanced Lithium Electrochemistry.		5227	0.337
GCP Infrastructure Investments Ltd	GCP LN		0.337
Renewable Energy Group Inc	REGI		0.336
Sino-American Silicon Products Inc		5483	0.331
Albioma SA	ABIO FP		0.329
Neo Solar Power Corp		3576	0.327
China Singyes Solar Tech.		750	0.325
Motech Industries Inc		6244	0.299

Takuma Co Ltd	6013	0.297
Shunfeng International Clean Energy	1165	0.293
VERBIO Vereinigte BioEnergie AG	VBK	0.264
Akenerji Elektrik Uretim AS	AKENR TI	0.263
eRex Co Ltd	9517	0.228

Recent past Sector Weightings in NEX Index, as seen late last year in 2016:

<u>NEX Index Sector</u>	<u>Key</u>	<u>NEX Sector</u>
<u>Weights - Q4 2016</u>		
1.00%	ECV	Energy Conversion
31.83%	EEF	Energy Efficiency
5.64%	ENS	Energy Storage
9.03%	RBB	Renewables - Biofuels & Biomass
5.43%	ROH	Renewables - Other
17.92%	RSR	Renewable - Solar
29.14%	RWD	Renewable - Wind

Appendix VI:

WilderHill New Energy Global Innovation Index (NEX) for start of Q3 2017.

Grouped here generally by NEX Index Sector:

(subject to revision; see http://www.nexindex.com/Constituents_And_Weightings.php)

For values see also, http://www.nex-index.com/Constituents_And_Weightings.php

Here are links to quotes to NEX Index available on the web:

NEX Quotes & Data	Ticker	Bigcharts	Bloomberg	Marketwatch	Yahoo
USD Price Index	NEX	51599W10	NEX:IND	NEX	^NEX
EUR Price Index	NEXEU	26499Z42	NEXEU:IND	NEXEU	^NEXEU
GBP Price Index	EXBP	26499Z40	NEXBP:IND	NEXBP	^NEXBP
JPY Price Index	NEXJY	26499Z38	NEXJY:IND	NEXJY	^NEXJY
USD Total Return Index	NEXUST	26499Z43	NEXUST:IND	NEXUST	^NEXUST
EUR Total Return Index	NEXEUT	26499Z41	NEXEUT:IND	NEXEUT	^NEXEUT
GBP Total Return Index	NEXBPT	26499Z39	NEXBPT:IND	NEXBPT	^NEXBPT
JPY Total Return Index	NEXJYT	26499Z37	NEXJYT:IND	NEXJYT	^NEXJYT

*The Global NEX Index only is a unique co-equal Partnership as between three entities: Bloomberg New Energy Finance with global presence; Josh Landess of First Energy Research; and Dr. Rob Wilder - jointly being WilderHill New Energy Finance LLC (WHNEF). NEX is produced by this WHNEF.
