

We provide comment on the fourth quarter of 2017 for Alternative Energy:

- Quarterly commentary
- Outlook
- Portfolio changes
- Performance
- Holdings

### Quarterly commentary

The fourth quarter was another good quarter for the alternative energy sector and the fund. A strong following wind for broad markets and a more stable market for financing projects have given better visibility on future earnings growth for companies. We believe that this is creating a platform for better equity returns for investors in the sector.

The following factors supported alternative energy stocks over the quarter:

- Strong Chinese solar demand
- Growing public and government recognition of renewables' competitiveness versus fossil fuels
- Robust growth in global electric vehicle demand, particularly in China and Norway
- Higher oil prices
- Record-high global greenhouse gas statistics after three years of no greenhouse gas emissions growth
- Renewable energy successes in power auctions in Latin America and India

The following factors weighed down on alternative energy stocks:

- The pending US solar trade case
- US tax reform concerns
- Slow payment of subsidies to generators in China
- Concerns about low pricing from increased prevalence of auctions

### Performance contribution

Top 5 performing stocks	Q4 2017	Bottom 5 performing stocks	Q4 2017
First Solar	47.17%	Boer Power	-27.54%
China Singyes Solar Technologies	29.94%	Good Energy	-12.85%
SunPower	15.64%	Senvion	-11.05%
Iniziative Bresciane	13.11%	Mytrah Energy	-8.89%
Cosan	9.47%	TPI Composites	-8.42%

*Past performance does not guarantee future results. Holdings are subject to change.*

### *Solar*

The solar sector fared well this quarter, with several companies seeing double-digit returns. First Solar, a US head-quartered thin-film module manufacturer, has benefited from the US International Trade Commission siding with Suniva to propose an import tariff on imported silicon cells. First Solar is one of the few companies – and the only major module supplier - that does not use silicon cells for its modules and would not be subject to the proposed tariff. Analysts expect First Solar to be able to command higher prices for its modules in the US but still be able to undercut modules using imported silicon cells. First Solar's balance sheet continues to be strong and its manufacturing capacity for 2018 is completely sold out.

JA Solar and JinkoSolar were slightly weaker in the fourth quarter for the same reason that First Solar was up. JA Solar and JinkoSolar supply silicon-based modules and could see their market share decrease in the US thanks to potential import tariffs. Canadian Solar was up slightly as its business is less exposed to module sales, consequently less exposed to potential import tariffs. SunPower, a US head-quartered high-efficiency silicon module manufacturer, rose significantly due to exceeding guidance and expectations in the third quarter. For the Chinese manufacturers the US forms relatively small percentage of their sales, so the introduction of a tariff would only have a limited impact on their sales and profitability.

China Singyes Solar Technology, a Chinese solar project developer, and Xinyi Solar, a solar developer and glass backsheet supplier for module manufacturers, both had positive returns this quarter. The unexpected dramatic increase in solar installations in China is likely to translate into higher earnings for both companies.

### *Wind*

The wind sector holdings made a slight negative contribution to the portfolio's returns in the fourth quarter in 2017. Canadian wind farm developer, owner and operator Boralex returned 9.8% in the fourth quarter, on the back of increased revenues from energy sales in Q3 (year-on-year increase of 38%), and increased capacity under operation (28% increase since year end 2016). China Suntien Green Energy, a Chinese wind asset owner, also contributed positively to the fund this quarter. The stock rallied after issuing short-term commercial papers and good quarterly earnings. Most of Suntien's Wind power assets are in regions without high wind power curtailment. Huaneng also contributed positively, having most of its wind power assets in regions where curtailment is not an issue. China Datang, China Longyuan and Concord New Energy are more exposed to regions with high wind power curtailment and fared worse over the quarter, contributing negatively to the portfolio returns. Mytrah, a London-listed parent company of an Indian developer and owner of wind assets, suffered due to delayed wind projects in India. Good Energy had failed to collect sufficient customer revenues, with which the market was unimpressed.

Our two wind manufacturing holdings took a hit this quarter, along with other wind manufacturing stocks not in the portfolio. Uncertainty around the outcome of the US tax reform and its impact on the US wind sector has shaken some confidence in wind companies. Furthermore, concerns about the potential for oversupply in the wind market has scared some into expected extreme margin compression and reducing valuations. TPI Composites, a US-based supplier of wind turbine blades, and Senvion, a German wind turbine manufacturer, both fell victim to the confidence drop in the sector. However, both companies have well

differentiated product positioning in the market and should be well placed to generate shareholder returns from continued steady growth of the wind market.

#### *Efficiency*

We have several subsectors under the 'efficiency' umbrella. The two best performing stocks had exposure to electric vehicles. LG Chem, a new position acquired to replace the fund's holding in Centrotec has had a strong start within the portfolio. LG Chem is a Korean materials and li-ion battery manufacturer that reported strong earnings, with a year-on-year net income increase of 83.4%. The company's energy solutions division, which sells batteries to electric vehicle manufacturers, is on track to turn an annual profit for the first time in 2018. Ricardo announced positive results for the year ended June 30, 2017, showing a record order book, meeting profit expectations and increasing its full-year dividend.

Kingspan, an insulation building materials group, and Sensata, a sensors and controls manufacturer, both fared well. Kingspan posted lower-than-expected growth for the third quarter 2017 but recovered by year end. Sensata increased their guidance up to 2020, which was well received by the market. Larger industrial companies did not fare as well this quarter, with Schneider Electric, Nibe Industrier and Prysmian giving up some of their gains, although still having performed well over the year. Prysmian bought their US competitor General Cable in cash. After a short-term fall in the share price, we have now seen a near full recovery in the stock price and believe that the transaction will be accretive over the medium term.

Wasion and Boer Power, two Hong Kong-listed stocks, had a difficult quarter. Wasion, a Chinese metering manufacturer, has been awarded significant orders from its client 'State Grid' for meters and data collection but this has yet to be fully reflected in the share price. Bower Power continues to restructure, but we are confident that the share price will recover as visibility on future earnings improves.

#### *Hydro*

Our only hydro holding, Iniziative Bresciane, had a strong run following the commissioning of several new hydroelectric plants in Italy.

#### *Geothermal*

Ormat, a developer and owner of geothermal plants, also had a positive end to the year. Having met guidance, management have set out their plans to cut costs while maintaining their growth plans.

#### *Biofuel*

Cosan, a Brazilian natural gas distributor, bought a 16.8% stake in Comgas from Shell after the latter exercised its put options. After the transaction completion had been announced early December, Cosan stock recovered to end broadly flat over the quarter.

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**Outlook**

**Solar PV**

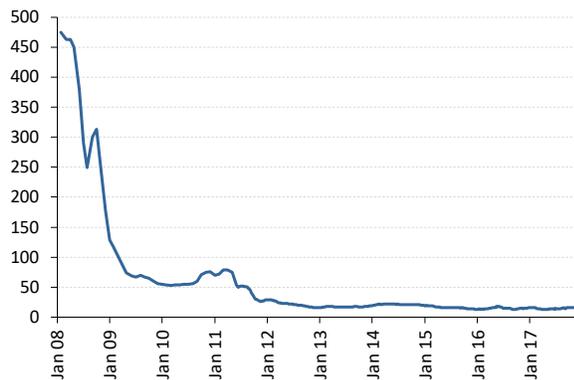
	2013	2014	2015	2016	2017e	2018e	2019e
<b>World</b>	43	46	56	75	98	111	133
Asia	23	27	36	48	71	75	78
North America & Caribbean	6	7	8	15	12	13	18
EU Europe	10	7	8	6	6	7	11
Non-EU Europe	0	1	1	2	3	4	4
Oceania	1	1	1	2	3	3	4
Central & South America	1	1	1	1	2	3	5
Middle East & North Africa	0	1	1	1	1	4	8
Africa (excl. North Africa)	0	1	0	1	1	2	4

Source: Bloomberg. Note: Sorted by 2017 forecast installations

Forecasts are inherently limited and cannot be relied upon.

The solar sector has had an exceptionally high growth year with China unexpectedly contributing an estimated 50GW of demand versus initial market expectations of 30GW. This could be enough to nudge total solar demand in 2017 to over 100GW globally and we expect demand to grow further in 2018. The demand increase means that the solar value chain is showing less supply-demand imbalance than expected.

**Long-term Silicon price (\$/kg)**



Source: Bloomberg

**TTM Silicon price (\$/kg)**

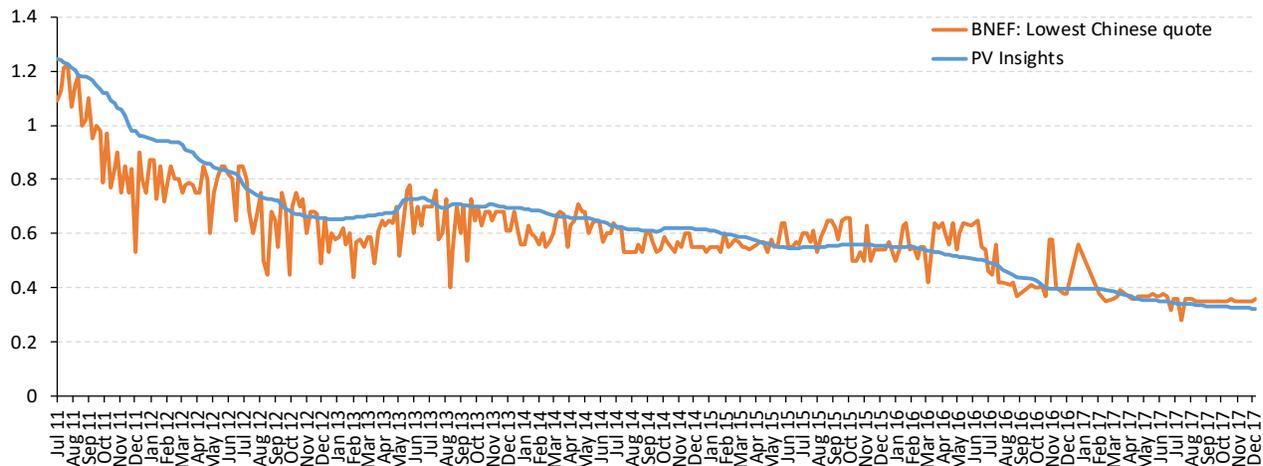


Source: Bloomberg

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Module Price (\$/W)



Source: Bloomberg (From July 2011 to December 2017)

Module prices have stabilized in the second half of 2017 due to strong demand in China and a surge of demand for solar modules in the US in anticipation of tariffs being imposed on imported modules by the Section 201 Suniva trade case.

Global solar demand forecasts continue to be revised upwards by analysts, mainly in response to demand from China and the increased competitiveness of solar over conventional power generation sources. China's appetite for new solar plants shows no sign of abating. China's air pollution levels remain high on the political agenda and GDP growth is driving an ever-increasing demand for energy. Most Chinese installations to date have been large, utility-scale projects, and now policy support is increasing for the rooftop solar market which provides a large additional unaddressed market to support continued growth.

The second-largest market for solar is the United States, where the Section 201 trade case brought forward by Suniva to the International Trade Commission may result in tariffs on imported silicon cells. Given that almost all low-cost silicon cells are manufactured outside of the US (over 80% in China), the ITC decision to back Suniva means that cheap solar modules could be difficult to come by in the United States for the next few years. If imposed, there would likely be fewer solar installations in the US in the short-term, but we believe that in the medium-to-long term the US solar market will remain strong. It is worth noting that the US solar market is less than a quarter the size of the Chinese solar market, and only represents around 10% of the global solar market. Even a large drop in installations in the US does not translate into global solar demand decreasing significantly. Nevertheless, we continue to view the US solar sector as a sentiment driver for many solar-related stocks.

India is now the third-largest solar market, overtaking Japan. India had set an ambitious goal of 100GW of total solar capacity by 2022, with 60GW coming from utility-scale plants and 40GW from rooftop

installations. The likelihood of the goal being reached may be low, but the ambition is there. The country installed 4.4GW in 2016, and is expected to have installed almost double that in 2017 (about 8GW). Renewable energy policy and import duty disputes within the country could create headwinds to demand growth for the next year, but in the medium to long term India has characteristics that are very supportive for solar installation growth. The country has abundant sunshine, steadily growing electricity demand, high electricity prices, a weak grid and capable developers offering solar bids at or below coal power generation costs.

The rest of the world continues to see solar demand growth. In Europe, where several countries went through boom and bust cycles in the early 2000s, solar demand is returning to growth. This is in part due to the 2020 renewable energy goals set for each country within the European Union, but mainly due to the competitiveness of unsubsidized solar – both rooftop and ground-mounted. There have been unsubsidized projects announced in many Mediterranean countries.

Southeast Asian countries are considering low-cost policy structures, i.e. auctions or feed-in tariffs capped at local generation costs. We view this region as having a lot of potential for solar installations.

The Middle East has disappointed many in the solar sector by announcing tenders and projects which ultimately did not result in as much installation as anticipated. We see this region as having the potential to support many countries with multi-GW solar markets and projects are now starting to move from the drawing board to rooftops (or the desert floor).

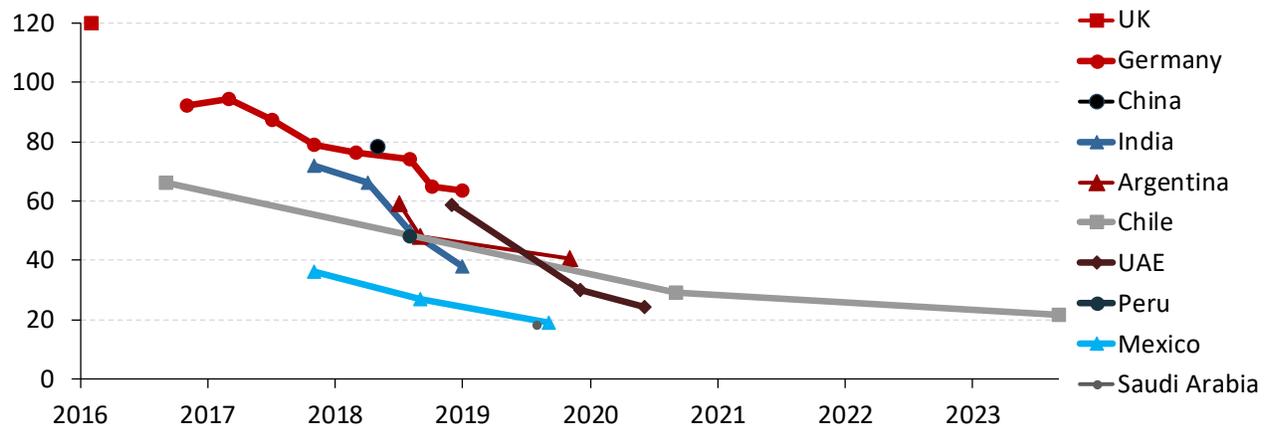
An increasing number of countries are embracing the potential for low cost domestically generated energy that solar affords and we expect to see growth from a more widespread range of geographies over the next five years, while China will remain supportive of its dominant solar industry.

#### *Solar LCOE developments*

Yet more lowest-ever solar records were set in Chile, Mexico and Saudi Arabia in Q4 2017. Enel's Chilean subsidiary dominated the most recent power auction, with one solar bid as low as \$21.5/MWh, the second lowest ever recorded in Latin America. The lowest ever recorded in Latin America was in Mexico's most recent auction, coming in at \$19.2/MWh. The lowest ever recorded worldwide was a bid in Saudi Arabia's first auction at \$17.9/MWh, a bid by Masdar from the UAE and France's EDF. Both the projects in Mexico and Saudi Arabia are due to come online in 2019. Although module prices have fallen, the stability of the module price may impact the completion of these projects given the short time horizon. The Chilean bid of \$21.5/MWh is regarding a project that need not be commissioned until 2024. Although some may hail these projects as unviable, competitor bids were not too far off the winning project bids.

It is worth noting how far the industry has come in terms of competitiveness. In 2014 the tariff of \$58.5/MWh in Dubai was the lowest cost tariff for a solar project. Many analysts believed this to be an unviable tariff level that was awaiting some miraculous cost decline in equipment. Today such a tariff in a particularly sunny country such as the UAE would be ridiculed as too expensive.

*PV bids by delivery date (\$/MWh)*



Source: Bloomberg, Cleantechica, Guinness Atkinson Asset Management  
 Forecasts are inherently limited and cannot be relied upon.

## Wind

	2013	2014	2015	2016	2017	2018	2019
World (onshore)	32	48	59	53	53	56	57
Asia	17	24	32	26	27	25	26
EU Europe	10	10	10	11	11	9	9
North America & Caribbean	3	8	10	10	9	12	14
Central & South America	1	4	3	3	3	4	3
Non-EU Europe	1	1	1	1	2	2	2
Africa (excl. North Africa)	0	1	1	0	1	1	0
Oceania	0	1	0	0	0	1	2
Middle East & North Africa	0	0	0	0	0	1	2
Offshore	2	1	4	1	5	4	6

Source: Bloomberg. Note: Sorted by 2017 forecast installations.

Forecasts are inherently limited and cannot be relied upon.

Like the solar market, China remains an essentially closed market to non-Chinese manufacturers. China is also the largest source of wind power demand and annual level of installations have stabilized at around 20GW each year. Europe is 20% of the global wind market, with demand between 9 and 12 GW per year. North America comprises a similarly sized market, with good demand visibility through to 2020 as Production Tax Credits provide continuing albeit falling support. Although some projects in the United States may have been delayed as developers waited to see which version of the tax reform would be passed, there has not been meaningful demand destruction. Whether the tax reform will decrease appetite for tax credits from wind projects is yet to be seen, but they are just one way to finance a renewables project.

India has an ambitious target of 60GW of wind installations by 2022, but there is a lack of clarity as to how this target would be reached. India has seen several auctions and record-low wind prices this year, which should be good for overall demand. Latin America, despite its natural resources, simply does not have the energy demand growth to propel the global wind market to strong growth. Latin America, like India, has

been particularly encouraging showing the world how low wind can go. The rest of the world will likely be the source of growth, as economic competitiveness of wind convinces more countries' governments to put accommodating policy in place.

With the global wind market stabilizing, the global wind supply chain is in oversupply. Nevertheless, due to China being a relatively closed market, there is some hope that Chinese companies would not be eating into non-Chinese wind turbine manufacturers' market share.

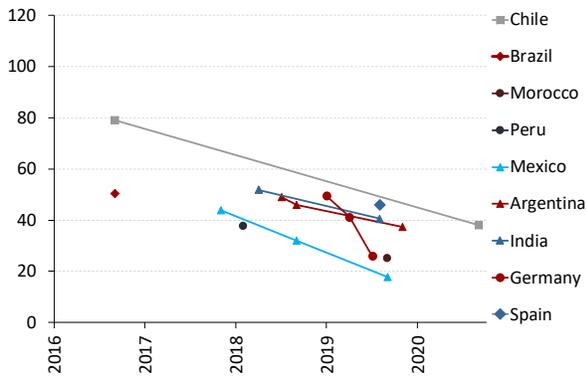
**Offshore wind updates**

The subsidy-free bids from Germany's previous offshore wind tender have spurred other countries to strive for similar standards. In the Netherlands, a tender for two offshore wind farms, totalling 750MW of capacity, ran between December 15-21. The Netherlands Enterprise Agency only accepted bids for the wind parks without subsidies. Winners are to be announced 13 weeks after closing of the tender.

After the highly-successful CfD auctions rounds in the UK in September 2017, the UK government announced that future renewable energy auctions for 'less established technologies' – including offshore wind - could receive a total of £557 million (\$752m) in subsidies. This would be enough to enable around 10GW of offshore wind to come online in the 2020s, according to Bloomberg analysts.

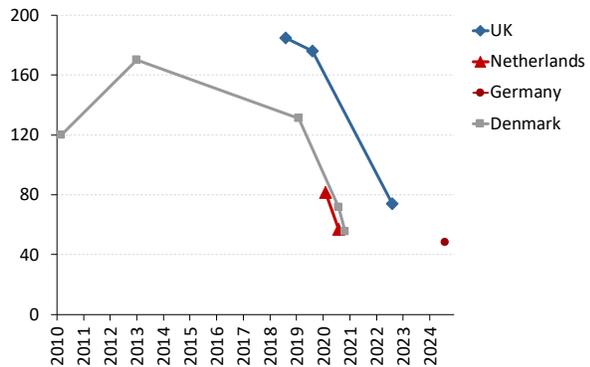
*Wind LCOE developments*

**Onshore wind bids by delivery date (\$/MWh)**



Source: Bloomberg, Guinness Atkinson Asset Management

**Offshore wind bids by delivery date (\$/MWh)**



Source: UK government, Government of the Netherlands, Windpower Monthly, Vattenfall, Guinness Atkinson Asset Management

Note: Projects have not been standardized for plant lifetime or financing cost and so values may not necessarily be directly comparable.

Developers are reaping the benefits of increased competition in the manufacturing space by getting more power out of the newer turbines for less capex. However, the power auctions sweeping the globe are also putting pressure on investor and developer returns. Nevertheless, the low \$/MWh power prices wind is able to deliver, coupled with its ability to generate power overnight and not just during the day like solar, show

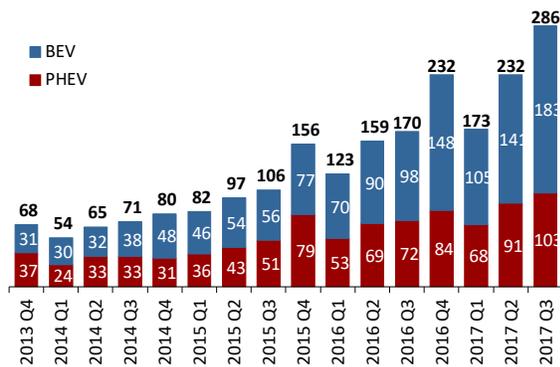
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that there is a long-term opportunity for the wind power sector. In most auctions held, a new record for that country or region was achieved.

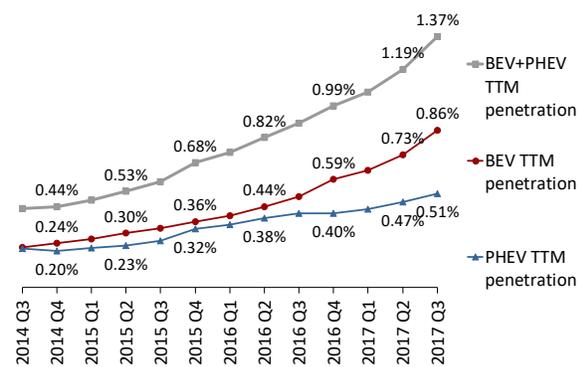
**Electric Vehicles**

**Quarterly plug-in electric vehicle sales in selected countries (thousands)**



Source: Bloomberg, Cleantechnica

**Trailing 12-month plug-in electric vehicle penetration of new car sales in selected countries (%)**



Source: Bloomberg. Note: TTM means trailing twelve months. Total EV sales across selected countries divided by total car sales in these countries show the penetration above.

Note: Selected countries include Austria, Belgium, Canada, China, Denmark, France, Germany, Ireland, Italy, Japan, Netherlands, Norway, Spain, Sweden, Switzerland, UK and USA. These countries were chosen for data availability and represent three-quarters of all car sales globally.

Plug-in electric vehicles comprise both pure battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs).

Plug-in electric vehicle (EV) sales have increased substantially from 2016 to 2017. We expect Q4 2017 will be another record quarter for plug-in electric vehicle sales given seasonal trends. The CAGR since 2013 until Q3 2017 is 47% and the compound quarterly growth rate for the same period stands at 10%.

The trailing 12 months market share of plug-in electric vehicles has passed 1% in most developed markets and in China. The growth rate of fully-electric vehicles, ie battery electric vehicles (BEVs), has been greater than that of plug-in hybrid electric vehicles (PHEVs), which have smaller batteries with a shorter range and still have a combustion engine for when the battery is depleted.

Car manufacturers have introduced more fully electric models to market in 2017 than any year before and all the main vehicle manufacturers are now developing electric vehicle ranges to compliment or even replace their existing range of internal combustion engine vehicles.

**Portfolio changes**

We sold Centrotec, a Germany heating and boiler installer. Sales growth had been expected after a change in law that required commercial buildings to install new boilers to meet efficiency standards. Although the growth never materialized, we were able to sell the stock for roughly the same price as it was originally

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introduced into the portfolio. We replaced the holding with LG Chem, a Korean chemicals and materials provider. LG Chem has reasonable valuation metrics and a leading battery business which is forecast to turn profitable in 2018. It is well placed to capitalize on the growing markets for electric vehicles and large scale stationary storage via its lithium-ion battery division.

**Fund Performance (Q4 2017)**

The Guinness Atkinson Alternative Energy Fund was up 2.33% for the fourth quarter of 2017. This compared to an increase in the Wilderhill Clean Energy Index of 8.94%, an increase in the Wilderhill New Energy Global Innovation Index of 4.18% and an increase in the MSCI World Index of 5.62%.

**Total Returns as of 12/31/17**

Total Returns	Q4 2017	2H 2017	1 year	3 year	5 year	10 year
Guinness Atkinson Alternative Energy Fund	2.33%	10.55%	20.68%	-3.96%	4.16%	-14.38%
Wilderhill New Energy Index	4.18%	12.60%	28.70%	6.92%	13.23%	-6.24%
Wilderhill Clean Energy Index	8.94%	18.19%	39.81%	-0.81%	5.15%	-15.04%
MSCI World Index	5.62%	10.88%	23.10%	9.91%	12.30%	5.68%

CY = Calendar

YearExpense Ratio: 1.99% (net); 2.60% (gross)

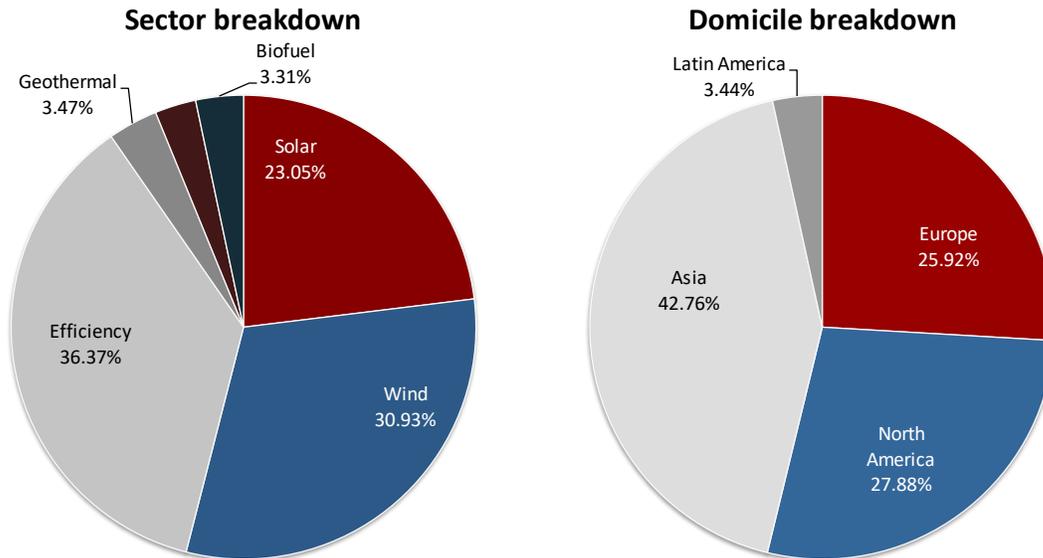
*All return figures represent average annualized returns except for periods of one year or less, which are actual returns.*

*Performance data quoted represents past performance; past performance does not guarantee future results. The investment return and principal value of an investment will fluctuate so that an investor's shares, when redeemed, may be worth more or less than their original cost. Current performance of the Fund may be lower or higher than the performance quoted. Performance data current to the most recent month end may be obtained by visiting [www.gafunds.com](http://www.gafunds.com) or calling 800-915-6566.*

*The Advisor has contractually agreed to reduce its fees and/or pay Fund expenses (excluding Acquired Fund Fees and Expenses, interest, taxes, dividends on short positions and extraordinary expenses) in order to limit the Fund's Total Annual Operating Expenses to 1.98% through June 30, 2018. To the extent that the Advisor waives its fees and/or absorbs expenses to satisfy this cap, it may recoup a portion or all of such amounts absorbed at any time within three fiscal years after the fiscal year in which such amounts were absorbed, subject to the 1.98% expense cap in place at the time recoupment is sought, which cannot exceed the expense cap at the time of the waiver. The expense limitation agreement may be terminated by the Board of the Fund at any time without penalty upon 60 days' notice.*

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**Fund Holdings**



Sector holdings are subject to change

Top 10 holdings as of 12/31/17	% of assets
Tianneng Power International Ltd	3.79%
LG Chem Ltd	3.57%
Ormat Technologies Inc	3.40%
Senvion SA	3.35%
China Suntien Green Energy Corp Ltd	3.35%
TPI Composites Inc	3.32%
Ricardo PLC	3.32%
Borex Inc	3.31%
Xinyi Solar Holdings Ltd	3.31%
China Datang Corp Renewable Power Co Ltd	3.31%

Fund holdings are subject to change

Edward Guinness and Samira Rudig

January 2018

Commentary for our views on global energy and Asia markets is available on our website. Please [click here](#) to view.

Total returns reflect a fee waiver in effect and in the absence of this waiver, the total returns would be lower.

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Opinions expressed are subject to change, are not guaranteed and should not be considered investment advice.

This information is authorized for use when preceded or accompanied by a prospectus for the Guinness Atkinson Alternative Energy Fund. The [prospectus](#) contains more complete information, including investment objectives, risks, charges and expenses related to an ongoing investment in The Fund. Please read the prospectus carefully before investing.

**The Fund invests in foreign securities which will involve greater volatility and political, economic and currency risks and difference in accounting methods. The risks are greater for investments in emerging markets. The Fund is non-diversified meaning its assets may be concentrated in fewer individual holdings than diversified funds. Therefore, the Fund is more exposed to individual stock volatility than diversified funds. The Fund also invests in smaller companies, which will involve additional risks such as limited liquidity and greater volatility. Current and future portfolio holdings are subject to risk. The Fund's focus on the energy sector to the exclusion of other sectors exposes the Fund to greater market risk and potential monetary losses than if the Fund's assets were diversified among various sectors.**

Fund holdings and/or sector allocations are subject to change at any time and are not recommendations to buy or sell any security.

The WilderHill New Energy Global Innovation Index (NEX) is a modified dollar weighted index of publicly traded companies which are active in renewable and low-carbon energy, and which stand to benefit from responses to climate change and energy security concerns.

The WilderHill Clean Energy Index (ECO) is a modified equal dollar weighted index comprised of publicly traded companies whose businesses stand to benefit substantially from societal transition toward the use of cleaner energy and conservation.

The MSCI World Index (MXWO) is a capitalization weighted index that monitors the performance of stocks from around the world.

One cannot invest directly in an index.

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