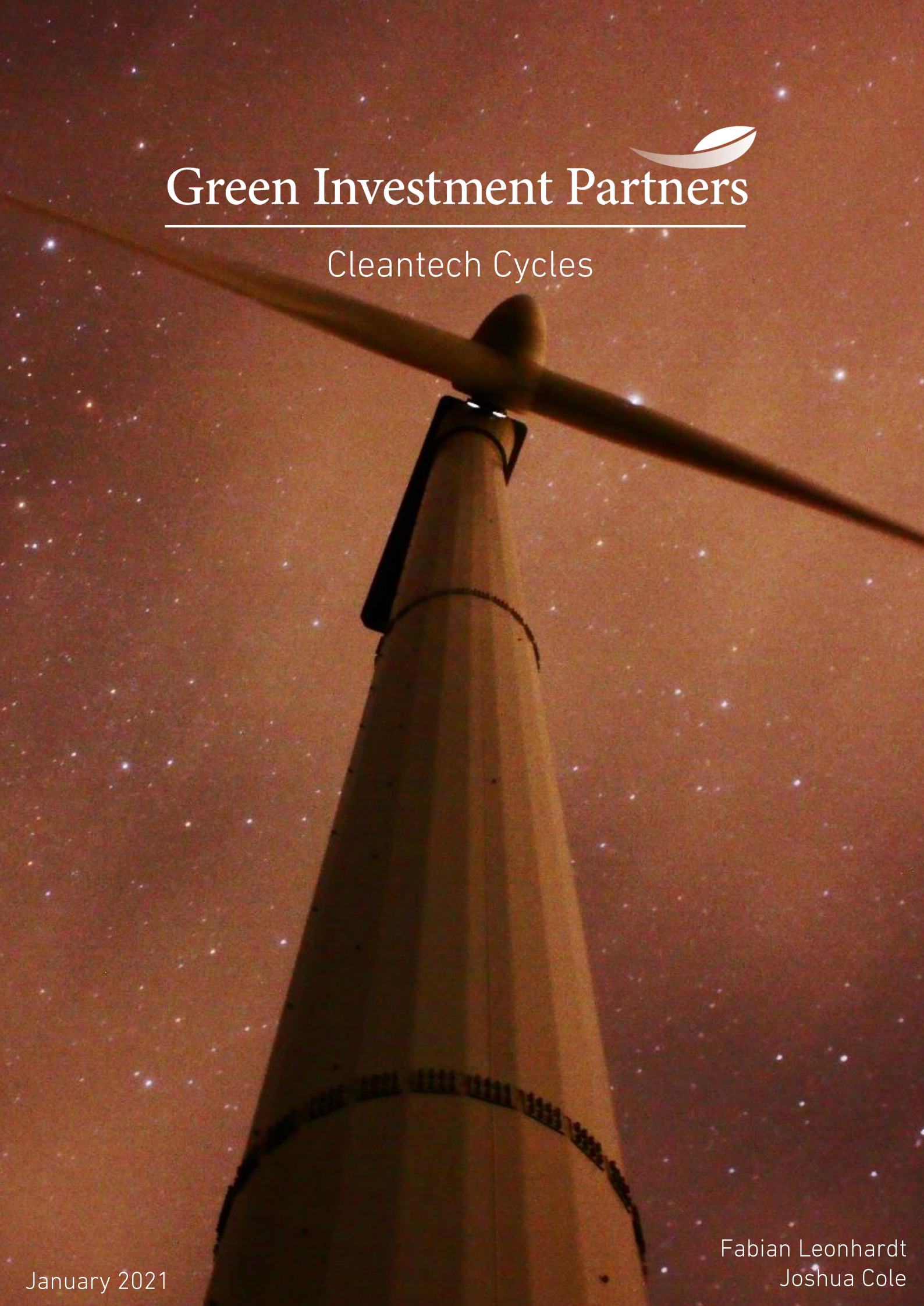

Green Investment Partners

Cleantech Cycles

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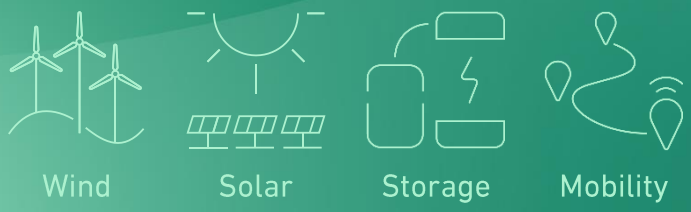
Cleantech Cycles

In this paper, we look at the history and risks of cleantech cycles and have found passive cleantech exchange traded funds ("passive cleantech ETFs") do little to mitigate downside risks.

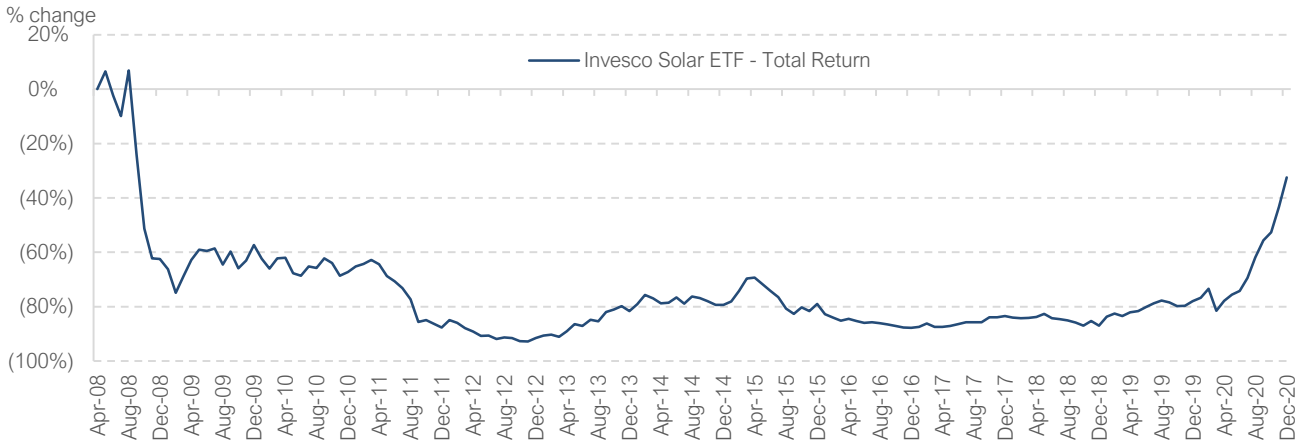


History of Cleantech Cycles

Historically, at the start of innovation cycles, new technologies have tended to generate speculation and early valuation bubbles before maturing. In '*Doing Capitalism in the Innovation Economy*', William Janeway argues that long-term state-funded research is necessary to develop new technologies, as the public markets only have a medium-term profit-oriented time horizon. Venture capital and speculation are positive, when not debt-financed, and necessary to get new technologies going. Once the technology is established, the public markets with their medium time horizon, can finance the future growth, reduce costs, and enable the distribution of the technology. The renewable energy industry is a great example of this time horizon interaction.

Cleantech boom-and-bust cycles can also lead to significant downside risk and volatility within diversified passive sector strategies. The 2007 global recession brought an end to the boom in renewables, which had seen strong increases in valuations. Solar companies saw a short-lived recovery in 2008, prior to a significant bursting of this bubble. The growth of solar had been foreseen, but the pricing, driven by speculation, had diverged significantly from fundamentals.

Figure 1: Invesco Solar ETF (TAN) Performance Since 2008 (Total Return in EUR from Apr-08 to Dec-20)

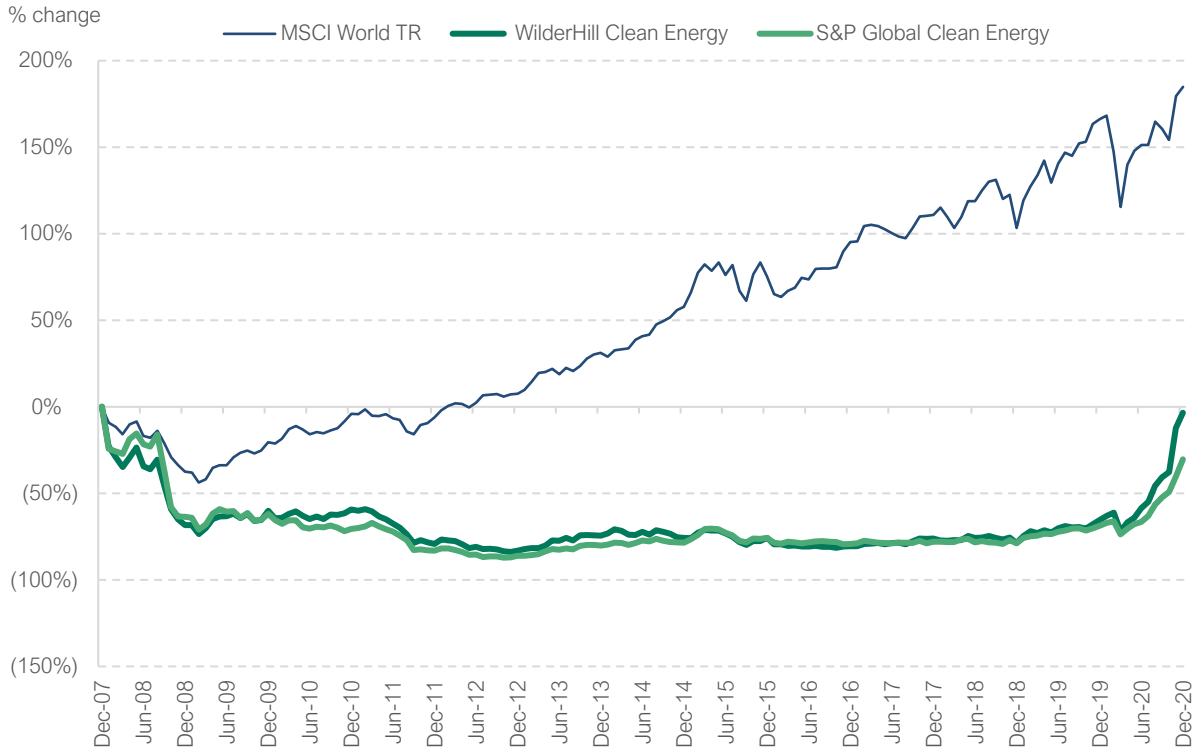


Source: Green Investment Partners, Bloomberg

Shortly before the 2008 decline, several passive cleantech ETFs were launched. Over the next decade world equities markets recovered and rallied, but most passive cleantech ETFs (or their

respective indices) have not recovered their 2007 year-end pricing, despite such a strong 2020.

Figure 2: Passive Cleantech Indices Have Underperformed for Over a Decade (Total Return in EUR from Dec-07 to Dec-20)



Source: Green Investment Partners, Bloomberg

The hydrogen market in 2020 is showing extreme valuations and weak fundamentals. We are not dismissing the technology but we are wary of speculation, especially as there are strong parallels to the solar bubble in 2008.

Figure 3: Hydrogen Fuel Cell Companies' 2020 Total Return and Fundamentals (in EUR)

Ticker	Name	2020 Total Return	Price to Sales[1]	Market Cap (mEUR)[2]	EBIT (mEUR)[3]
PLUG US	PLUG POWER INC	886%	33	11,672	-45
MCPHY FP	MCPHY ENERGY SA	825%	48	972	-7
ITM LN	ITM POWER PLC	586%	580	3,243	-34
336260 KS	DOOSAN FUEL CELL CO LTD	503%	18	2,665	15
CWR LN	CERES POWER HOLDINGS PLC	376%	106	2,416	-11
AFC LN	AFC ENERGY PLC	359%	na	552	-4
FCEL US	FUELCELL ENERGY INC	309%	34	2,901	-60
BE US	BLOOM ENERGY CORP- A	252%	5	3,819	-79
NEL NO	NEL ASA	215%	71	4,014	-26
BLDP US	BALLARD POWER SYSTEMS INC	199%	47	5,230	-24
PPS LN	PROTON MOTOR POWER SYSTEMS	188%	281	546	-8
PCELL SS	POWERCELL SWEDEN AB	119%	196	1,794	-8
MXWO	MSCI World Index	7%	2		

Source: Green Investment Partners, Bloomberg
1. Ratio of a stock's price, as of 31-Dec-20, divided by trailing 12-month sales per share
2. Current total market value of a company's outstanding shares in EUR millions. Capitalisation is a measure of corporate size
3. Trailing 12 months operating income (earnings before interest expenses and income taxes) in EUR millions

Once the speculative phase is over and the market for the technology is established, there are opportunities for real fundamental growth to occur. At this stage, investable industry champions can be identified and held for the long run, with a concentrated approach. Investing at this stage is still not straightforward, but it reduces the risk to capital from speculative bubbles. Investing in the speculative phase has a low probability of long-term success, as most analysis is based on the uncertain future. Sector consolidation and companies going bankrupt adds further difficulty.

The cleantech universe is heterogeneous, spanning many sectors, and not every area is experiencing extreme valuations. There remain strong long-term investment opportunities with reasonable valuations, good returns, and growth possibilities, but each sector requires careful analysis.

Passive Cleantech Investment Pitfalls

The two largest passive cleantech ETFs currently available are the iShares Global Clean Energy ETF ("ICLN", USD 4.7bn, benchmark: S&P Global Clean Energy Index "SPGTCLNT") and the Invesco WilderHill Clean Energy ETF ("PBW", USD 2.2bn, benchmark: WilderHill Clean Energy Index "ECOTR"). Both have rallied over the past two years, but they (or their respective indices) are still below or close to their 2007 peaks. Their inherent design means large drawdowns and long recoveries can reoccur.

Figure 4: Performance of Passive ETFs (in EUR)

	Ticker	Benchmark	Total Return to 31-Dec-20		Max Drawdown		Valuation	
			Since 31-Dec-19	Since 31-Dec-07	Since 31-Dec-19	Since 31-Dec-07	P/E Current[1]	P/E Fwd[2]
iShares Global Clean Energy ETF	ICLN US	SPGTCLNT	122%	na	(41%)	na	52	43
Invesco WilderHill Clean Energy ETF	PBW US	ECOTR	180%	9%	(49%)	(85%)	960	109
S&P Global Clean Energy Index	SPGTCLNT	na	122%	(33%)	(42%)	(88%)	54	56
WilderHill Clean Energy Index	ECOTR	na	179%	(4%)	(49%)	(85%)	749	134
MSCI World Index	MXWO	na	7%	185%	(34%)	(48%)	33	21

Source: Green Investment Partners, Bloomberg
1. Share price as at 31-Dec-20 to trailing 12-month earnings per share
2. Share price as at 31-Dec-20 to Bloomberg Estimates earnings per share

The structural issues we see in passive cleantech ETFs are as follows:

- Investing in competitive industries that are prone to boom-and-bust cycles requires industry expertise to assess opportunities, limit downside and find good risk-adjusted returns. This contrasts with passive cleantech ETFs whose nature can lead to purchasing expensive companies in bubble territories.
- When passive cleantech ETFs size positions based on market capitalisation, they are relying on past performance and not explicitly considering valuations.
- When passive cleantech ETFs equally weight positions, small speculative growth companies with high uncertainty can drive returns, or losses.

- Passive cleantech ETFs, generally, do not allow for significant cash holdings, therefore drawdowns can be significant during broad and sector-specific crises.
- Investor psychology and ETF asset flows can have a reflexive impact on underlying stock prices, especially for smaller stocks. This can result in speculation, which can fuel bubbles.

In some irrational speculative environments, we anticipate our strategy will underperform passive cleantech ETFs. However, over the long-term real fundamentals are what truly matter and are how a company is eventually measured. To paraphrase Benjamin Graham, in the short-term the market is a voting machine, but in the long-run the market is a weighing machine – evaluating the substance of a company. We are confident that fundamentals will prevail and provide more sustainable returns over the coming years, compared to the speculative growth in stock market valuations we have seen in some areas in recent years, most notably within the hydrogen fuel cell sector.

Detailed Sector Research Matters

Generally, a more diversified strategy is favoured at the beginning of a sector cycle, as it is harder to identify market champions. As the cycle develops a more concentrated investment approach can be used, as champions can be identified through fundamental and competitor analysis.

Growth sectors often start with a large base of smaller players. The competition, consolidation, interaction with competing sectors and further technology developments are hard to analyse at the initial growth stage. It is not always the first innovator that will win the race.

In renewable energy sectors, politics and regulations matter and need to be taken into account. After the solar sector correction in 2008, the industry went through significant changes; of the 30 companies in the Invesco Solar ETF present in Dec-09, only 50% are still actively traded today. Political interest and various subsidy systems have resulted in country-level boom-and-bust cycles. In the past, growth has overshot expectations and negatively impacted state budgets, leading to retroactive feed-in-tariffs cuts. This, in turn, impacts investors' trust and confidence in an industry. Such examples include solar in the Czech Republic and Spain, while France is also considering retroactive cuts to solar feed-in-tariffs. Internationally, China has taken a clear lead in the solar manufacturing industry, disrupting German first movers for which the market had aggressive growth predictions. Most solar technology forecasts underestimated the cost reduction and growth of solar over the last ten years. There is also an industry tipping point when the dependency on government subsidies changes in favour of corporate power purchase agreements (PPAs). PPAs are used to hedge power prices and allow access to cheaper project finance. Solar technology has had an incredible run over the last decade and is crucial to the sustainable economy. Despite this, buying a solar ETF post-financial crisis would not only have underperformed the broader market, but also remains below its starting value.

Rigorous Analysis and Valuation in Cleantech

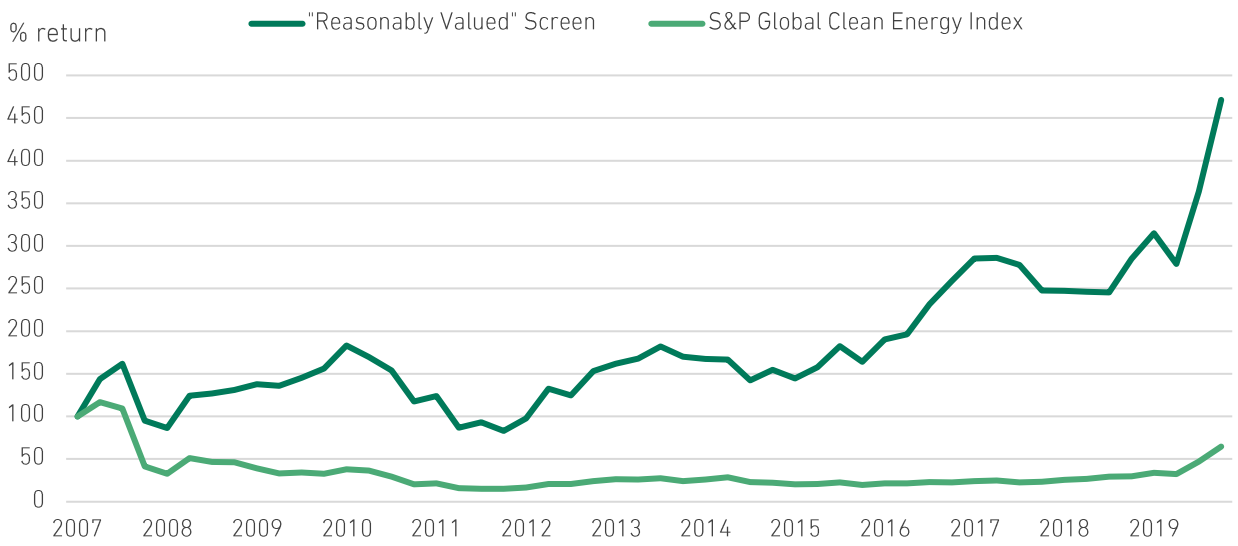
To illustrate why we think investing in reasonably valued green companies is a good approach, we have applied a screen to the constituents of the S&P Global Clean Energy Index (SPGTCLNT) and the WilderHill Clean Energy Index (ECOTR). The screen excluded expensive companies, defined as price to free cashflow of over 20x.

It is difficult to define a de facto reasonably priced cleantech universe and survivorship bias can distort results. By no means do we think this screen is a complete representation of such, but there will be some overlap. We want to show that if you consider valuation, even simplistically, the behaviour of bubble-prone cleantech sectors can be improved.

Figure 5 below shows the simulated past performance of a hypothetical strategy of buying companies that meet the criteria, on a quarterly basis, from Nov-07 to Aug-20. The performance is based on an equally weighted portfolio and total return with quarterly rebalancing. Management, performance, trading, or other costs are not included and past performance is not a reliable indicator of future performance. The portfolio is very concentrated with the size of the portfolio ranging from 5 – 18 companies.

Our focus is not on the overall total return, but on how a simple consideration of value can offer some downside protection in the post-2008 cleantech drawdown, when compared to a passive index, such as S&P Global Clean Energy Index. The hypothetical strategy underperformed from 2018 to 2020 in a market rally driven less by fundamentals. In quarters where the benchmark was down, the hypothetical strategy returned on average -5% whereas the benchmark returned -12%. In quarters where the benchmark was up, both returned on average 13%.

Figure 5: Simulated Past Performance of a Hypothetical "Reasonably Valued" Green Strategy Against the S&P Global Clean Energy Index (in EUR)



Source: Green Investment Partners, Bloomberg
Figure 5 refers to simulated past performance and past performance is not a reliable indicator of future performance.

Not All Opportunities Are Equal

We aim to allocate more capital towards companies that, we believe, can deliver strong returns over the next five years with conservative assumptions, as opposed to lesser opportunities. Therefore, we do not believe that equally weighting all companies that meet our minimum investment hurdle is the correct approach. We aim to size positions according to our strict assessment of a company. As well, we would not invest if opportunities do not meet our investment hurdle. This is at odds with passive cleantech ETFs that are forced to invest independently from any investment return calculation. Similarly, if we fixed the number of positions in a strategy, we could not guarantee that we would always find that exact number of

good investments within our universe. This is one of the reasons why we expect to be very concentrated or diversified at different stages of a market cycle.

Funds often see inflows increase after good performance and outflows increase after poor performance and for individual investors this can lead to a lower money-weighted return. We will communicate to our investors, when there are attractive investment periods so they can try to achieve a higher money-weighted than time-weighted return. We are transparent about our approach and return prospects. Periods of opportunities will probably arise after times of uncertainty and significant drawdowns.

Our long-term success depends on finding the right investors who understand our approach and are willing to invest in attractive times when the market becomes depressed about the long-term outlook. The market has periods of mild, medium and rare-but-wild volatility. Behaving correctly in periods of wild volatility is important for long-term outperformance and applies to both the manager and investors alike.

Conclusion

Investors are recognising the strong growth in renewable energy and cleantech sectors. Growth alone does not mean that all cleantech investments will succeed or that capital should be distributed indiscriminately across all companies, good or bad. We believe a strategy with the following attributes is right for cleantech sectors experiencing secular growth, regulatory changes, and strong competition:

- Rigorous stock analysis and valuation work with a longer investment horizon
- Detailed sector research by renewable industry experts
- Ability to allocate according to risk-return opportunities
    - Core value position: strong upside, limited downside. We have a structural advantage as we can allocate more to excellent companies.
    - Asset-backed or strong industrial position: These could be companies which are backed by renewable projects. We are experts in renewable project valuation and for a detailed discussion see our Green Investment Partners' insight on Renewable Asset Valuation.
    - Small growth positions: we can hold small growth positions, with an initial 1-3% allocation per position. Positions are sold down when the valuation overshoots even the most optimistic growth assumptions.
- Opportunistically take advantage of high volatility periods, selling down positions when valuations overshoot and holding cash in extreme situations
- Managers who invest alongside fund investors and have strong performance incentives

Each of the individual elements above will play a role in our strategy, but it is the sum that generates outperformance over the long-term.

Passive cleantech ETFs are trading at elevated valuation multiples; the iShares Global Clean Energy (ICLN US) is trading at 43x and the Invesco WilderHill Clean Energy (PBW US) is at 109x, on a forward P/E ratio as of 31-Dec-20. To put this in perspective the MSCI World (MXWO) is trading at 21x. The aggressive growth assumptions now baked into the price of many companies held by passive cleantech ETFs increases the risk of future underperformance.

Large drawdowns over an extended period can hurt investors and cause a permanent loss of capital, as seen in passive cleantech ETFs since 2008. Our aim is to reduce the chance of such drawdowns and extended underperformance, while achieving attractive risk adjusted returns.

"Only when the tide goes out do you discover who's been swimming naked" – Warren Buffett

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