GUINNESS ATKINSON
FUNDS

2020 Outlook for Alternative Energy

The Guinness Atkinson Alternative Energy Team, January 2020

2019 IN REVIEW

2019 was a year in which the outlook for Sustainable Energy companies benefitted from increasing social and government pressure for improved global energy efficiency and cleaner energy production and consumption. While the intent is clear, limited transition was likely achieved in 2019; achieving Paris commitments will need more effort over a time period measured in decades.

The dominant themes in the sector for 2019 were:

- **The economics of sustainable power generation** improved further in 2019 with solar and wind now embedded as the most economic sources of new supply in many countries. Wind and solar power generation will likely represent around 3.5% of global energy supply in 2019 as global power grids are still able to accept the variability of their supply without significant new investments. Solar capacity installations are likely to have increased by 20GW to 129GW in 2019, despite China seeing significantly lower installations than in 2018. Wind installations are likely to have increased by 18GW to 68GW in 2019, with offshore installations up 50% to 9GW.
- **Improvements in the displacement and energy efficiency** are likely to have disappointed again, having disappointed every year since 2015. While volatile weather conditions have brought increased energy demand in 2018 and 2019, we find that global energy prices are, on average, at relatively low levels and that there is little economic incentive for consumers to become more efficient. In many European countries, we have seen a rise in social conscience around carbon dioxide emissions and the sustainability theme in general but the scale of energy reduction, as it currently stands, has had little effect on overall global energy demand. European carbon prices rose by more than 50% to average around Eur25 in 2019 but they are still not high enough, in our opinion, to force behavioral change or to incentivize carbon capture projects.
- **The manufacturing cost of lithium ion batteries**, the facilitator of the growing **electrification** of the global energy market, is likely to have fallen again in 2019, having fallen in 2018 to c.$176/KWh. This battery cost is still too high to electrify personal transportation at scale without subsidy but a quadrupling of manufacturing capacity between 2018 and 2023 will help to bring costs lower. Sales of electric vehicles stuttered in 2019, as a result of subsidy reductions in the US and China, but the direction of travel is clear; governments and cities mandated further strict decarbonization targets in 2019 and the auto industry added a record number of new EV models.

Sustainable Energy equities delivered a strong return in 2019; the Guinness Atkinson Alternative Energy Fund delivered 30.2% total return versus the MSCI World Index at 27.3%. Underlying sustainable energy company profitability has continued to improve; our portfolio of sustainable energy equities delivered in excess of 10% return on capital employed in 2019, up from 9% in 2018 and materially higher than the post-financial crisis level of 6% in 2009. Despite the strong performance in 2019, we believe that the broader market remains skeptical of the sustainability of these 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 or calling 800-915-6566.

OUTLOOK FOR 2020

- **We expect the "energy transition" theme to remain central to political debate in 2020 as it offers an economic solution to energy security, urban pollution & carbon emissions for most countries.**

- Despite pushes for greater efficiency, **world energy demand will grow again in 2020.** Renewables will likely have satisfied only one-third of total global energy demand growth over the five years up to end-2020. Carbon emissions, from the combustion of fossil fuels, will reach new peaks. A ratcheting of carbon prices, to reward the development of lower carbon investments, is inevitable if governments keep to their Paris Agreement commitments.

- We need to see energy **efficiency** take a center stage. The slowdown in energy efficiency gains since 2015 are unlikely to be turned around in 2020 unless energy prices rise (forcing consumers to be more efficient) or social pressures on energy consumption, sustainability and carbon emissions broaden. While we expect to see new appliance efficiency standards, new building insulation codes and a stronger take up of heat pumps and LEDs, we need to see an acceleration of government mandated energy efficiency measures.

- We expect the rate of cost reduction in **lithium ion batteries** to slow somewhat in 2020 as raw material deflation slows. On our estimates, the raw materials in a lithium ion battery currently cost over $100/kWh, leaving little room for all additional costs and margin for the manufacturers. Despite the higher manufacturing cost of EVs, the global auto industry will nearly double the size of its EV model range in 2020 with higher battery costs having to be either passed on to consumers or subsidized by government.

- **Solar installations will grow** from 129GW in 2019 to 137GW in 2020 with China still being dominant (at 40GW) although less dominant than in previous years. The supply chain is likely to remain reasonably loose although more concentrated than in recent years. Higher cost players and those reliant on older technologies (such as multi rather than mono-silicon based solar modules) are likely to see profitability under pressure.

- **Wind installations will grow** from 68GW in 2019 to 71GW in 2020 as changes in Chinese feed in tariffs and lower US tax credits cause slower growth after a bumper year in 2019. The supply chain for wind is more consolidated than for solar but pricing is still likely to remain under pressure as manufacturers compete for the limited market growth in 2020.

- Our portfolio of Sustainable Energy equities is likely to witness **further return on capital employed (ROCE) improvement** in 2020 as a result of top line growth and improving underlying economics. While near term profitability will be impacted by the arrival and/or removal of individual subsidies and incentives, we believe that ROCE should improve from 2019 levels.

- If ROCE were to achieve 12%, and the stock market were to reflect it sustainably in the valuation of the equities, we would expect the portfolio to offer a valuation upside. Coupled with P/E and

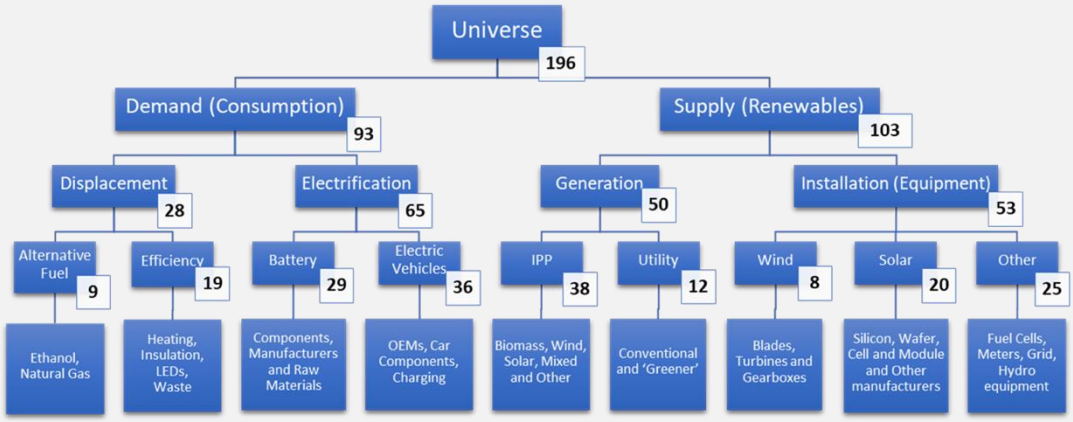
EV/EBITDA metrics that are 10-20% lower than the MSCI World, we believe that the **Guinness Atkinson Alternative Energy portfolio offers reasonably valued, concentrated exposure to an attractive "mega trend"**.

A Guide to our 2020 Outlook for Sustainable Energy

This document reviews the sustainable energy sector in 2019 and provides an outlook for 2020 and beyond. Since there is no Global Industry Classification Standard (GICS) sector for sustainable energy, we have identified a universe of 196 companies (market capitalization of over USD$500m) that are most directly exposed to the sustainable energy theme. We have classified the investment universe using the structure shown below. Our outlook follows the same structure.

Guinness Atkinson Alternative Energy Universe

Numbers represent number of companies in each sub sector



- The outlook for 2020 starts on page 4 with **"The Energy Transition",** covering our long-term outlook for greater energy efficiency, greater renewable electricity generation and the positive carbon, pollution and energy security effects that will result.
- We then lead into some longer-term context and shorter-term outlook for each of our four main subsector classifications. On the "demand" side, pages 5-7 deal with **energy** displacement, while pages 7-9 consider the **electrification** sector (batteries and EV supply chain). The "supply" side looks at the **generation** and **installation** of sustainable energy**.** We analyze these segments together, looking at the changing economics of renewable energy (on pages 10-11), before turning to **solar power** generation (pages 11-15) and **wind power** generation (pages 15-18).
- After the review of these key macro themes, we turn our attention to the valuation of our **alternative energy equities** universe (pages 19-22). We assess recent share price performance of each subsector, and also the relative valuation of each based on the relationship between return on capital employed (ROCE) and price/book (P/B) valuation.
- After considering the valuation of the universe, we turn our attention to the key themes and valuation of the Guinness Atkinson Alternative Energy Fund. We highlight that the fund is an equally weighted selection of 30 equities covering the entire sustainable energy equity universe

which screens as being undervalued versus historical trends and trading around 10-20% lower than the MSCI World on a selection of valuation multiples.

- We hope that you find the document a useful review and outlook for the year ahead.

Sustainable Energy and the Energy Transition

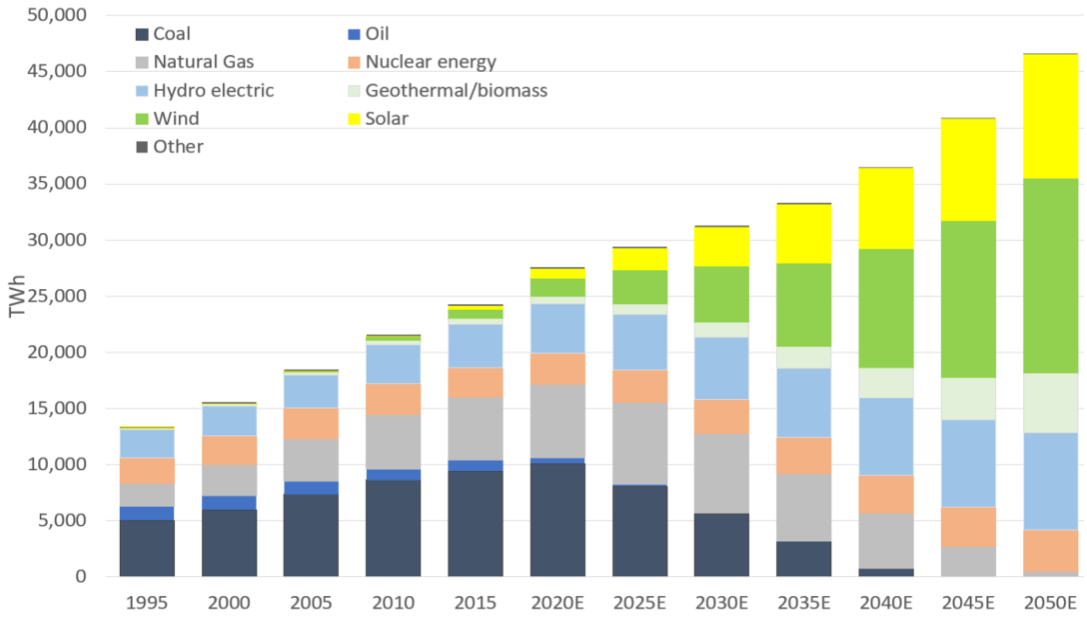
Over the next thirty years, the world will continue its transition to a sustainable energy system. The key factors driving the transition are:

- **Population and GDP growth** putting a significant strain on today's energy supply
- **Economics** as sustainable sources of energy will be cheaper than the incumbents
- **Climate change** leading the world to reduce carbon emissions via cleaner energy
- **Pollution** forcing governments to drive air pollution out of cities via cleaner energy
- **Energy security** as sustainable energy sources, which are more evenly spread across all countries, facilitate lower reliance on energy imports

The outcomes of the energy transition will of course be wide ranging. On the **supply** side, we see a sustained shift towards electrification, with global power consumption set to double to 2050. On the **demand** side, we believe that improved energy efficiency will be key to limiting energy consumption growth to a manageable level.

Within the power generation industry, we expect a radical change in energy mix. Today, the global power generation mix is predominantly driven by coal and natural gas (37% and 24% respectively), while variable renewable generation (wind and solar) have less than a 10% share. By 2035, we expect wind and solar to have grown to nearly 40% of the generation mix, increasing to around 60% by 2050.

Global power generation by type (TWh)



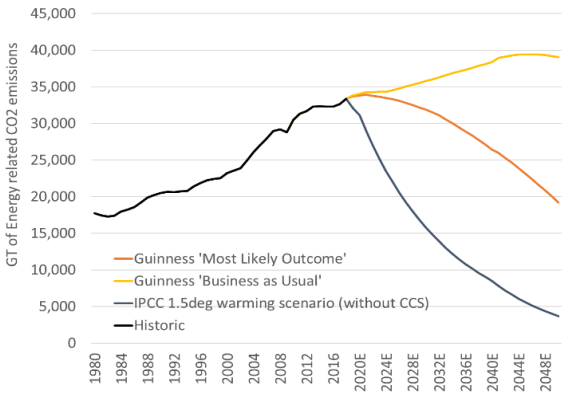
Sources: BP Statistical Review; Guinness Atkinson Asset Management

On the one hand, the world is already adding renewable generation at a rapid pace: 177GW of new capacity was installed in 2018 with about 55% of that being solar, 30% wind and the rest mostly in hydro-power. This new renewable capacity represented just under half of the new electricity generation capacity added in the year.

On the other hand, while the scale of growth in 2018 was significant, the new capacity added was the same as in 2017, making 2018 the first year since 2001 that annual new installations of renewable generation capacity failed to increase from the previous year. In addition, renewable sources only represented 30% of total energy demand growth in 2018. Reasons for the slowdown included a cut in solar power subsidies in China and weaker installations of wind power in Europe and India.

Considering the progress made from a carbon emissions standpoint, the International Energy Agency (IEA) believes that this rate of new renewable power additions is currently only about 60% of what is required to meet the Paris climate agreement's goal of keeping the increase in global temperatures to "well below" 2°C. Even our "most likely outcome" global energy scenario, which assumes rapid growth in renewable energy and gains in global energy efficiency, sees energy-related carbon emissions in 2030 as being around double the IPCC's required level for 1.5° warming.

Annual Energy-related CO2 emissions



Source: IEA, Guinness Atkinson Asset Management

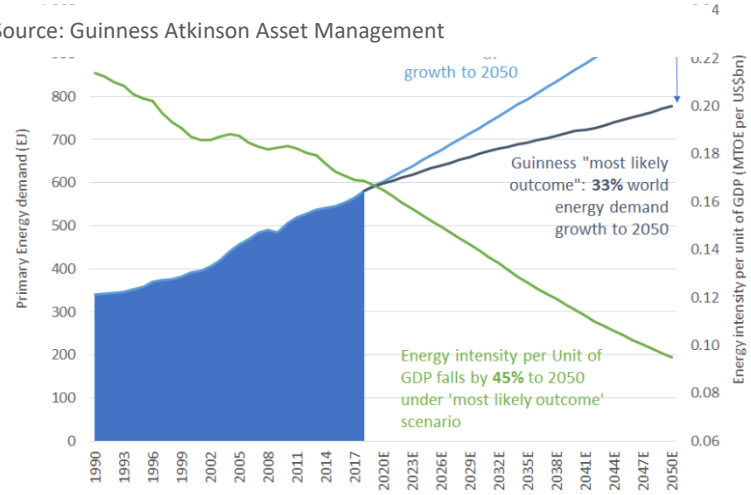
In its "Tracking Clean Energy Progress" report of May 2019, the IEA reviewed 45 clean energy sectors and technologies and concluded that only seven are on track to meeting global goals consistent with the Paris Agreement. These sectors are: solar PV, bioenergy, electric vehicles, rail, lighting, data centers & networks and energy storage. There is much work still to be done in transitioning to a sustainable energy future.

Displacement: energy efficiency and alternative fuels

The long-term view: the need for significantly greater energy efficiency It is a common misconception that achieving rapid growth in renewable power generation will be enough to deliver government pollution, energy security and carbon emission targets. Renewable generation is a key part of the solution, but we see the displacement and more efficient usage of existing energy sources as just as critical, and in fact more urgent, in achieving these targets. The IEA refers to the theme of "energy efficiency" as being the "first fuel" that should be considered in delivering the energy transition.

We carry out two demand scenarios as part of our modeling of long-term world energy demand. Our *"business as usual"* case sees world energy demand growing by 75% to 2050 as per capita energy demand and the energy intensity of GDP follow historic patterns. The level of global energy demand implied by *"business as usual"* looks unsustainable, in our opinion. We believe that a more likely outcome for world energy supply and demand is one where energy demand growth is moderated substantially via the displacement and more efficient use of existing sources.

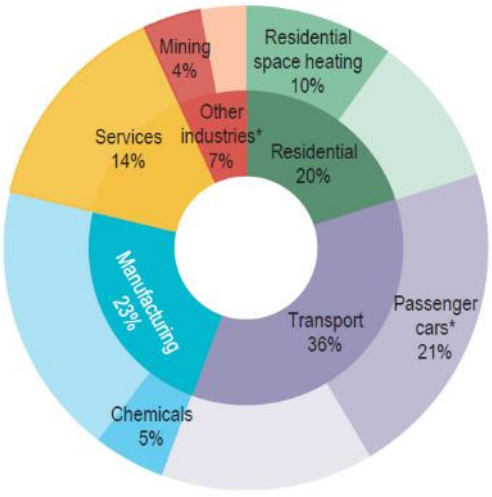
Source: Guinness Atkinson Asset Management



Our *"most likely outcome"* scenario reflects this view and sees global energy demand grow by 33% from 2018 to 2050 despite the global population growing by 26% and global GDP more than doubling. While per capita energy demand stays broadly flat at 1.8-1.9 tons of oil equivalent (TOE), we see every $1bn of global GDP requiring only 95 TOE in 2050 relative to the current intensity of 170 TOE in 2018. Delivering on energy efficiency is worth tens of trillions of dollars to world GDP by 2050; there are clear economic, as well as climate-related reasons, for the world to consume energy more efficiently.

Energy is utilized broadly as shown in this schematic from the IEA Energy Efficiency Indicators database (2019 update reflecting 2016 data). There is room to improve efficiency across all aspects of demand but, in our opinion, some of the areas that could become substantially more efficient are:

Global Energy Demand



Source: Guinness Atkinson Asset Management

- **Residential demand:** representing 20% of global energy demand. Key efficiency gains come from heating (greater use of heat pumps), lighting (installation of LED technology) and building materials (improvements in building insulation). The drive towards net carbon neutrality in many OECD countries has seen a spotlight on construction and heating standards for buildings. This has created better than expected growth for efficient heating, insulation and lighting developers. In the UK, for example, it was announced in March that fossil fuel heating could be banned in all new build homes after 2025. Currently renewable heating represents just 2% of the UK market.

- **Transportation** and **passenger vehicles:** representing around 36% and 21% of total global energy demand respectively. According to the IEA, global transport sector energy intensity fell by 2.1% in 2018 after falling an average 1.5% per year between 2000 and 2017. The IEA sees the need for annual efficiency improvements to reach 3.4% on average annually from 2019 to 2030.

The shorter-term view: catalysts for improving energy efficiency in 2020 and beyond

According to IRENA (the International Renewable Energy Agency), global energy efficiency gains earlier this decade had been improving at around 2.3% per annum (p.a.) but dropped to 1.7% in 2017 and 1.2% in 2018. These levels are far below the targeted level of 3% p.a. improvement, which would allow the delivery of Paris commitments. Some of the deterioration in 2018 can be attributed to short-term factors (predominantly one-off weather effects causing higher natural gas and electricity use in buildings), but structurally, global growth shifted back towards energy intensive industries. We expect to see advances in most areas of demand (as has been seen in recent years) and as highlighted in the table.

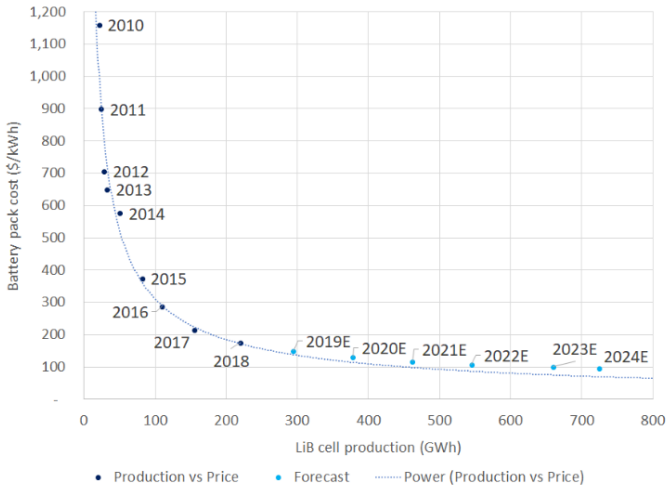
Sector	Subsector	Efficiency measure example	Efficiency Gains 2000-2017
Transportation	Road	Transition to hybrid and electric vehicles	5.0%
	Rail & Shipping	Further electrification of rail; ships to LNG	15.0%
	Air	Higher fuel efficiency of jet engines	46.0%
Buildings and Appliances	Heating (space & water)	Heat pumps / building insulation	31.0%
	Cooling	More efficient air conditioners and controls	-30.0%
	Lighting	Further penetration of energy efficient LED	21.0%
	Cooking & Appliances	Mandatory efficiency standards	-7.0%
Industry	Iron & steel	Greater use of electric arc furnaces	5.0%
	Other high energy industries	Fuel switching	8.0%
	Petrochemicals	Increased plastics recycling	15.0%
	Low energy intensive industries	Electric heat pumps for process heating	16.0%

The economic benefit is very significant in the near term. The 1.2% improvement in energy efficiency in 2018 meant that the world generated “only” $1.6trn more GDP for the amount of energy used compared to 2017. However, this saving could have been more like $4trn had energy intensity improved at 3% every year since 2015.

Electrification: lithium ion batteries and electric vehicles

The longer-term view: growth in battery storage and electrified transportation

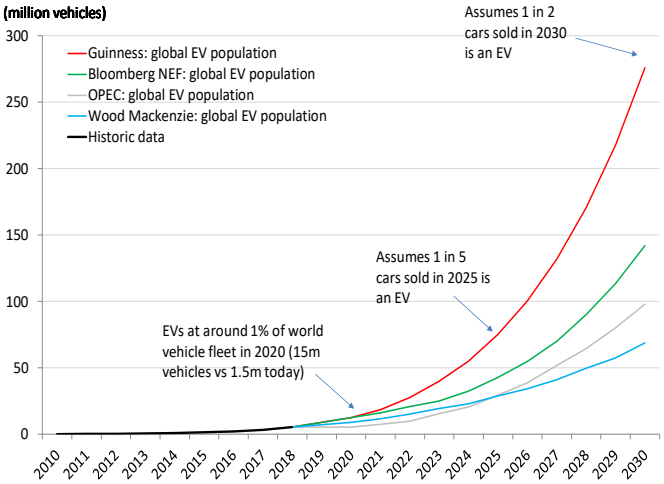
The battery industry plays a two-part role in the transition to sustainable energy. Batteries are likely to form part of the energy storage solution, allowing variable renewable energy (i.e. solar & wind) to play an expanding role in the global power grid. They are also, of course, a key component in electric vehicle manufacturing. A catalyst for greater battery use has been sharp falls in the cost of lithium ion batteries. According to Bloomberg New Energy Finance (BNEF), battery costs are down 85% over 2010-2018 (an implied "learning rate" of around 18%) with costs likely to fall a further 15% in 2019 on our estimates.



Source: Guinness Atkinson Asset Management

Significant economies of scale from mass battery manufacturing have lowered costs and, as these continue, the cost of producing a lithium ion battery is likely to fall towards $100/kWh in the mid-2020s. This would allow electric vehicles (EVs) to compete on price with internal combustion engine vehicles, without subsidies.

By our estimates, the total global EV passenger vehicle fleet reached around 8m vehicles at the end of 2019 with new sales in 2019 being about 2.5m vehicles (or 2.8% of global passenger vehicle sales). We expect an acceleration in the uptake of new EVs, with around 20% new passenger vehicles sales being electric in 2025, rising to around 50% in 2030. On this basis, there will be nearly 300 million electric vehicles on the world's roads by 2030. This level of electric transportation would displace around 3m barrels of day of world oil demand in that year.



Source: Bloomberg, Guinness Atkinson Asset Management

The growth rates for "pure battery" EVs sales are eye-catchingly high, with sales now running at double the number of "plug-in hybrid" EVs. A key factor behind the growth in continued demand is the stricter targets from governments and cities for the phasing out of internal combustion engine vehicles:

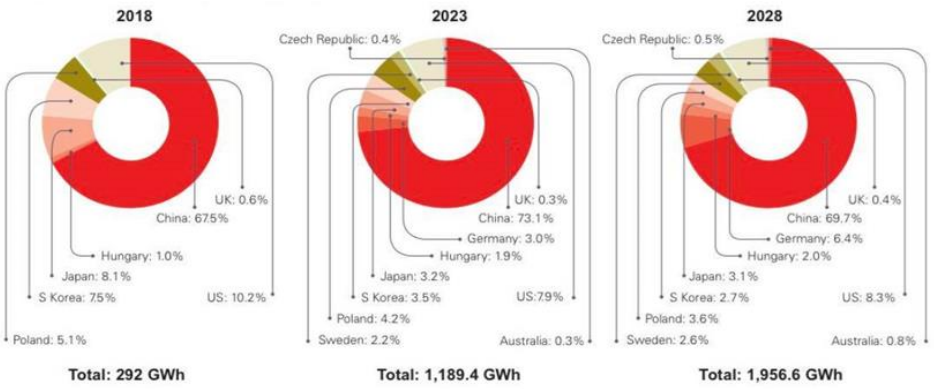
- **2025** The European Union targets 20% of total sales to be EVs while Norway plans to ban the sales of all gasoline and diesel cars

- **2030** The Fossil Fuel Free Declaration covering 12 large global cities with a total population of 32 million people commits to no ICE vehicles on their streets by 2030
- **2040** France, Italy and the UK plan 100% zero emission vehicle sales

The shorter-term view: rapidly growing lithium ion battery capacity and new EV models

We expect to see another marked increase in the global manufacturing capacity of lithium ion batteries in 2020 and beyond. Large scale plant capacity is likely to expand from nearly 300GWh in 2018 to nearly 1,200GWh in 2023 and then onto over 2,000GWh by the end of the 2020s. These facilities are being built globally but China will still maintain its dominance, with its share of global capacity staying in the 65-70% range.

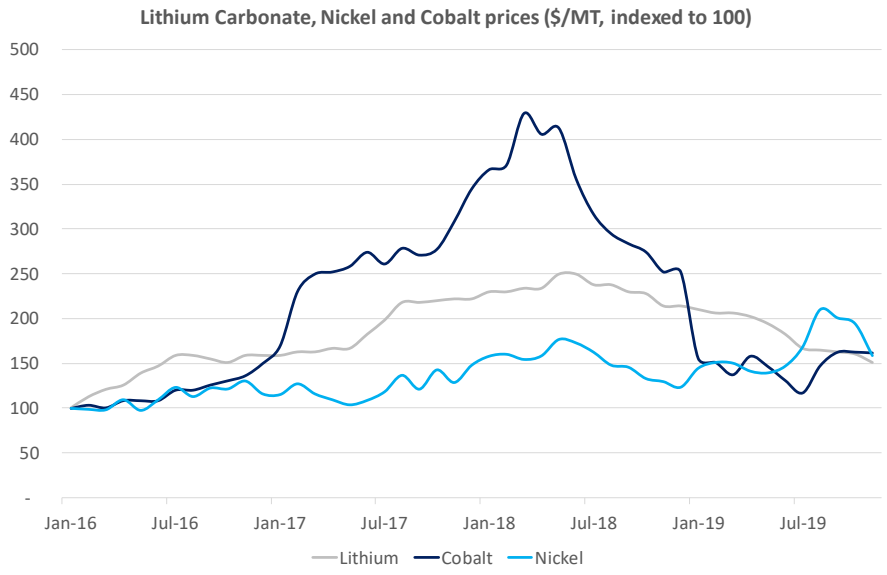
Global large-scale lithium ion battery manufacturing capacity



Source: Benchmark Mineral Intelligence

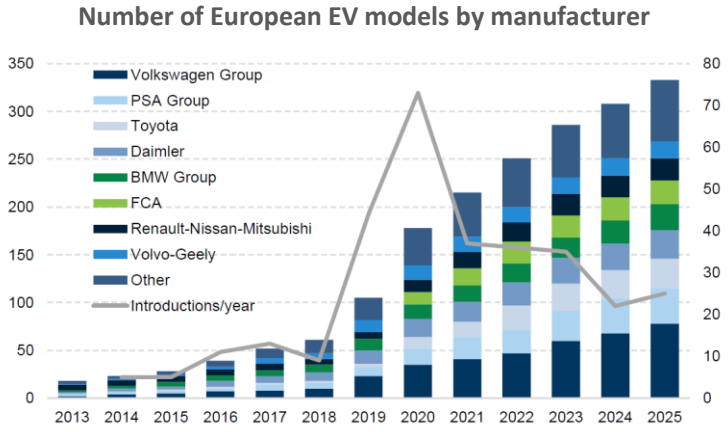
In contrast to the cost benefits coming from manufacturing scale, we note that roughly 50% of the cost of a typical lithium ion battery is due to the cost of the raw materials (anode, cathode, separator, electrolyte and wiring). Nickel, lithium and cobalt are critical here and we estimate that a typical NMC532 lithium ion battery would increase in cost by around 20% if the cost of these raw materials were to double.

We monitor these raw materials markets closely and note that lithium and cobalt are down around 20% and 50% respectively in 2019 while nickel has increased by around 10%. The declines in lithium and cobalt has put both metals much closer to cost curve "support" levels and, while naturally volatile, we believe that they could well cause input cost inflation for battery manufacturers in 2020 and that will likely mute the overall cost reduction of lithium ion batteries in 2020. As costs increase and social pressures grow around the sustainable sourcing of battery metals, we expect to see an increase in companies targeting the recycling of lithium ion batteries either via electrochemical processes or for re-use in electric grid storage.



Source: Bloomberg

The auto industry added a record number of new EV models into the market in 2018 and has done so again in 2019, although sales in China and the US have been under some pressure as a result of incentive reductions. Nonetheless, there will be a further step up in 2020 with new EVs weighted towards the first half of the year as Audi presents its first all-electric saloon and a number of compact car models from Ford, Mini, Volkswagen, Vauxhall and Peugeot are fully electrified. Despite the cost improvements mentioned above, on our estimates, the upfront cost of an average EV is still greater than an average ICE vehicle and this, together with consumer concerns around access to charging infrastructure, will keep unsubsidized EV purchases close to current relatively low levels. We expect the "tipping point" to come in the mid 2020s when EVs present a real economic alternative to ICE vehicles for the average global consumer.

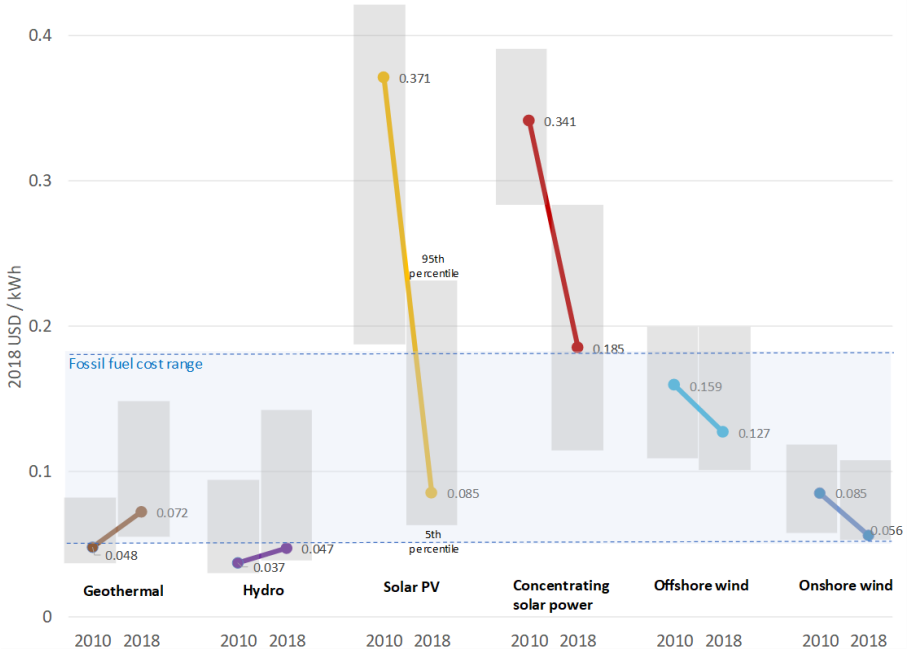


Source: Goldman Sachs

Generation and installation: renewables versus fossil fuels

Before considering the detailed dynamics of key renewable power generation markets of wind and solar, it is worth considering the significant changes that have been seen across various renewable power generation technologies since 2010. Onshore wind and solar PV have joined hydro and geothermal power to sit at the lower end of the cost range for new fossil fuel power generation. As we will highlight in the coming sections, however, there is still further room for both wind and solar power generation technologies to deliver further cost reductions.

Global LCOE of utility-scale renewable power generation technologies (2010–2018)



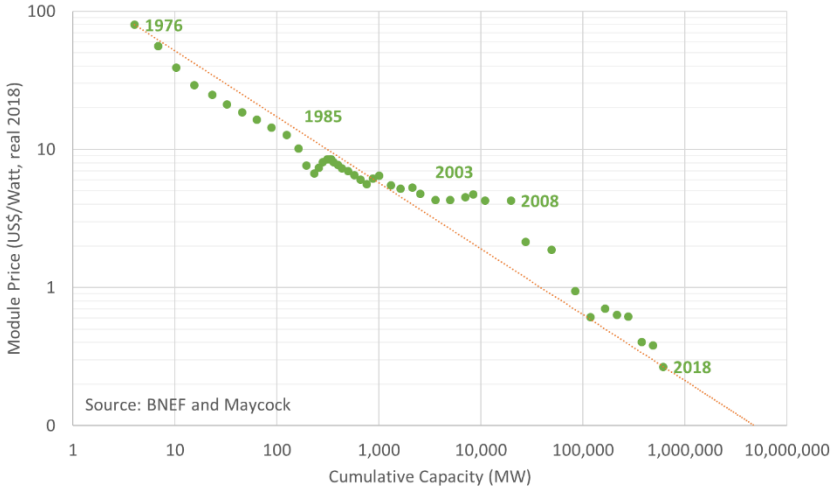
Source: IRENA; Guinness Atkinson Asset Management

Generation and installation: solar power

The longer-term view: solar module "learning rate" driving significant cost reductions

The fact that solar PV is being taken seriously today as a variable renewable energy source owes much to the significant fall in the price of crystalline silicon PV modules. In their infancy, in the late 1970s, a PV module cost around $80 per watt ($/W). By 2010, this had been reduced to around $2/W, a rapid decrease but one that still left solar as being uneconomic versus most other energy generation sources. Critically, the learning rate this decade (the cost reduction for every doubling of cumulative industry capacity) continued at a similar level – around 28% - bringing us to a module cost of $0.27/W in 2018, 85% lower than the cost in 2010. Prices have continued to fall in 2019, down to around $0.25/W, and there seems a reasonable prospect that module prices reach around $0.16/W (-37%) by 2025.

Solar module prices (1976-2018)

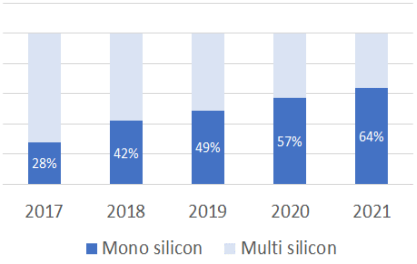


The path to the solar industry becoming competitive versus other energy sources has been paved with a number of technological and economic improvements, including the following key trends:

- **Use and pricing of polysilicon**. The cost of polysilicon has dropped dramatically since 2010, and importantly, it is being used more efficiently, with the average multicrystalline module using 33% less polysilicon than at the start of the decade. This has resulted from higher efficiency per gram of poly used, and improved wafer cutting methods that reduce waste during the manufacturing process. Further wafer thickness improvements are expected to 2025.

- **Shift from multicrystalline to monocrystalline.** The industry is increasingly using monocrystalline silicon in place of multicrystalline silicon for the manufacture of solar wafers. "Mono" has higher efficiency than "multi", and uses less polysilicon, with the breakthrough in usage being manufacturers adapting to lower the cost of mono-based wafers, which historically were too expensive to compete.

  "Mono" vs "multi" silicon in the PV market



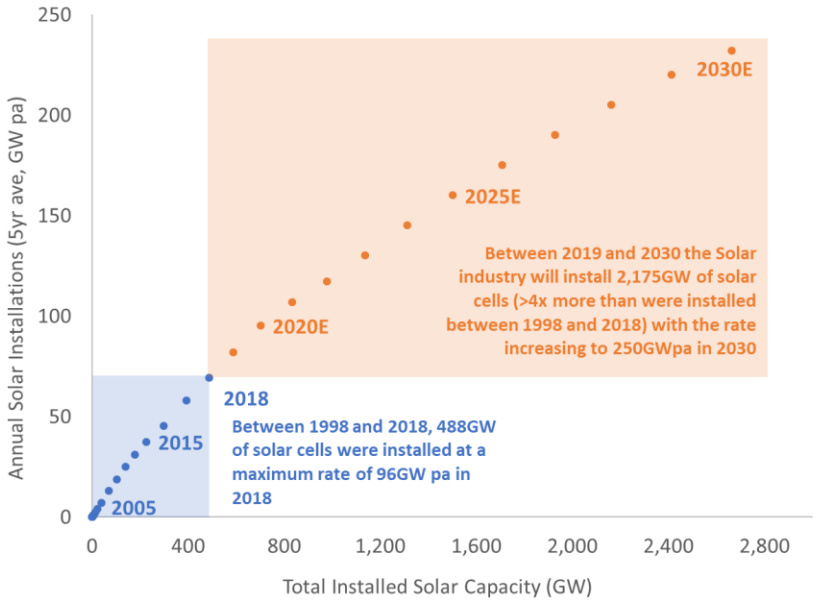
  Source: BNEF, Guinness Atkinson Asset Management

- **Fall in the cost of other parts of the solar PV system.** PV modules form one part of a solar PV system, the other key components being the inverter, the balance of plant (a pad-mount transformer, plus transmission lines and roads), and engineering/installation costs. In 2010, the average utility-scale PV system cost around $3.50/W, of which the parts aside from the module cost around $1.50/W. By 2020, the total system cost is expected to have declined to around $0.77/W, of

which the non-module parts will cost around $0.54/W. Whilst the fall on the costs of other parts of the system have not been as significant (down by around 65% versus modules down nearly 90%), the fall has still been impressive. Looking ahead to 2030, it seems plausible that the total PV system cost will have fallen to nearly $0.50/W.

The improved cost competitiveness of solar energy opens the way for a rapid expansion of solar in the global electricity grid:

Annual and cumulative solar installations (2005-30)



Sources: Bloomberg; Guinness Atkinson Asset Management

In the twenty years to the end of 2018, nearly 500GW of solar power generation systems were installed globally. Between 2019 and 2030, we expect the industry to install a further 2,200GW of solar capacity, more than four times what was already been installed. For context and adjusting for efficiency (i.e. translating capacity into actual power generation), we expect the expansion of the solar industry from now to 2030 will be comparable to the entire global nuclear industry capacity today.

Short-term view: solar demand to grow again in 2019 and 2020

In terms of demand, we expect 2019 to show the largest absolute rise in annual solar power installations since the industry started, increasing to around 129GW from 108GW in 2018. This increase looks likely despite a 5GW reduction in new installations from China (down from 44GW in 2018 to 39GW in 2019). The decline represents a hangover from the restructuring of solar project subsidies for most of China to attempt to move the industry towards unsubsidized growth. The changes, announced in mid 2018, were initially severe and caused a sudden sharp slowdown in the roll-out of Chinese PV projects. As a result, China changed again its approach to solar feed-in-tariffs (FiTs), effective from July 2019. These new tariffs are now typically being set through a competitive bidding process with the Chinese authorities setting an upper limit for the FiT and the market defining the minimum requirement. The new market-driven subsidization approaches provided clarity for the world's largest solar market leading to a much-improved demand outlook

relative to that expected a year ago. Of particular interest, we have seen China announce this year its first ever unsubsidized wind and solar projects, marking a potential inflection point for the industry. Other bright spots in 2019 have been Ukraine and Vietnam, both growing thanks to the availability of new incentives.

Global solar installations, 2010-2020 (GW)

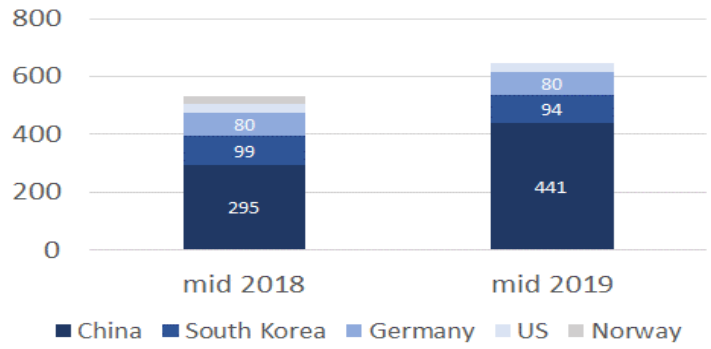
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
OECD solar installations (annual)											
North America	1	2	4	6	7	8	14	11	10	11	13
Germany	7	7	8	3	2	1	2	2	4	4	4
Italy	4	8	4	1	0	0	0	0	0	1	1
Spain	0	0	0	0	0	0	0	0	0	4	4
Rest of Europe	3	4	5	5	5	6	4	3	4	5	6
Australia	0	1	1	1	1	1	1	2	4	5	5
South Korea	0	0	0	1	1	1	1	1	2	2	2
Japan	1	1	2	7	10	11	8	8	7	9	7
Total OECD	**17**	**23**	**24**	**24**	**25**	**29**	**29**	**26**	**31**	**41**	**42**
Change in OECD annual installations	*10*	*7*	*0*	*0*	*2*	*4*	*0*	*-3*	*5*	*9*	*1*
Non-OECD solar installations (annual)											
China	0	3	3	14	13	19	30	53	44	39	40
India	0	0	1	1	1	2	5	10	11	11	15
Rest of non-OECD	1	3	3	4	6	6	11	9	22	38	40
Total Non-OECD	**2**	**5**	**8**	**18**	**21**	**27**	**46**	**72**	**77**	**88**	**95**
Change in non-OECD annual installations	*1*	*3*	*2*	*11*	*2*	*6*	*19*	*26*	*5*	*11*	*7*
Total solar installations (annual)	**19**	**29**	**31**	**42**	**46**	**56**	**75**	**98**	**108**	**129**	**137**
Change in world annual installations	*11*	*10*	*2*	*11*	*4*	*10*	*19*	*23*	*10*	*20*	*8*

Sources: Bloomberg; Guinness Atkinson Asset Management

We expect annual global solar installations to increase by another 6% in 2020 to around 137GW (though it is important to note that visibility on installation growth is never that good). Demand from China is expected to be steady at around 40GW, and much of the growth is likely to come from other parts of the non-OECD (e.g. India, Poland and Turkey). The breadth of global solar installation demand is improving: in 2017, China accounted for 54% of new installations; by 2020, we expect this figure to be down to around 30%.

In terms of production, we find that the supply of polysilicon has generally been abundant in recent years, leading to sharp falls in price. According to BNEF, around 68% of global solar grade polysilicon supplied in 2019 will be from Chinese makers, up from 59% in 2018 and driven by a raft of new factories built by large Chinese firms.

Global polysilicon capacity (kT)



Source: BNEF; Guinness Atkinson Asset Management

One trend over the last twelve months has been the consolidation of supply into the hands of a smaller number of manufacturers. Although China, for example, was responsible for all of the capacity growth over this period, the number of polysilicon suppliers shrunk from 24 to 16. As in any competitive market however, being a low-cost operator remains key. The weighted average cost of supply globally in 2019 has been around $8.70/kg. With costs continuing to fall, we believe any supplier producing at much above this price in 2020/21 will struggle to be profitable.

Solar wafer, cell and module pricing is expected to fall on average by a further 10-15% in 2020. Prices in the US are holding up better than average, where supply is relatively restricted thanks to trade tariffs against PV products imported from China. The US, though, will represent less than 10% of the overall market in 2020.

Similar to the polysilicon market, the overall "tier 1" capacity of solar module manufacturing has seen consolidation in recent years, but capacity additions continue. Total tier 1 module capacity is thought to be around 139GW, of which around 65% sits in the hands of the ten largest suppliers (of a total of 48 tier 1 suppliers). In 2020, we expect total module manufacturing capacity to be over 150GW, creating a market similar to polysilicon manufacturing where only the lower cost operators are likely to thrive. Beyond a short-term cyclical pricing recovery, we expect pricing pressure to prevail in this high growth market.

Generation and Installation: wind power

The long-term view: an abundant offshore resource is becoming economic

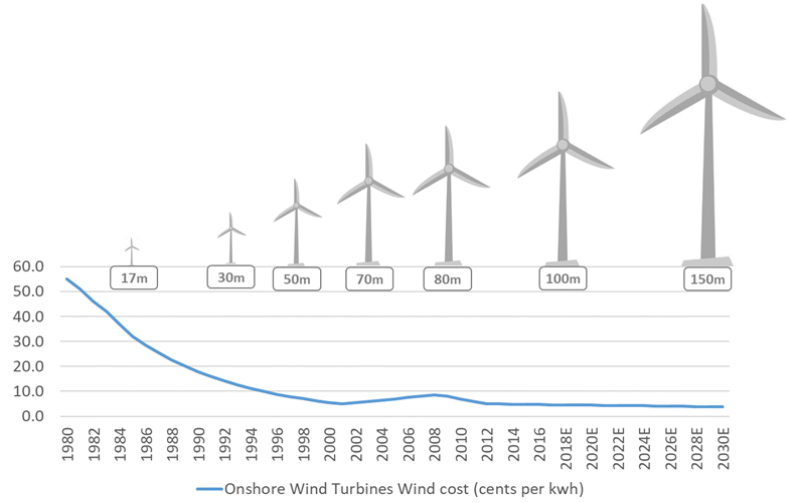
The decline in the cost curve for wind power installations over the last ten years has not been as dramatic as solar, but it started from a lower base that was already competitive with some fossil fuel power generation. Indeed, the overall learning rate for the development of wind turbines since the early 1980s has been around 11%, versus a learning rate for all-in wind project capex of round 7%, implying a shallower pricing decline for other wind plant components.

The success of the wind industry is also being driven by turbines becoming larger. The median size of onshore turbines in 2010 was around 2GW, and today this has risen to around 3.4GW. By 2050, BNEF estimate that the median size will be over 5GW. The scale improvements offshore are even more striking, with a move up from 7GW today to around 19GW by 2050.

Larger wind turbines bring overall economies to the installation process. Less foundation work and less cabling are needed per MW, while there are fewer parts to install and maintain. Improved performance monitoring systems are increasing the efficiency of installation and maintenance work.

The greater scale and improved design of turbines has set onshore wind costs on a path of declining costs. In 2008, onshore wind power cost an average of 8.5c/kwh, falling to an estimated 4.5c/kwh in 2019 and expected to fall further to 3.8c/kwh by 2030:

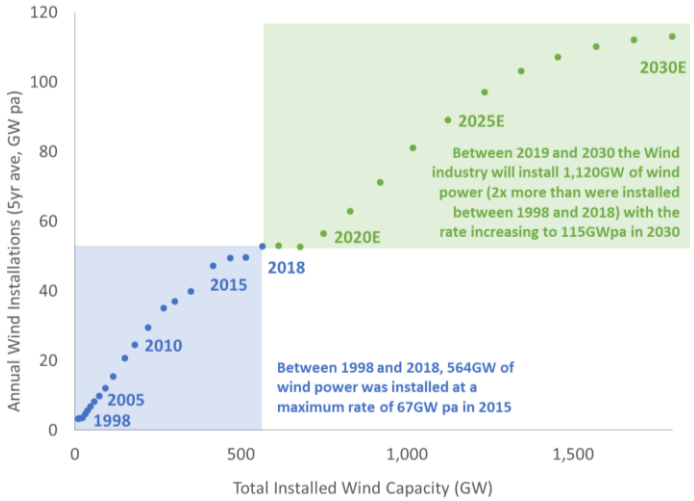
Onshore wind power costs vs turbine height (1980-2030)



Sources: OpenEnergyMonitor; Guinness Atkinson Asset Management

In the twenty years to the end of 2018, just over 550GW of wind power generation systems were installed globally. Between 2019 and 2030, we expect the industry to install a further 1,100GW of wind capacity, around twice what was already been installed.

Annual and cumulative wind installations (2005-30)



Sources: Bloomberg; Guinness Atkinson Asset Management

Like the solar market, China remains an essentially closed market to non-Chinese wind turbine manufacturers. China is also the largest source of wind power demand and the annual level of installations has stabilized at around 20GW each year. 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 in recent months, which should be good for overall demand.

The major segment of growth in the wind industry is now offshore. Governments and companies have been attracted to offshore wind by lower capital costs, cheap financing and, therefore, a falling levelized cost of energy. Indeed, the major piece of scalable growth for European utilities is offshore wind.

Increasing scale and larger turbine power capacities should allow the offshore sector to grow faster than onshore in the years ahead with new installations reaching around 12GWpa in 2025. The typical onshore turbine used by the wind industry in 2018 was rated at around 3MW but there were plans announced by GE earlier in 2019 for a 12MW offshore turbine with a rotor diameter of 107m. It is well known that wind speeds are higher at greater altitude and hence the desire of the offshore industry to build bigger turbines with larger blade sweep areas to capture the greater wind speeds. Project scale also matters. Economies of scale start to emerge in wind farms larger than 300MW and we note that some European offshore wind farms are already around 1GW in size. Scale benefits also accrue where farms are clustered, allowing developers to benefit from an existing knowledge of port infrastructure, ground conditions and likely wind yields.

We expect annual offshore wind installations to average around 10GW from 2019-25, with a step change in the middle of the next decade above 15GW, as the breadth and ambition of countries embracing offshore wind grows. By 2030, we expect China, UK, US and Germany still to dominate cumulative offshore capacity, but other major participants will include the Netherlands, Taiwan, Japan, France, Korea, Denmark and India.

The shorter-term view: tax credits driving strong demand in 2019, slowing in 2020

Having peaked in 2015 at 63GW of newly installed wind capacity (versus 36GW in 2010), the world wind market looks to have accelerated markedly again (to around 68GW), making 2019 a record year for installations and the highest year-on-year increase in new capacity. The increases in 2019 are geographically well spread: China (+5GW), the US (+3GW), Europe (+4GW) and offshore (+5GW). The US has seen a flurry of PPA agreements for 2019/20, led by the presence of a production tax credit that is due to be phased out after 2020. Similar to the US, developers in China are accelerating project development to meet the 2020 deadline for feed-in tariff qualification. New projects in 2021 will only receive power prices as high as local coal FiTs.

Meanwhile some areas in Europe are struggling – Germany for example has seen a slump in new wind projects thanks to a shortage of available sites, ongoing litigation and a lack of coherent government policy. But other countries, notably Sweden, Norway and Spain, are seeing a surge in activity. As an overall illustration of the importance of wind turbines in the EU, the installed generation capacity of onshore and offshore wind power combined likely overtook that of natural gas in 2019.

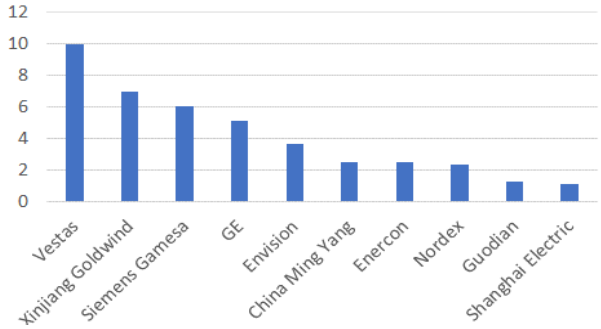
Annual onshore and offshore wind installations (GW)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Onshore wind installations (annual)											
North America	6	8	15	2	7	10	9	8	8	11	14
Latin America	0	0	0	0	5	3	3	3	3	4	4
Europe	9	10	12	11	11	11	12	13	8	12	13
China	17	18	14	15	21	29	22	17	19	24	24
India	1	1	1	1	1	1	2	3	1	3	4
RoW	3	4	4	3	4	5	5	5	6	5	5
Total onshore	**35**	**40**	**45**	**32**	**48**	**59**	**54**	**48**	**45**	**59**	**65**
Change in onshore annual installations		*5*	*5*	*-13*	*16*	*11*	*-6*	*-6*	*-2*	*13*	*6*
Onshore wind installations (annual)											
China	0	0	0	0	0	1	1	1	2	4	4
UK	1	0	1	1	0	1	0	1	2	3	1
Germany	0	0	0	0	0	2	0	2	1	2	0
RoW	0	0	0	1	0	0	0	1	0	1	2
Total onshore	**1**	**0**	**2**	**2**	**1**	**4**	**1**	**4**	**4**	**9**	**6**
Change in onshore annual installations		*-1*	*1*	*1*	*-1*	*4*	*-4*	*3*	*0*	*5*	*-3*
Total wind installations (annual)	**36**	**40**	**46**	**34**	**49**	**63**	**54**	**52**	**50**	**68**	**71**
Change in world annual installations		*4*	*6*	*-13*	*15*	*14*	*-9*	*-3*	*-2*	*18*	*3*

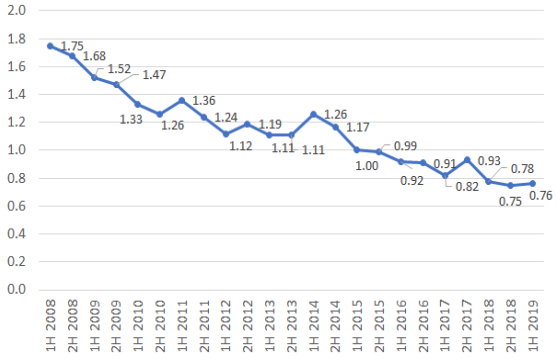
Sources: Bloomberg; Guinness Atkinson Asset Management

In terms of supply, the wind turbine market remains slightly more concentrated than the solar upstream market, with around two-thirds of global capacity in the hands of the top ten manufacturers. Outside China we find that Vestas, SiemensGamesa and GE remain the dominant players.

Annual onshore/offshore wind installations (GW)



Turbine price ($m) per MW by signing date



Sources: GlobalData; BNEF, Guinness Atkinson Asset Management

Average prices for turbine contracts (by signing date) since the start of 2018 have been relatively stable, around the $750,000-$800,000 per MW level. However, turbine pricing by delivery date suggests that prices in the early 2020s are set for another leg down.

There is also cost pressure in the operations and maintenance sector of the wind industry, driven by greater competition. According to BNEF, the global average price of full-service contracts signed in 2019 fell by 12% to $16,200 per MW/year. This compares to an average price of $20,500 per MW/year in 2017 and $45,000 per MW/year in 2010.

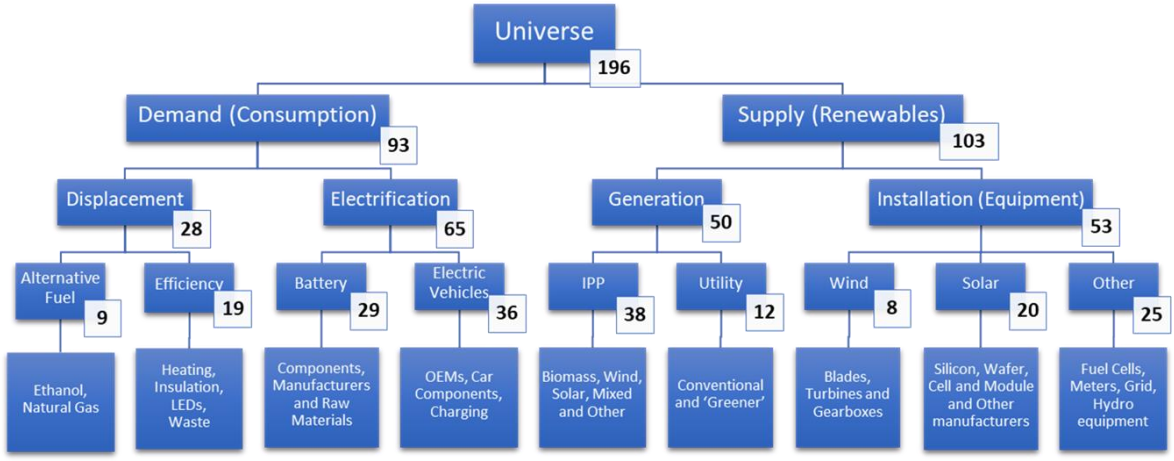
Sustainable Energy Equities

The Guinness Atkinson Alternative Energy fund is positioned to benefit from the many opportunities associated with the sustainable energy transition that we have discussed. We have identified a universe of 196 companies (market capitalization of over USD$500m) that are most directly exposed to the theme, and classify them into the following four sub-sectors:

- **Displacement** includes companies involved in the displacement or improved efficient usage of existing hydrocarbon-based energy
- **Electrification** includes companies involved specifically in the switching of hydrocarbon-based fuel demand towards electricity, especially for electric vehicles
- **Installation** includes companies involved in the manufacturing of equipment for the generation and consumption of sustainable energy
- **Generation** includes companies involved in the generation of sustainable energy, either pureplay companies or those transitioning from hydrocarbon-based fuels

Guinness Atkinson Alternative Energy Universe

Numbers represent the number of companies in each sub sector



Investment universe - review of 2019 and valuation outlook

Sustainable energy equities have generally had a strong year in 2019, with the Guinness Atkinson Alternative Energy Fund delivering a total return of 30.2% versus the MSCI World Index at 27.7% and the median equity in our Alternative Energy Universe which delivered 29.2%. As ever, there were some significant divergence between the equity subsectors so we provide a quick tour here of our four key sub sectors to highlight their share price performance trends in 2019 and their current valuation outlook:

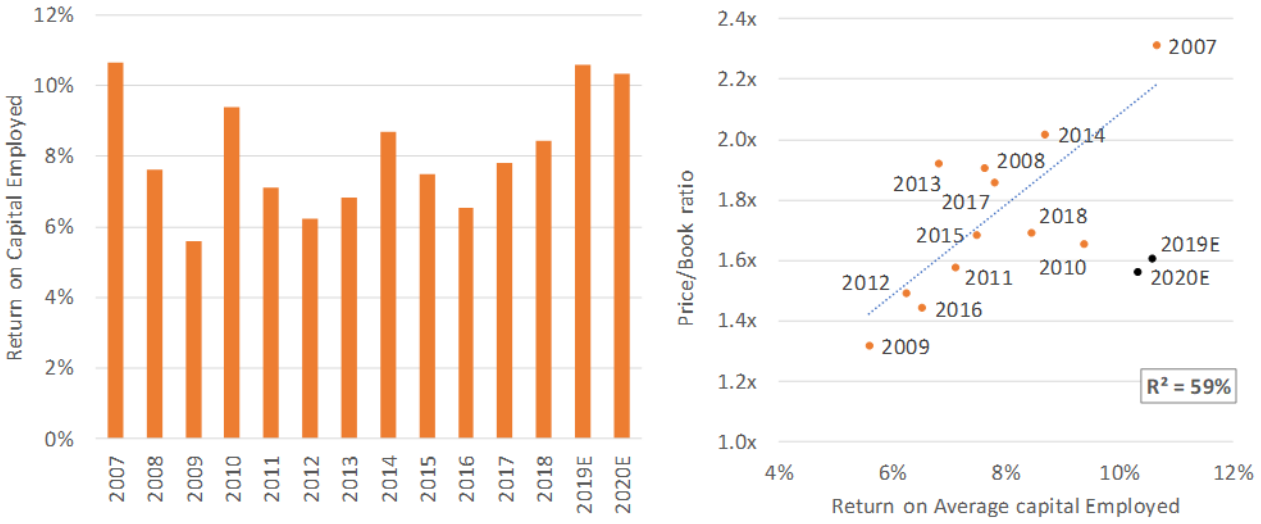
Displacement sector – strong ROCE improvement in 2019

The Displacement sector of our universe contains 28 equities with businesses focused on energy efficiency and covering multiple technologies. The majority of these technologies fared well in 2019 with the median equity delivering a return of around 26% (those focused on energy efficiency delivered stronger returns while those focused on alternative fuels were weaker). Better performing technology areas included LED equipment manufacturing companies (including Applied Materials and Veeco Instruments), waste management companies and heating efficiency companies (including Nibe Industrier).

Companies participating in the ethanol market, mainly in the US, experienced a volatile year despite a positive macro tailwind as US ethanol mandates expanded in 2019 to 20bn gallons (with 16bn gallons from corn ethanol). However, the sector was buffeted by political crosswinds, with ethanol prices falling sharply mid-year as the US government announced plans to reduce the number of refineries needing to blend in ethanol, then rallying on a possible reversal of that plan. The ethanol subsector of our universe delivered a total return of 17% in 2019 with a number of companies including Future Fuel and The Andersons delivering negative total returns.

Energy efficiency and displacement companies have seen a healthy improvement in ROCE since 2016, increasing from 6% to 10% in 2019. Since 2007, there has been a near 60% r-squared between the ROCE of the companies and their price/book valuation multiples. Based on 2019 and 2020 estimates, the valuation of the subsector does not look particularly challenging, with price/book ratios averaging around 1.6x (vs 2018 at 1.7x), despite ROCE expectations having improved:

Displacement Universe Equities - ROCE and correlation with Price/Book



Source: Bloomberg; company data; Guinness Atkinson Asset Management

Electrification sector – the weakest performing sub sector in 2019

Electrification was generally the weakest of the sustainable energy subsectors in 2019, with companies involved in the battery supply chain producing particularly poor total returns. Our universe of Electrification equities contains 65 companies with nearly one quarter of them delivering a negative total return for the year, and the median equity delivering a return of around 14%.

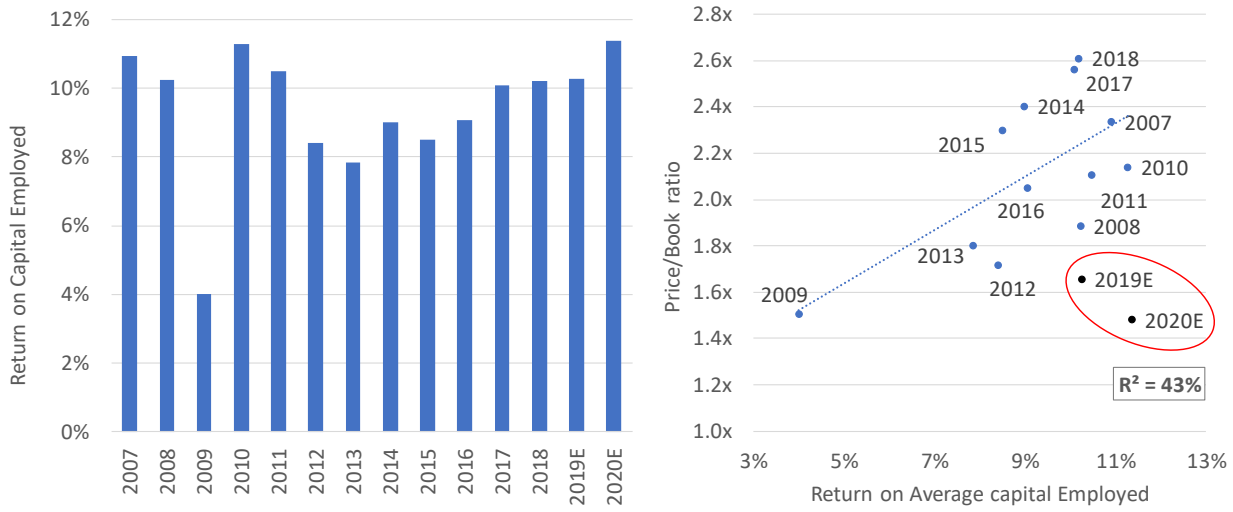
Electric vehicle component manufacturers, particularly on the high-tech side, delivered the best total returns. The shift to a cleaner, safer, and more efficient auto sector is positive news for many of the more sophisticated component manufacturers (e.g. of thermal management systems, power management and sensors) which are seeing their dollar content per vehicle rise. Physical car component manufacturers delivered a 19% total return while those manufacturing electronic car components delivered around 42% total return.

Many of the producers of key battery metals, such as lithium and cobalt, suffered as the prices of those metal fell in 2019, after a strong run-up in 2017/18. Spot lithium carbonate prices fell by more than 20% in 2019 to around $10,000/mt amid a global glut of supply. Lithium supply, spurred by high prices, has been growing more quickly than demand, even with the acceleration in lithium-ion battery manufacturing for electric vehicles. Similarly, cobalt prices have dropped this year (albeit only back to the level at the start of 2017) as the cobalt market has looked in better balance than many had anticipated. Our Sustainable Energy universe contains 10 raw materials companies and only one, Toyo Tanso, delivered a positive total return over the year.

Battery manufacturers were also held back as the race for lower battery costs (to make electric vehicles competitive with combustion engine vehicles) resulted in profit margins remaining low. Only GS Yuasa, Panasonic and Samsung SDI sneaked out positive returns for the year.

Electrification companies saw an extremely sharp fall in ROCE during the 2008/09 recession, but generally have been on a strong upward trend since 2015. We estimate that ROCE held at just over 10% in 2019 and we expect that it will increase further in 2020. The correlation between price/book and ROCE for this subsector since 2007 has not been particularly high (at only 43%) but it is noticeable that that the implied valuation, relative to ROCE, for 2019 and 2020 is significantly away from the long-term trend:

Electrification Universe Equities - ROCE and correlation with Price/Book



Source: Bloomberg; company data; Guinness Atkinson Asset Management

Generation sector – strong performers in 2019

The Generation sector of our investment universe contains 50 equities with key business areas being either IPPs (independent power producers) or utilities. As a whole, the Generation sector performed well in 2019, delivering a total return of around 38% which left it as the joint best-performing subsector of the four (broadly in line with the Installation sub sector).

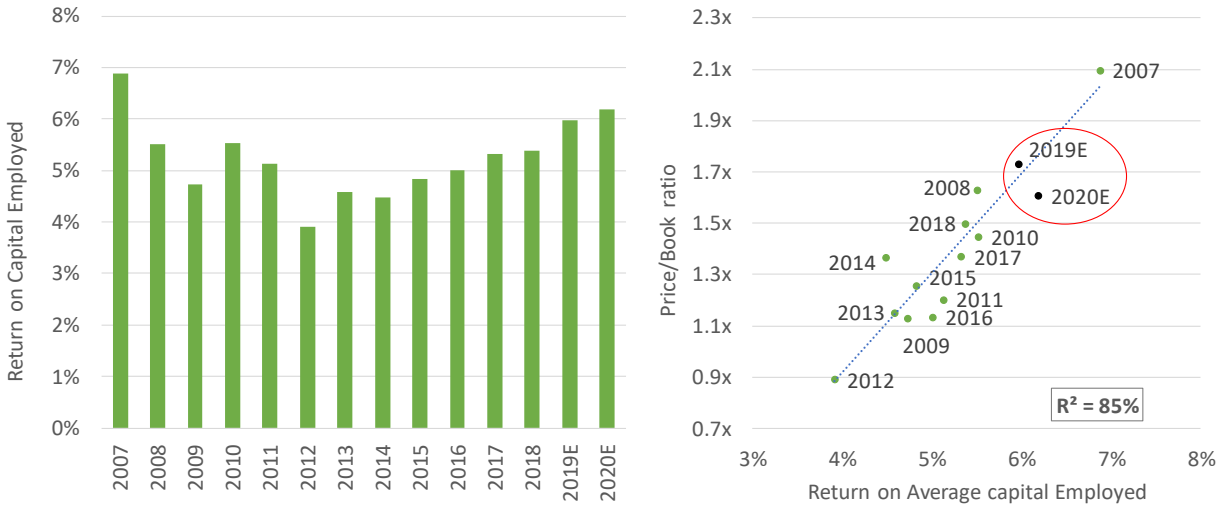
Within Generation, utility companies delivered around a 35% total return in 2019 while the IPPs performed particularly well, delivering a slightly higher total return (at 42%). The overall strength was driven in part by falling interest rates and interest rate expectations, which lowered long-term discount rates in the sector. Wind and solar IPPs were assisted by continued falls in the cost of variable renewable energy developments, making them increasingly cost competitive versus incumbent sources of power generation. Allied to this, there was also growing positive sentiment towards the growth that can be achieved in wind and solar over the next few years.

Solar IPPs, both residential and utility-focused, were the strongest subsector within IPPs as the pace of expansion accelerated. Residential solar in the US, for example, grew by around 25% in 2019 and is expected to grow by a similar rate in 2020.

The Generation subsector on average produces a lower but more stable ROCE than other sustainable energy subsectors. ROCE did decline during the 2008/09 recession (but not severely) and it has since steadily recovered and achieved a level of around 6% in 2019. The steady ROCE and steady growth profile of the subsector means that our ROCE and P/B valuation methodology works particularly well and it is clear that valuations in this subsector look fuller than in others. According to the 85% correlation, our universe of

Generation companies looks marginally overvalued on 2019 ROCE and marginally undervalued on 2020 ROCE.

Generation Universe Equities - ROCE and correlation with Price/Book



Source: Bloomberg; company data; Guinness Atkinson Asset Management

Installation sector – rebounding well in 2019 but remaining volatile

The installation subsector of our universe contains 53 companies that are involved in the supply chain associated with growth in renewable electricity generation. On the whole, these companies had a positive year and many recovered strongly from poor performance suffered in 2018. In 2019, they delivered a total return of around 40%, with some subsectors in negative territory (hydroelectric equipment manufacturers, for example) while some specialist subsectors returned well in excess of 50% total return.

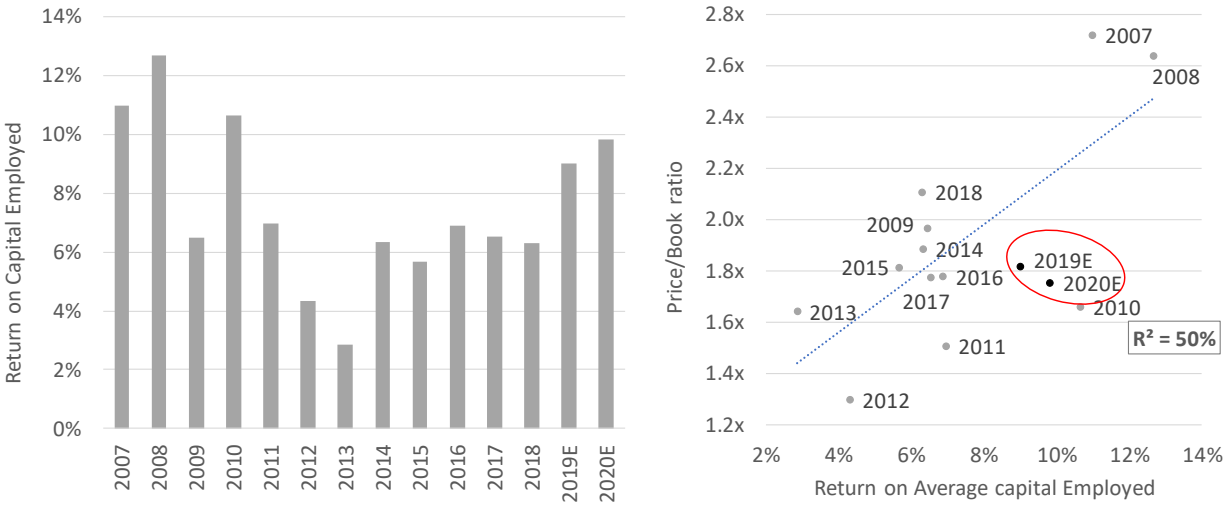
For upstream solar, non-Chinese polysilicon manufacturers were weak as intense competition in the sector saw polysilicon prices fall (by around 20%). Chinese polysilicon manufacturers, which have expanded capacity rapidly at the lower end of the cost curve, performed better. Solar wafer and module manufacturers suffered in 2018 as a Chinese pull-back on solar subsidies dented demand in the sector. However, they bounced back well in 2019 as global demand for solar installations picked up by over 10%. The solar PV inverter sector was also particularly strong; smaller US players benefitted from Huawei's withdrawal from the US inverter market.

Wind equipment installers generally did well in 2019, benefitting in particular from the sharp rise in offshore wind developments (more than doubling from 4GW in 2018 to 9GW in 2019) and tax incentives in the US and China, which drove strong uptake of onshore wind in 2019 and 2020.

Companies manufacturing and installing sustainable energy equipment have enjoyed high growth over the last decade, but this has not been matched by ROCE, which has suffered due to falling ASPs and pressure on profit margins. Nevertheless, consolidation in the upstream solar and wind sectors has helped to stabilise returns, with ROCE in 2019 rebounding to the highest level since 2010, in excess of 8%.

The volatility of ROCE leads to the ROCE vs P/B valuation methodology being less reliable on a long-term basis. Nonetheless, valuations in the sector look 'middling' – trading on 1.8x price/book (2019), in line with the average of the last six years and a little below the average of the 10-year range. The market is used to seeing capacity expansion in solar and, to a lesser extent, wind, and remains somewhat sceptical of the sustainability of returns.

Installation universe Equities - ROCE and correlation with Price/Book



Source: Bloomberg; company data; Guinness Atkinson Asset Management

Portfolio characteristics of the Guinness Atkinson Alternative Energy Fund

In our portfolio, we currently reflect the displacement, electrification, installation and generation sectors by combining them into the following investment themes:

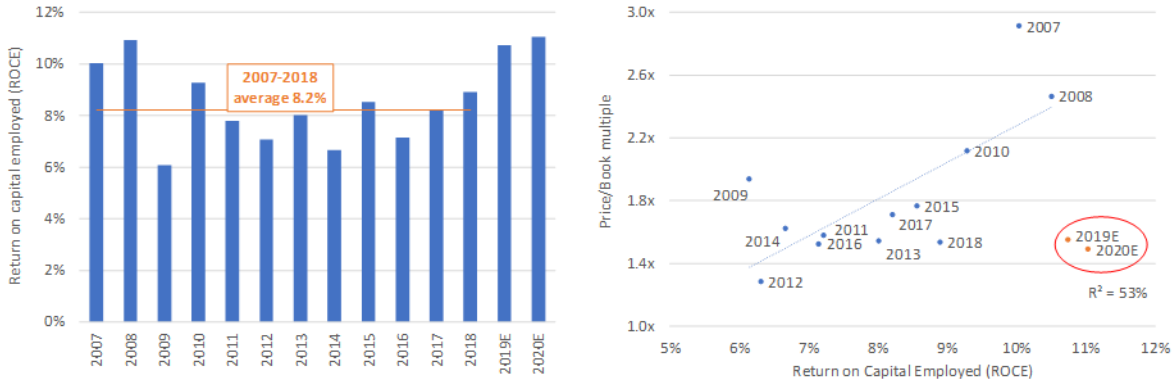
Key themes in the Guinness Atkinson Alternative Energy Fund

	Theme	Example holdings	Weighting (%)
1	Electrification of the energy mix	TransAlta renewables, Quanta	16.3%
2	Rise of the electric vehicle and auto efficiency	Aptiv, Sensata Technologies	19.0%
3	Battery manufacturing	Samsung SDI	8.7%
4	Expansion of the wind industry	tpi Composites, Vestas	17.9%
5	Expansion of the solar industry	Daqo	14.3%
6	Heating, lighting and power efficiency	Kingspan, Nibe	13.4%
7	Geothermal and biomass	Ormat, Albioma	7.4%
8	Other (inc cash)		3.0%

Source: Bloomberg, Guinness Atkinson Asset Management estimates

The current portfolio has a ROCE of just over 10% for 2019, rising towards 11% for 2020. Improved sector economics have helped to lift ROCE to these levels, after a decline over 2008-14 period as the withdrawal of overly generous subsidies affected profitability. Today, lower generation costs and technology improvements should help to sustain ROCE at current levels.

Guinness Atkinson Alternative Energy Fund – ROCE and correlation with Price/Book



Source: Bloomberg; company data; Guinness Atkinson Asset Management

The stock market has historically valued energy companies based on their sustainable levels of return on capital. As the chart above (right) shows, looking back to each year since 2007, there is a reasonable historic relationship (r-squared correlation of 50%) between Price/Book multiple and ROCE. The current P/B valuation implies that the ROCE of our companies will fall to around 7% and stay at that level long term. However, if ROCE stays at the current level of around 11%, and the market were to pay for it sustainably, it would imply an increase in the equity valuation of over 50%.

Considering other valuation characteristics, we see the portfolio trading at a modest discount vs the MSCI World on 2019/2020 P/E ratios and EV/EBITDA multiples. The dividend yield expected for 2020 is lower (1.6% vs 2.5%), but the expected dividend growth rate is significantly higher (below we show historic dividend growth). Importantly, we see a portfolio that trades at a cashflow return on investment - a version of ROCE we like to use, comfortably ahead of the MSCI World average in 2020.

	P/E			EV/EBITDA			Dividend Yield		Dividend Growth	CFROI	
	2019E	2020E	2021E	2019E	2020E	2021E	2019E	2020E	5yr historic	2019E	2020E
Guinness Sustainable Energy Fund	13.4x	13.2x	11.1x	10.5x	10.0x	8.6x	1.9%	1.6%	7.4%	8.2%	9.0%
MSCI World Index	17.4x	15.9x	14.7x	11.6x	10.7x	10.1x	2.4%	2.5%	1.3%	8.2%	8.3%
Fund Premium/(Discount)	*-23%*	*-17%*	*-24%*	*-10%*	*-6%*	*-15%*	*-0.5%*	*-1.0%*	*6.1%*	*0.0%*	*0.7%*

In aggregate, we expect investor interest in sustainable energy equities will grow further in 2020 as a result of increased individual, social and government pressures for consumers to become more energy efficient and for producers to increase their share of sustainable energy generation. We believe that the Guinness Atkinson Alternative Energy portfolio of 30 equally weighted equities, chosen from our universe of 196 companies, provides concentrated exposure to the theme at attractive valuation levels.

Jonathan Waghorn, Will Riley & Edward Guinness

January 2020

Performance

as of 12.31.2019 (in USD)

	YTD	1 year	3 years	5 years	10 years
GAAEX	30.20%	30.20%	9.91%	-0.51%	-6.45%
MSCI World NR USD	27.67%	27.67%	12.57%	8.73%	9.46%
WilderHill Clean Energy TR USD	59.32%	59.32%	23.77%	5.83%	-3.84%

All returns after 1 year annualized.

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 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, 2020. 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.

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

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

The Guinness Atkinson Alternative Energy Fund's investment objectives, risks, charges and expenses must be considered carefully before investing. The statutory and summary prospectuses contain this and other important information and can be obtained by calling 800- 915-6565 or visiting www.gafunds.com. Read and consider it 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.

Effective 5/1/19, the MSCI World Index is the Fund's primary benchmark and replaces the Wilderhill Clean Energy Index. The MSCI World Index is more representative of the Fund's investment strategies.

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.

Distributed by Foreside Fund Services, LLC