Guinness Sustainable Energy

Investment Commentary – September 2025

RISK

This is a marketing communication. Please refer to the Prospectus, Supplement and KID/KIID for the Funds (available on our website), which contain detailed information on their characteristics and objectives and full information on the risks, before making any final investment decisions. The Funds are equity funds. Investors should be willing and able to assume the risks of equity investing. The value of an investment and the income from it can fall as well as rise as a result of market and currency movement, and you may not get back the amount originally invested. The Funds invest at least 80% in companies in the sustainable energy sector and can be volatile. Past performance does not predict future returns.

ABOUT THE STRATEGY

Launch	19.12.2007
Index	MSCI World
Sector	IA Commodity/Natural Resources
Managers	Will Riley Jonathan Waghorn
EU Domiciled	Guinness Sustainable Energy Fund Guinness Sustainable Energy UCITS ETF
UK Domiciled	WS Guinness Sustainable Energy Fund

INVESTMENT POLICY

The Guinness Sustainable Energy Funds are managed for capital growth and invest in companies involved in the generation, storage, efficiency and consumption of sustainable energy sources (such as solar, wind, hydro, geothermal, biofuels and biomass). We believe that over the next twenty years the sustainable energy sector will benefit from demand growth, improving economics and both public and private support, offering attractive investment opportunities. The Funds are actively managed and use the MSCI World Index as a comparator benchmark only.

CONTENTS

PRI Principles for Responsible Investment

COMMENTARY

Past performance does not predict future results

'BACK TO SCHOOL' FOR SUSTAINABLE ENERGY

Supportive supply cost and investment trends confirm that the global energy transition is continuing and, with US clean energy policy now clarified, sustainable energy equities have started to perform. In this 'back to school' piece we review the key sectors in the Guinness Sustainable Energy Fund and see an earnings growth outlook that sits at odds with the sector's depressed valuation levels.

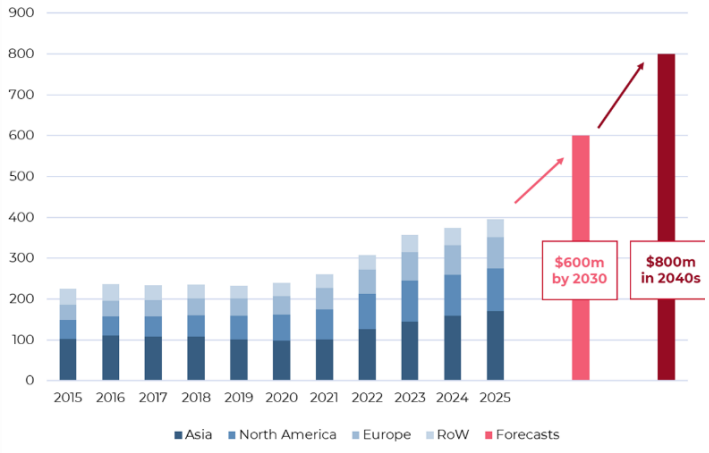
EQUITIES

The Guinness Sustainable Energy Fund (Class Y) delivered a return of 3.2% (in USD) in August, outperforming the MSCI World, which returned 2.6%. Among the fund's top performers were Ameresco and Enphase, which benefited from a more supportive US federal spending outlook than had been feared and clarity around US safe-harbour guidance. Among the fund's bottom performers were companies such as Canadian Solar and On Semiconductor which continue to be affected by tariffs and weak end market demand.

CHART OF THE MONTH

Global power grids are struggling to cope with the accelerating secular trend of electrification. 80 million kilometres of new or refurbished grids – equal to the size of the current global grid – are needed by 2040. Annual investment in grids will need to double to over $600bn by 2030 and average $800bn in the 2040s.

CHART OF THE MONTH: Global power grid investment by region ($ bn)



Source: Rystad, IEA, September 2025

AUGUST NEWS AND EVENTS IN REVIEW

In this section, we review the key news items and their impact on our various portfolio sub-sectors over the last month.

News	Sub-Sector	Impact
In a positive development for the US renewables industry, the US Treasury issued updated guidance on eligibility for tax credits that was widely viewed as supportive for the clean energy build-out compared to expectations. The update confirmed that the changes under the One Big Beautiful Bill Act would not apply retroactively, preserving tax credit eligibility for projects already underway, and it maintained the 5% capex "spend test" for small-scale systems. For large utility-scale projects, the 5% test was removed, but developers can still qualify by demonstrating physical work continuity and using the four-year construction window. As policy clarity continues to improve in the renewable energy space, we expect investment to accelerate.	US Renewables	
Global electric vehicle (EV) sales grew 21% year-on-year in July, according to research house Rho Motion. Sales growth in China, the largest EV market globally, slowed to 12% as a pause in some government subsidy programmes tempered demand. Stronger growth is expected to return as new subsidies become available from August. Europe continues to experience strong, policy-driven growth as supportive subsidy schemes in this key market drove 48% year-on-year growth in the month. As has been the case this year, growth in North America has lagged other major markets as political headwinds continue to dampen demand.	Global EV sales	
Rapid growth in AI-related data centre load is colliding with limited spare capacity in the US grid, heightening reliability and cost risks. In August, Google entered peak-time demand-response agreements with Indiana Michigan Power and the Tennessee Valley Authority to curtail consumption at AI data centres during system stress, underscoring the need for flexible load management. With existing generation capacity unable to meet the rising demand outlook, the Data Center Coalition has encouraged the US Treasury to retain existing wind and solar tax credits, making the case that the US will need all generation technologies to meet the AI-driven load growth and stay ahead of competition.	US Power Demand	
US offshore wind continues to face significant policy headwinds. In late August, the Bureau of Ocean Energy Management (BOEM) issued a stop-work order on Ørsted's Revolution Wind project off Rhode Island, despite being c.80% complete. This followed BOEM's suspension of Equinor's Empire Wind off New York. In the same month, the administration cancelled $679m of federal support for 12 offshore wind initiatives. Taken together, these actions are likely to lift political risk premia, slow project decision making, and weigh on supply-chain investment.	US Offshore wind	
Attractive valuations and growing electricity demand continued to drive M&A activity in the sustainable energy space in August. US investment firm Sixth Street acquired 38% of Italian renewable energy company Sorgenia in a deal valuing the business at $4.6bn. Sorgenia has a portfolio of low-carbon assets across solar, wind, biomass and hydroelectric plants with 1,700MW of installed capacity. This marks the latest in a series of power section transactions in 2025, led by Constellation Energy's $16.4bn acquisition of Calpine and its portfolio of natural gas and geothermal generation assets.	Sustainable energy M&A	

MANAGERS' COMMENTS

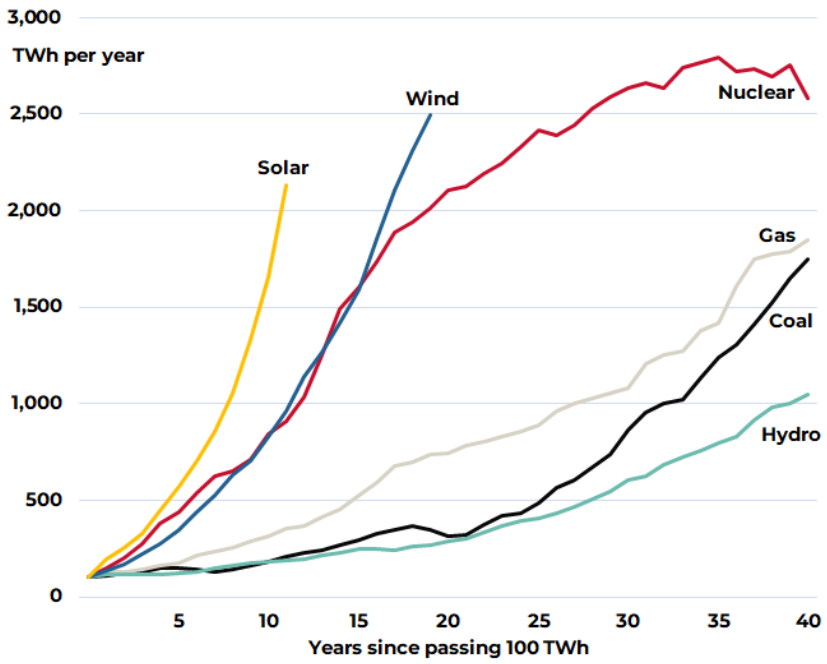
'Back to school' for sustainable energy

Supportive supply cost and investment trends confirm that the global energy transition is continuing and, with US clean energy policy now clarified, sustainable energy equities have started to perform. In this 'back to school' piece we review the key sectors in the Guinness Sustainable Energy Fund and see an earnings growth outlook that sits at odds with the sector's depressed valuation levels.

Global energy transition goes on, despite US headwinds

The global clean energy industry has suffered over the last 18 months due to the nomination and election of Donald Trump as President of the United States and the subsequent passing of his "One Big Beautiful Bill" (OBBB). With support for the US clean energy industry under pressure, you would be forgiven for thinking that the global energy transition has stalled. We would argue quite differently and suggest that we are still in the **very early stages of the secular energy transition** trend of growing renewable/low-carbon energy supply and the electrification of global energy demand. Wind and solar are growing faster than any prior form of power supply, while the electrification of the world energy system is leading to sharply positive revisions for power demand. The energy transition is just getting into its stride.

Annual global power generation after exceeding 100 TWh in a year



Sources: Nat Bullard; EMBER; Guinness Global Investors, 2025

Despite the passing of the OBBB and Donald Trump's 'Liberation Day' tariffs, sustainable energy equities have outperformed markets year-to-date, with the Guinness Sustainable Energy Fund up 19.3% (in USD) to 31 August 2025, outperforming the MSCI World Index (up 13.8%). We believe this performance generally reflects:

- The strength of electrification theme: the world waking up to the level of investment needed to expand and modernise the power grid, and to meet new power demand;
- In Europe, real investment being added to green rhetoric, with Germany's new infrastructure spending including significant sums earmarked for clean energy; and
- The outcome of Trump's OBBB being not as bad as many feared; its passage may well be seen as a significant clearing event.

No doubt the OBBB makes clean energy development in the United States tougher than under existing Inflation Reduction Act provisions, but its effects are likely to be nuanced. As expected, EVs and offshore wind were relative losers in the OBBB, but clean energy equipment manufacturing was a relative winner. Uncertainty around the outcome had forced many clean energy developers to stall their developments (nearly $19bn of clean energy projects have been cancelled in 2025, most in the lead up to the OBBB, according to Atlas Public Policy's Clean Economy Tracker) but activity is now starting to recover. In recent days, the US Treasury has confirmed that projects started by July 2026 will have up to four years to "safe harbour" tax credits (much later than many feared), so there is a reasonable chance the projects get quickly restarted and equipment orders start to recover from here.

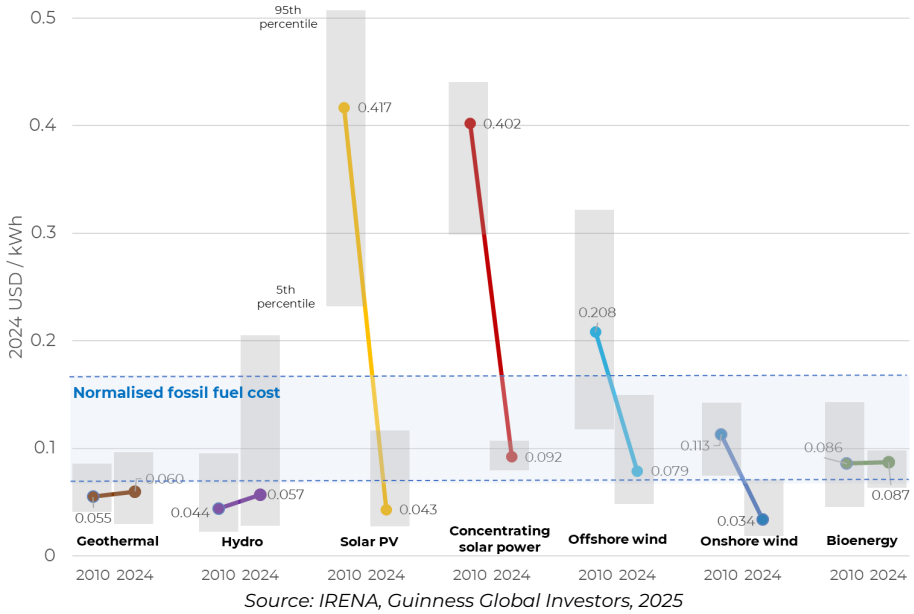
With the tax credits now settled, we expect the market to focus more on the issues raised by **surging electricity demand growth** in the US, thanks to data centres, AI and the reshoring and electrification of industry. This inflection in electrification is likely to keep demand strong for new renewable power (as it is more economic and faster to market than other forms) and we expect renewable power purchase agreements (PPAs) to continue to inflate. Growth in demand is very likely to highlight weaknesses and the need for significant investment in the US electric grid.

Looking beyond the US, we continue to see **positive energy transition trends**. In Europe, Germany's new infrastructure spending (EUR100bn earmarked for clean energy within EUR500bn total infrastructure spend) provides earnings growth potential for our companies, while the UK announced further EV support and South Korea introduced its own 'Inflation Reduction Act' to support the development of clean energy. Meanwhile, China has continued determinedly with its broad-based electrification strategy and we saw some early signs that the government is starting to address the significant oversupply in some clean energy manufacturing industries.

There have been numerous headwinds and tailwinds for global clean energy policy over the last few years and there are likely to be more in the years ahead. We urge investors to concentrate on industry activity, and we continue to find that project cost data and global clean energy investment data give us confidence in the economic rationale for renewables.

Recently published data from IRENA, based on real projects commissioned across the world in 2024, showed that the levelised cost of electricity (LCOE) of solar and wind remained **broadly flat last year,** keeping both firmly at the bottom end of the cost curve. We believe that this cements the attractiveness of both energy forms, since these data points now include the effects of post-COVID supply chain issues, raw material cost inflation and the effect of higher interest rates. The flat supply cost profile of wind and solar contrasts with gas-fired power, where the **cost of a gas turbine has increased 2.3x since 2022.**

Global LCOE of newly commissioned utility-scale renewable power technologies (2010–2024)



Source: IRENA, Guinness Global Investors, 2025

The recent World Energy Investment 2025 report from the IEA estimates that global investment in clean technologies remains on track to hit **nearly $2.2tn in 2025**, 10% more than 2024 and almost twice the spend on coal, oil and gas.

Supporting this, in the first half of the year, research provider BNEF estimates that a record $386bn was invested in renewable energy projects (also up 10% year-on-year) with wind projects up 24% and solar up 5%.

In summary, then, energy transition continues to make economic sense. And while the strong equity performance this year reflects some relief after the passage of the OBBB, more importantly it reflects a continued economic supply cost advantage that is incentivising growing investment in the face of surging electricity demand.

The key themes in the Guinness Sustainable Energy portfolio

The Guinness Sustainable Energy Fund is positioned to benefit from numerous themes within the broader secular trend of the energy transition. We highlight eight such themes below:

	Theme	Example holdings	Weighting (%)
1	Electrification of the energy mix		26.9%
2	Modernising the power grid		12.0%
3	Rise of the electric vehicle and auto efficiency		11.3%
4	Power semiconductors		8.9%
5	Wind & solar: equipment manufacturing		8.5%
6	Low carbon power generation: regulated producers		8.5%
7	Low carbon power generation: independent producers		7.6%
8	Building and Industrial efficiency		15.1%
9	Other (inc cash)		1.3%

Source: Guinness Global Investors. Data as of 31.08.2025

The **electrification of the energy mix** is the key theme in the transition, with electricity demand growing around 4% a year (increasingly displacing fossil fuels) and reaching around 60% of final world energy use by 2050. Electricity demand equivalent to 1.5 times the global oil industry is being created, and this is a challenge for many governments and companies that are not used to growth. While we see high growth rates for AI and data centre electricity demand, we note that the electrification trend is much broader-based and includes industry, buildings and transportation.

To achieve this, the global **power grid needs to be modernised**. Much of the western world's power grid is 40-50 years old and over half of US grid transformers are over 30 years old. By 2040, we see estimates that over 50 million km of new grids and 30 million km of refurbished grids will be needed, equivalent to a doubling of the global power grid today. Grid spending rose 9% in 2024 and will need to grow from nearly $400bn in 2025 to $600m by 2030 and average $800m a year in the 2040s.

The **rise of the electric vehicle** should see the global transportation sector's share of global electricity demand grow from less than 1% today to around 15% by 2050, representing a 50-times increase in electricity demand. China is leading the race with more than 50% of new car sales being EVs because the average battery EV is now cheaper than the average internal combustion engine (ICE) vehicle. Following the current 'S curve' will see China at 80% adoption of EVs in 2030 while still globally exporting low-cost vehicles than are more efficient that their ICE counterparts. Further reductions in the cost of battery manufacturing will support the transition towards EVs and **power semiconductor** demand will also rise.

Bottom-of-the-cycle conditions in **clean energy equipment manufacturing** will improve as demand for wind and solar power persists. Renewables represented over 90% of new power capacity installed globally in 2024 and renewables remain attractive either due to speed of delivery or cost of supply relative to fossil fuels. In solar, we believe that module prices have bottomed and that China may have some success in removing excess capacity for the industry. In wind, turbine prices have moved higher allowing manufacturers to stabilise margins. Both wind and solar manufacturing could see short-term demand spikes prior to the roll-off of tax credits in the United States.

Our **low-carbon generation companies** are well placed to benefit from rising electricity demand expectations and rising electricity prices. Urgency around electricity demand brings substantial opportunities for these companies to invest in either

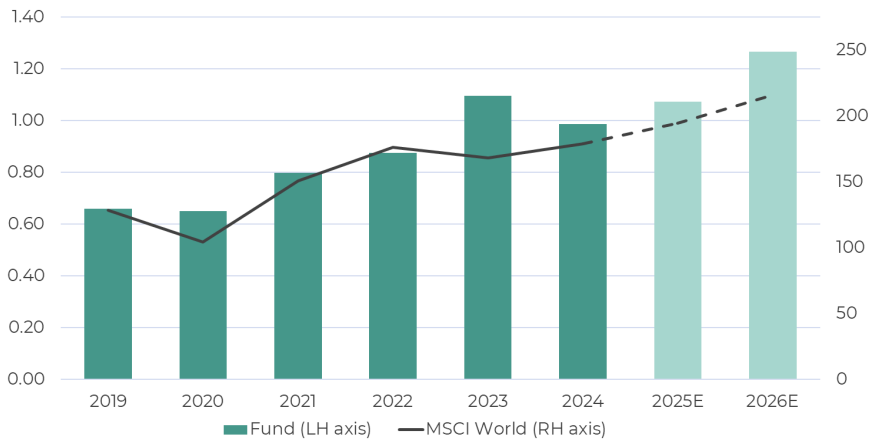
new renewable supply or substantial grid upgrades at attractive regulated or semi-regulated rates of returns. Rising prices in power purchase agreement and lower interest rates should improve their cash return spreads and equity valuations.

Lastly, our companies in **building and industrial efficiency** will be key beneficiaries of electrification. In the near term, lower US interest rates would certainly help to boost lagging home starts, but longer-term policy commitments and higher electricity prices are leading governments to bring in greater efficiency regulations, boosting the payback on efficiency upgrade projects that our companies are exposed to. By 2050, the need for efficiency is clear as electricity consumption from buildings will likely grow by 3.5 times and electricity consumption from industry will grow by 4 times.

Positive thematic reflected in attractive fund characteristics

In the Guinness Sustainable Energy portfolio, we believe that we have advantaged exposure to companies within these themes. Our basket of companies is projected on consensus estimates to deliver **good earnings growth** in 2025, in excess of the MSCI World. Benefiting from the strong tail wind of the energy transition, the fund has historically delivered earnings per share (EPS) growth in excess of the MSCI World (8.4% annually from 2019-2024 versus the MSCI World at 6.8%) and, based on current consensus expectations, it should return to that trend again. Including recent 2Q 2025 results, fund EPS is expected to grow at 13.3% per annum to 2026 (reflecting 9% growth in 2025 and 18% in 2026) while the MSCI World is expected to grow at 9.8% per annum to 2026 (reflecting 9% growth in 2025 and 11% in 2026).

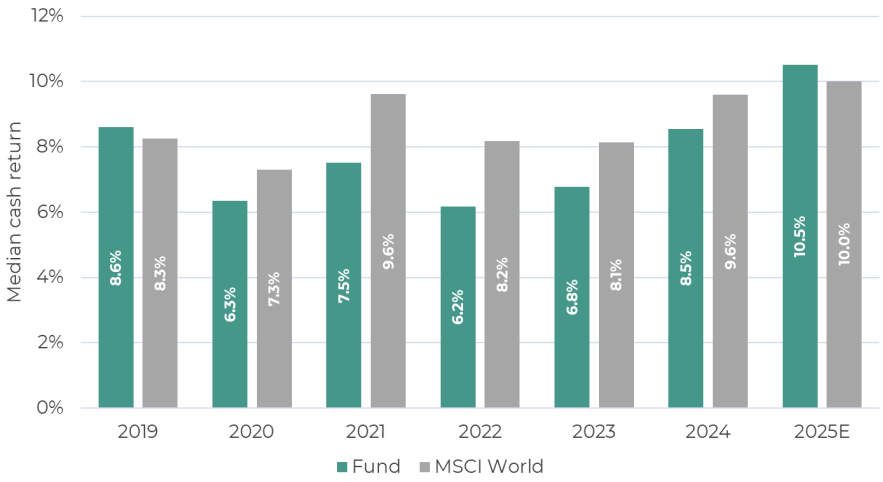
Earnings per share (US$) for Guinness Sustainable Energy Fund and MSCI World index



Source: Company data, Guinness estimates, 31.08.2025

The cash return of the fund's holdings (a measure of real economic return on capital employed) has moved higher over 2024 and 2025 and has now reached 11% for the median holding at the end of August 2025. This is result of improvements in the cash returns of various existing investee companies, plus some high grading of the portfolio. Looking back over the fund's history, **cash returns are now at a peak level** and, for the first time since 2019, they are at a premium to the median cash return of the MSCI World Index.

Cash returns for Guinness Sustainable Energy Fund and median MSCI World index



Source: Company data, Guinness estimates, HOLT, 31.08.2025

Stock changes that we have made in the portfolio over the last 18 months (and in particular taking advantage of volatility following 'Liberation Day') have contributed to improved quality and greater end market diversification. This has reduced the historic volatility of the fund's earnings but without sacrificing its **pureplay clean energy exposure**. The forthcoming edition of the strategy's Impact Report (soon to be available here) highlights that the companies in our portfolio at the end of 2024 sold products and services that helped to displace 919 tonnes of CO2e (per $1m of portfolio assets) compared to the continued use of incumbent fossil fuel technologies. In 2024, the companies in the fund (on a 100% ownership basis) grew their carbon dioxide emissions avoided by 9%, thereby delivering a five-year annualised rate of 13%. Our analysis of business exposure suggests that the portfolio at the end of July 2025 had over 70% of green revenues from clean energy, very similar to the levels estimated for our portfolio from 2019.

Accordingly, the fund continues to pursue a pureplay thematic. Its active share with the MSCI World Index remains high, at 98.4%, and the 12-month rolling correlation between the daily performance of the fund and the MSCI World Index sits at 77%; less correlated than history and low in the context of global equity funds more broadly.

Despite growth potential, valuation still at a discount to the MSCI World

At 31 August 2025, the Guinness Sustainable Energy Fund traded on a 2025/26 price/earnings ratio of 19.4x/16.4x, while the MSCI World Index traded on 21.5x/19.4x. On a 12-month forward view, the fund trades at about a **13% P/E discount to the MSCI World Index**, despite consensus forecast suggesting it will deliver superior earnings growth (13.4% a year vs the MSCI World at 10.2% a year).

Valuation and earnings growth of the Guinness Sustainable Energy fund

As at 31 August 2025	PE			EV/EBITDA			Dividend Yield		EPS Growth (%pa)		CFROI	
	2024	2025E	2026E	2024	2025E	2026E	2025E	2026E	2019-24	2024-27	2025E	2026E
Guinness Sustainable Energy Fund	21.2x	19.4x	16.4x	12.9x	11.9x	10.4x	1.5%	1.8%	7.7%	13.4%	10.4%	10.7%
MSCI World Index	23.4x	21.5x	19.4x	15.1x	14.0x	12.6x	1.7%	1.8%	6.7%	10.2%	9.7%	10.3%
Fund Premium/(Discount)	*-9%*	*-9%*	*-15%*	*-15%*	*-15%*	*-17%*						

*2024 P/E = Latest month-end price / 2024 earnings; Portfolio = median CFROI; Index data = HOLT MSCI World ETF median CFROI, EPS derived from consensus, adjusted for Canadian Solar

This 13.4% annualised EPS growth implied by consensus today is lower than prior forecasts from 2021 and 2022 but comes from a more diversified end market exposure. Should this earnings growth play out, we would expect the fund's 13% P/E valuation discount to the MSCI World Index to close and, potentially, move back to a premium reflecting the forecast earnings growth premium to the MSCI World Index.

12-month forward P/E relative of Guinness Sustainable Energy Fund vs MSCI World Index

Source: Guinness Global Investors (31 August 2025)

Conclusion

Increasing global electricity demand, a better-than-expected resolution to US policy, and supportive policy elsewhere in the world provide a backdrop for our companies that is better than anything seen in the last 24 months. Improvements in quality and diversified exposure to better structured end markets should allow fund earnings to grow in 2025 and 2026 and bring greater confidence in the longer-term earning potential. We believe that our basket of sustainable energy equities provides exposure to earnings growth in excess of the MSCI World at an attractive valuation discount to the MSCI World.

PERFORMANCE

Past performance does not predict future returns.

The **Guinness Sustainable Energy Fund** (Class Y, 0.68% OCF) delivered a return of 3.2% in the month, while the MSCI World Index (net return) delivered 2.6% (all in USD terms).

Total return in USD	Ytd	1 Yr	3 Yrs	5 Yrs	10 Yrs*
Fund (Class Y)	19.3%	5.1%	5.5%	40.4%	120.8%
MSCI World NR Index	13.8%	15.7%	66.4%	83.4%	201.0%
Out/Underperformance	*5.6%*	*-10.6%*	*-60.9%*	*-43.0%*	*-80.3%*

	2024	2023	2022	2021	2020
Fund (Class Y)	-11.8%	-0.4%	-12.5%	10.4%	84.1%
MSCI World NR Index	18.7%	23.8%	-18.1%	21.8%	15.9%
Out/Underperformance	*-30.4%*	*-24.2%*	*5.6%*	*-11.4%*	*68.2%*

	2019	2018*	2017*	2016*	2015*
Fund (Class Y)	31.4%	-15.2%	20.2%	-15.4%	-12.0%
MSCI World NR Index	27.7%	-8.7%	22.4%	7.5%	-0.9%
Out/Underperformance	*3.7%*	*-6.5%*	*-2.2%*	*-23.0%*	*-11.2%*

*The Fund was launched on 19.12.2007. *Simulated past performance prior to the launch of the Y class on 16/02/2018. The Performance shown is a composite simulation for Y class performance being based on the actual performance of the Fund's E class, which has an OCF of 1.24%. On 31/12/2018, the benchmark became the MSCI World NR. Prior to this, the benchmark was the Wilderhill Clean Energy Index (ECO Index).*

The **WS Guinness Sustainable Energy Fund** (Class Y, 0.67% OCF) delivered a return of 1.2% in the month in GBP, while the MSCI World Index (net return) delivered 0.5%.

Total return in GBP	Ytd	1 Yr
Fund (Class Y, 0.67% OCF)	11.9%	5.0%
MSCI World NR Index	5.5%	12.5%
Out/Underperformance	*6.5%*	*-7.5%*

	2024	2023
Fund (Class Y, 0.67% OCF)	-10.4%	-5.8%
MSCI World NR Index	20.8%	16.8%
Out/Underperformance	*-31.2%*	*-22.6%*

The Fund was launched on 30.12.2022.

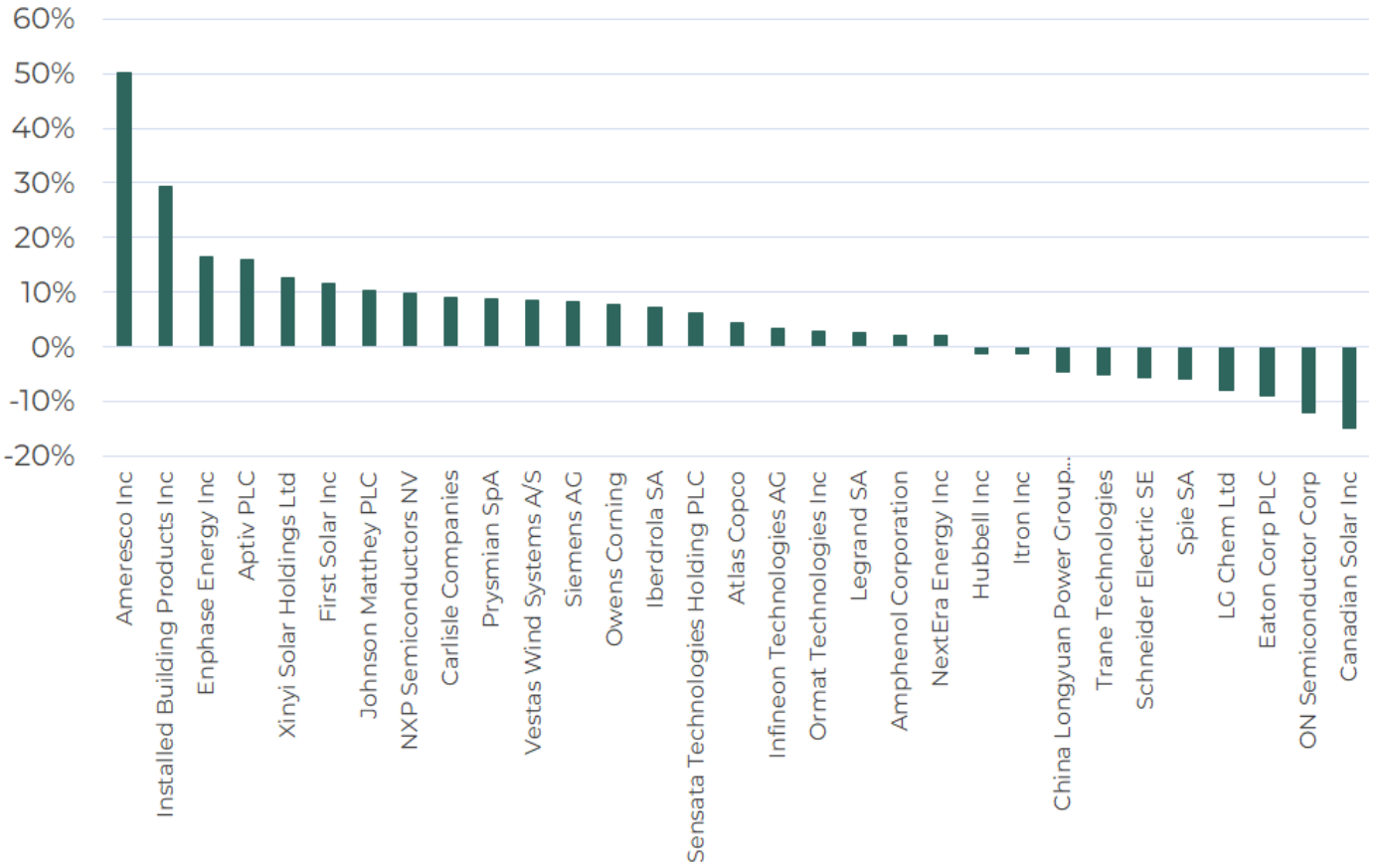
The **Guinness Sustainable Energy Fund UCITS ETF**, under our management since 25 July 2024, delivered a return of 3.2% in the month in USD, while the MSCI World Index (net return) delivered 2.6% (all in USD terms).

Total return in USD	Ytd	1 Yr
Fund (Class A Acc, 0.65% OCF)	19.2%	5.5%
MSCI World NR Index	13.8%	15.7%
Out/Underperformance	*5.6%*	*-10.2%*

Data as of 31.08.2025. Source: FE fundinfo, bid to bid, total return net of fees. Investors should note that fees and expenses are charged to the capital of the Funds. This reduces the return on your investment by an amount equivalent to the Ongoing Charges Figure (OCF). The performance shown has been reduced by the current OCF shown. Returns for share classes with different OCFs will vary accordingly. Transaction costs also apply and are incurred when a Fund buys or sells holdings.

Within the Fund, the strongest performers were Ameresco Inc, Installed Building Products Inc, Enphase Energy Inc, Aptiv PLC and Xinyi Solar Holdings Ltd, while the weakest performers were Canadian Solar Inc, ON Semiconductor Corp, Eaton Corp PLC, LG Chem Ltd and Spie SA.

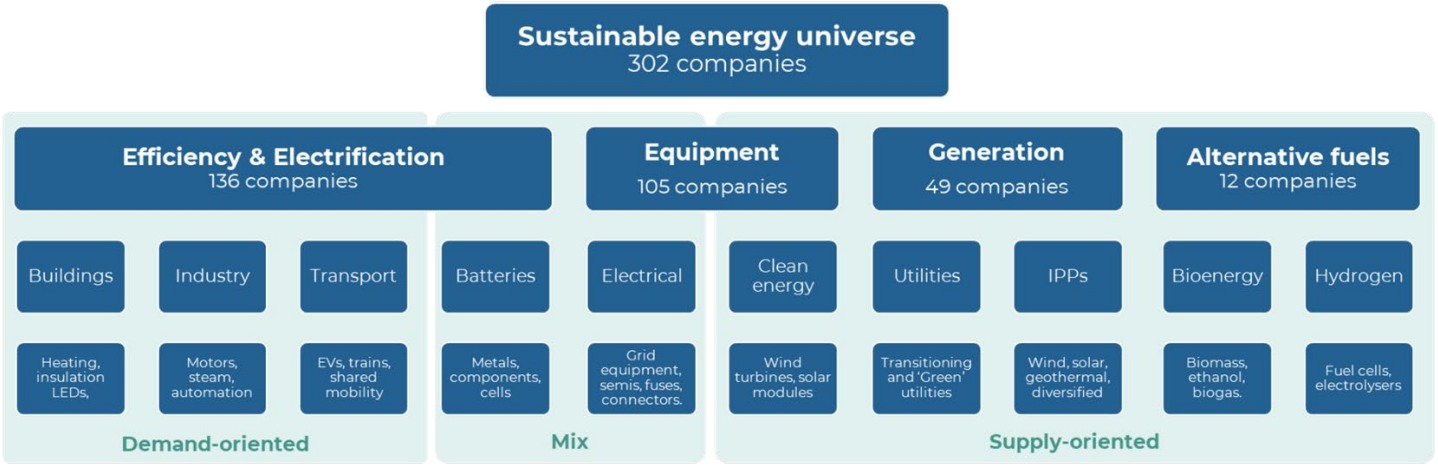
Stock by Stock performance over the month, in USD



Source: Bloomberg. As of 31st August 2025

PORTFOLIO

The Guinness Sustainable Energy Fund is positioned to benefit from many of the long-term themes associated with the transition towards a lower-carbon economy and of sustainable energy generation via investment in companies with activities that are economic with limited or zero government subsidy and which are profitable. We do not limit ourselves to 'pure plays', opening our universe up to some companies with existing hydrocarbon-based fuel exposure, but this must be allied with a commitment to transitioning their business models towards sustainable energy sources. Our investment universe comprises around 300 companies which are classified as follows:



Source: Guinness Global Investors; data as of 31 August 2025

We monitor each of the industry areas very closely and hope that detailed top-down (macro) analysis of each (complemented with disciplined equity screening and stock valuation work) will allow us to deliver attractive fund performance via a broadly equally weighted portfolio of 30 stocks. The portfolio is designed to create a balance between maintaining fund concentration and managing stock-specific risk.

Guinness Global Investors is a signatory of the United Nations Principles for Responsible Investment. The Guinness Sustainable Energy Fund prioritises returns whilst delivering concentrated exposure to companies playing a key role in global decarbonisation. The Fund's holdings align most closely with four of the UN's sustainable development goals:

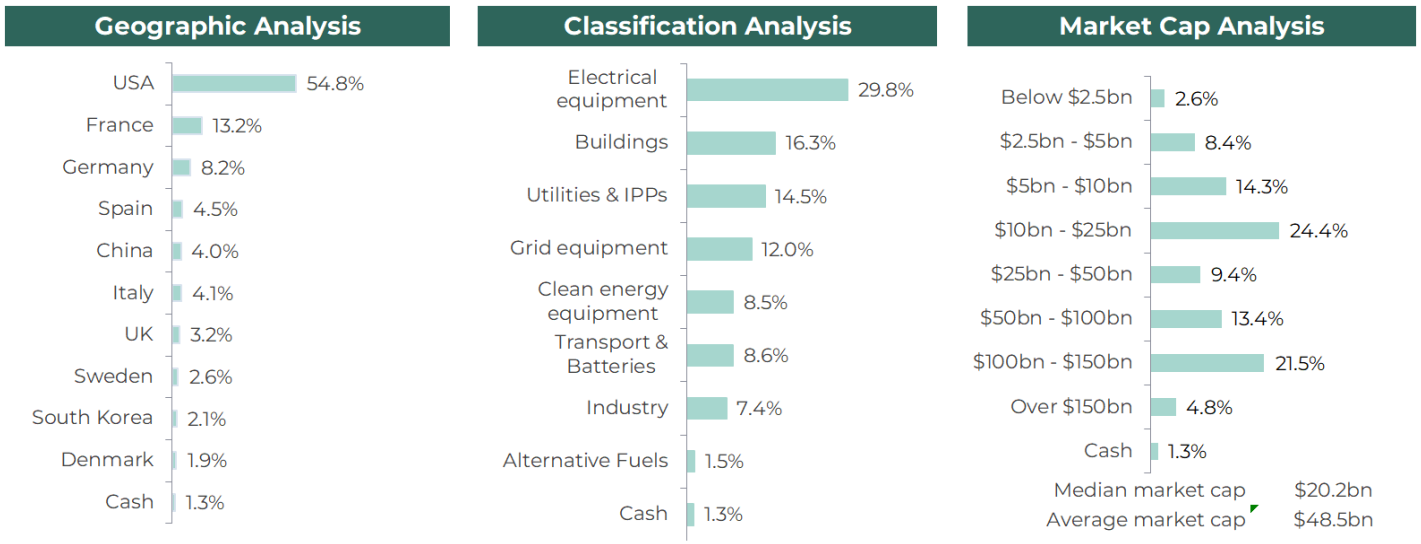
Signatory of:

PRI Principles for Responsible Investment

Buys/Sells

There were no buys/sells in the month, but the portfolio was actively rebalanced.

Portfolio structure analysis



Data as of 31.08.2025. Source: Guinness Global Investors. Portfolio holdings are subject to change.

Portfolio sector breakdown

The following table shows the asset allocation of the Fund at 31st August and at previous year ends.

Asset allocation as %NAV	Current	*Change*	Year end	Previous year ends				
	Aug-25		*Dec-24*	Dec-23	Dec-22	Dec-21	Dec-20	Dec-19
Electrical equipment	29.8%	*3.0%*	26.8%	25.1%	20.3%	19.0%	10.0%	9.6%
Buildings	16.3%	*1.5%*	14.8%	*9.6%*	*7.7%*	*4.2%*	*3.7%*	*10.2%*
Utilities & IPPs	14.5%	*-6.0%*	20.5%	*19.5%*	*17.7%*	*23.1%*	*24.6%*	*22.2%*
Grid equipment	12.0%	*3.0%*	9.0%	7.6%	7.3%	6.6%	6.1%	5.5%
Clean energy equipment	8.5%	*-1.8%*	10.3%	15.8%	19.7%	18.7%	28.8%	23.5%
Transport & Batteries	8.6%	*-2.7%*	11.3%	16.4%	18.5%	19.5%	20.4%	21.7%
Industry	7.4%	*2.6%*	4.8%	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
Alternative Fuels	1.5%	*-0.3%*	1.8%	*1.8%*	*3.0%*	*3.7%*	*3.6%*	*3.2%*
Cash	1.3%	*0.6%*	0.7%	4.2%	5.8%	5.3%	3.0%	4.2%
Total	100.0%		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Guinness Global Investors

Valuation

At the month end, the Guinness Sustainable Energy portfolio traded on the following multiples:

As at 31 August 2025	PE			EV/EBITDA			Dividend Yield		EPS Growth (%pa)		CFROI	
	2024	2025E	2026E	2024	2025E	2026E	2025E	2026E	2019-24	2024-27	2025E	2026E
Guinness Sustainable Energy Fund	21.2x	19.4x	16.4x	12.9x	11.9x	10.4x	1.5%	1.8%	7.7%	13.4%	10.4%	10.7%
MSCI World Index	23.4x	21.5x	19.4x	15.1x	14.0x	12.6x	1.7%	1.8%	6.7%	10.2%	9.7%	10.3%
Fund Premium/(Discount)	*-9%*	*-9%*	*-15%*	*-15%*	*-15%*	*-17%*						

*2024 P/E = Latest month-end price / 2024 earnings; Portfolio = median CFROI; Index data = HOLT MSCI World ETF median CFROI, EPS derived from consensus, adjusted for Canadian Solar

Source: Guinness Global Investors, Bloomberg

Portfolio holdings as at end August 2025

Our portfolio is typically allocated across 30 broadly equally weighted equities providing exposure across the value chain of sustainable energy.

We hold a c.44% weight to companies associated with the consumption (or demand) of sustainable energy. Our largest exposure here is to companies involved in the electrification of demand, either via the creation of new batteries (c.5%) or the

electrification of transportation (c.19% weight), while we have c.20% weight to those companies involved in either displacing existing energy sources or improving overall energy efficiency.

We hold one lithium-ion battery manufacturer, LG Chem, which is a Korean chemicals company and one of the largest lithium-ion battery manufacturers in the world.

The portfolio holds six names in the electric vehicle sub-category, giving it exposure to companies that provide semiconductors, electronics, components and software/services to the growing EV and autonomous vehicle industry. Onsemi, Infineon and NXP Semi are providers of power semiconductors and microcontrollers that are a necessity for higher-voltage electric vehicles to become competitive with ICE (internal combustion engine) vehicles, while Aptiv and Sensata are component manufacturers and service providers that should benefit from the ever-increasing amount of electronics present in electric vehicles. Amphenol supplies connectors, sensors and high voltage interconnect solutions that are vital for EVs and EV charging infrastructure.

Our displacement holdings provide pure-play quality exposure to heating industries (Trane Technologies), insulation (Installed Building Products, Owens Corning, Carlisle Companies), energy efficient electrical equipment and services (Hubbell, Atlas Copco) and energy efficiency projects (Ameresco), and the group as whole will benefit from the increasing industry focus on energy efficiency that is expected to be a very long-term trend.

In terms of the supply of sustainable energy, we hold a c.15% weight to companies involved in the generation of sustainable energy and 38% weight to those exposed to the installation of or equipment used in the process of sustainable energy generation.

China Longyuan is a pure-play Chinese wind power producer and represents one of our six generation holdings. The remaining exposure comes in the form of geothermal (Ormat), plus broad-based wind/solar renewable energy generation through NextEra Energy (the largest producer of renewable energy in the world). Iberdrola is our one utility.

We hold exposure to the solar and wind equipment and manufacturing value chains. Xinyi Solar is the world's largest supplier of the glass used in solar cell modules, and Enphase manufactures the inverters required to convert DC solar power into consumable AC electricity. Canadian Solar and First Solar give integrated exposure to the solar cell and module manufacturing process. Vestas provides broad exposure to the strong growth that we expect in the onshore and offshore wind markets

Our remaining exposure to installation (Itron, Eaton, Legrand, Siemens, SPIE, Prysmian and Schneider Electric) consists of companies that provide equipment and services to improve the efficiency and metering of electricity transmission and consumption.

Portfolio themes as at end August 2025

	Theme	Example holdings	Weighting (%)
1	Electrification of the energy mix		26.9%
2	Modernising the power grid		12.0%
3	Rise of the electric vehicle and auto efficiency		11.3%
4	Power semiconductors		8.9%
5	Wind & solar: equipment manufacturing		8.5%
6	Low carbon power generation: regulated producers		8.5%
7	Low carbon power generation: independent producers		7.6%
8	Building and Industrial efficiency		15.1%
9	Other (inc cash)		1.3%

Portfolio at end July 2025 (one month in arrears for compliance reasons)

Guinness Sustainable Energy Fund (31 July 2025)			P/E			EV/EBITDA			Price/Book			Dividend Yield		
Stock	**ISIN**	**% of NAV**	**2024**	**2025E**	**2026E**	**2024**	**2025E**	**2026E**	**2024**	**2025E**	**2026E**	**2024**	**2025E**	**2026E**
Displacement/Efficiency														
Hubbell Inc	US4435106079	4.6%	29.3x	24.5x	22.6x	18.0x	17.7x	16.5x	7.2x	6.3x	5.5x	1.1%	1.2%	1.3%
Trane Technologies	IE00BK9ZQ967	4.5%	38.7x	33.5x	29.8x	24.8x	23.3x	21.3x	13.2x	11.7x	10.1x	0.8%	0.8%	0.9%
Installed Building Products Inc	US45780R1014	2.7%	21.9x	21.5x	19.8x	11.7x	13.8x	13.0x	8.0x	6.8x	1.1x	1.5%	1.4%	1.2%
Carlisle Companies	US1423391002	2.4%	19.4x	17.0x	14.9x	12.5x	13.0x	12.0x	6.4x	7.1x	5.6x	1.0%	1.2%	1.2%
Owens Corning	US6907421019	2.2%	8.0x	10.4x	9.5x	6.3x	7.2x	7.0x	2.3x	2.2x	1.9x	1.8%	2.0%	2.0%
Ameresco Inc	US02361E1082	1.2%	23.8x	21.0x	14.8x	14.2x	11.5x	9.8x	0.9x	0.8x	0.8x	0.0%	n.m.	n.m.
Atlas Copco	SE0017486889	2.5%	26.3x	26.4x	24.4x	16.2x	15.8x	14.7x	7.3x	6.0x	5.4x	1.9%	2.2%	2.2%
		20.2%												
Electrification/Battery														
LG Chem Ltd	KR7051910008	2.3%	n.m.	65.7x	14.3x	9.6x	7.4x	5.5x	0.7x	0.7x	0.6x	0.3%	0.4%	1.1%
Johnson Matthey PLC	GB00BZ4BQC70	3.0%	113.7x	21.6x	10.7x	11.6x	6.2x	6.8x	1.4x	1.2x	1.2x	4.1%	4.5%	11.5%
		5.3%												
Electrification/Electric Vehicles														
Aptiv PLC	JE00BTDN8H13	2.9%	8.2x	9.4x	8.5x	7.3x	7.2x	6.8x	1.8x	1.5x	1.3x	0.0%	0.0%	0.1%
Amphenol Corporation	US0320951017	4.4%	53.6x	35.1x	31.2x	31.3x	21.5x	19.4x	13.2x	10.2x	8.2x	0.5%	0.6%	0.7%
ON Semiconductor Corp	US6821891057	2.6%	14.3x	24.4x	18.0x	9.1x	15.3x	12.2x	2.7x	2.8x	2.6x	0.0%	0.0%	0.0%
Infineon Technologies AG	DE0006231004	3.4%	20.8x	24.6x	17.8x	10.7x	11.0x	9.2x	2.9x	2.5x	2.3x	1.0%	1.0%	1.1%
NXP Semiconductors NV	NL0009538784	3.0%	18.6x	18.1x	15.1x	12.9x	13.5x	11.8x	5.9x	5.5x	4.9x	1.9%	1.9%	2.1%
Sensata Technologies Holding PLC	GB00BFMBMT84	2.5%	7.7x	9.2x	8.6x	5.9x	8.4x	8.1x	1.6x	1.5x	1.3x	1.6%	1.6%	1.6%
		18.9%												
Generation/IPP														
China Longyuan Power Group Corp Ltd	CNE100000HD4	2.5%	8.4x	7.9x	7.2x	10.1x	9.6x	8.9x	0.8x	0.7x	0.7x	3.5%	3.8%	4.1%
Ormat Technologies Inc	US6866881021	3.7%	40.7x	43.2x	36.2x	17.8x	13.8x	12.2x	2.2x	2.1x	2.0x	0.5%	0.5%	0.5%
NextEra Energy Inc	US65339F1012	4.0%	22.0x	19.6x	18.3x	19.2x	15.1x	13.4x	2.9x	2.5x	2.3x	2.9%	3.2%	3.5%
		10.2%												
Generation/Utility														
Iberdrola SA	ES0144580Y14	4.3%	18.4x	16.4x	15.8x	11.8x	11.1x	10.6x	2.2x	1.8x	1.8x	3.2%	4.3%	4.6%
		4.3%												
Installation/Equipment														
Schneider Electric SE	FR0000121972	4.5%	30.8x	25.6x	22.9x	17.7x	16.0x	14.6x	4.8x	4.1x	3.8x	1.6%	1.8%	2.0%
Legrand SA	FR0010307819	5.2%	29.7x	25.4x	23.6x	18.6x	16.6x	15.5x	5.0x	4.2x	3.9x	1.5%	1.8%	2.0%
Eaton Corp PLC	IE00B8KQN827	5.0%	38.6x	32.0x	28.4x	26.5x	24.5x	22.1x	8.2x	7.8x	7.2x	1.0%	1.0%	1.1%
Siemens AG	DE0007236101	4.6%	24.0x	19.4x	19.7x	14.0x	12.2x	10.9x	3.5x	3.1x	2.9x	2.2%	2.4%	2.5%
Itron Inc	US4657411066	3.5%	23.7x	21.2x	20.0x	17.3x	17.0x	15.4x	4.0x	3.4x	3.0x	0.0%	n.m.	n.m.
Spie SA	FR0012757854	4.2%	23.2x	16.6x	15.3x	11.5x	9.8x	9.3x	4.6x	3.4x	3.0x	1.8%	2.4%	2.6%
Prysmian SpA	IT0004176001	3.9%	24.4x	19.3x	16.4x	14.8x	11.0x	9.9x	4.4x	3.4x	3.0x	1.1%	1.3%	1.5%
Xinyi Solar Holdings Ltd	KYG9829N1025	1.6%	20.7x	18.5x	10.8x	9.0x	10.5x	8.2x	0.9x	0.9x	0.9x	3.3%	2.1%	3.3%
Enphase Energy Inc	US29355A1079	0.7%	32.6x	12.4x	12.4x	19.6x	9.5x	9.9x	5.1x	4.6x	3.4x	0.0%	0.0%	0.0%
First Solar Inc	US3364331070	2.8%	13.8x	11.6x	7.6x	9.5x	8.2x	5.7x	2.3x	2.0x	1.6x	0.0%	0.0%	0.0%
Canadian Solar Inc	CA1366351098	1.3%	4.5x	n.m.	7.8x	8.8x	9.3x	6.2x	0.3x	0.2x	0.2x	0.0%	0.0%	0.0%
Vestas Wind Systems A/S	DK0061539921	1.8%	37.9x	21.9x	15.5x	10.3x	7.5x	6.2x	5.1x	4.0x	3.3x	3.2%	1.1%	1.6%
		39.1%												
Cash	Cash	**2.0%**												

The Fund's portfolio may change significantly over a short period of time; no recommendation is made for the purchase or sale of any particular stock.

OUTLOOK - sustainable energy & 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 renewable power generation, fulfilling global power generation needs which are set to double by 2050. On the **demand** side, we believe that improved energy efficiency will be key to limiting energy consumption growth to a manageable level so that it can be increasingly satisfied by renewable sources.

The long-term direction is clear and is driven by economics, in our opinion, while geopolitical issues (such as the invasion of Ukraine in February 2022) could potentially have an effect on the speed of the transition and the relative importance of the factors stated above.

Policy support for decarbonisation

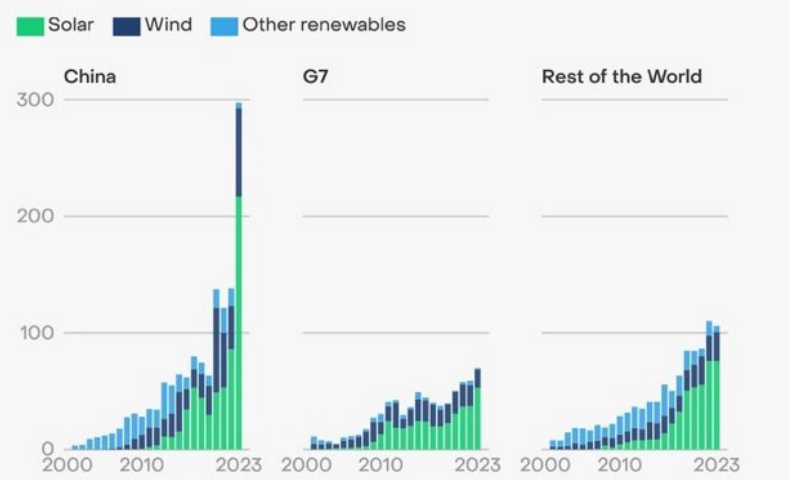
Sustainable energy policy in the **United States** has been dominated by the re-election of Donald Trump. His term will be a backward step for the energy transition and will bring a shift in US energy policy as he targets reduced energy costs, "energy dominance", and improved competitiveness for US industry via the removal of environmental regulations. The Inflation Reduction Act (IRA) – the key Democrat-led legislation providing $369bn of tax credits for clean energy investment – has been partially unwound as part of the President's plans to raise funds to support tax cuts elsewhere.

Trump's One Big Beautiful Bill eliminates electric vehicle and residential solar tax credits and speeds up the phasing out of utility solar and wind ITC and PTC tax credits, relative to initial IRA timelines. On the positive side, manufacturing tax credits for battery and solar equipment will last until 2032 (beyond previous expectations) with wind credits set to end in 2027. While the new bill is less favourable for clean energy, its passing will provide project developers with the certainty needed to plan and proceed. Our dialogue with OEMs and developers indicate that the planning scenario for many following the Trump election was for a full repeal of the IRA and that little activity would occur whilst the bill was under consideration. With this hurdle now cleared, we expect to see a resumption of activity in the US, from what we see as an encouraging base level of activity, unabated by recent policy headwinds.

Other areas of focus for Trump have included a broader reach of the Foreign Entity of Concern (FEOC) designation (beyond the electric vehicle industry), a slow down in the awards of new offshore wind permits (since there is federal involvement in offshore wind), a departure from the Paris Agreement, a removal of the liquefied natural gas (LNG) export pause and a roll back of environmental restrictions.

China continued to reap benefits from decades of investment in sustainable energy technologies, building nearly twice as much wind and solar capacity as the rest of the world combined in 2024, delivering the lowest clean energy costs globally (with onshore wind being the cheapest) and supplying over 60% of the world's demand for electric vehicles. We will likely look back and see that China achieved its target of 1,200 GW in wind and solar installations in mid-2024, around six years ahead of schedule. We view China's ability to offer comprehensive, long-term demand-side and supply-side policy support as a key differentiator, allowing it to increasingly dominate the global clean tech environment. We expect this rapid growth to continue as renewable energy (alongside grid modernisation) was again listed among the "strategic industries" whose development is expected to be supported by policymakers.

Annual renewable capacity additions by region 2000-23 (GW)



Source: Ember, 2024

In contrast, there seemed to be little real progress from **Europe** around commitment and investment as part of the Net Zero Industrial Act. Amendments to the European Climate Law (which targets net zero greenhouse emissions by 2050) were made to reduce the EU's net greenhouse gas emissions by 90% by 2040 (relative to 1990). This new interim target was designed to accelerate the transition and put the EU on a path towards a healthier and safer future, to avoid wasted investments in fossil fuels, boost the competitiveness of Europe's businesses and to make Europe more resilient.

As has often been the case in Europe, we found the bloc to be 'long' on targets but 'short' on actual support to help establish the supply chains and domestic manufacturing to allow the targets to be achieved. The Green Deal Industrial Plan, the Net Zero Industry Act and Critical Raw Materials Act (all passed in 2023) do not yet appear to be catalysing investment in the EU as little new central funding was announced to support these ambitions. However, we're optimistic that 2025 marks a shift in tone and substance, with the Clean Industrial Deal and Germany's debt brake reform offering substantial funding to enable Europe's green ambitions, unlocking up to €1 trn for broader defense, infrastructure and energy transition projects over the coming decade.

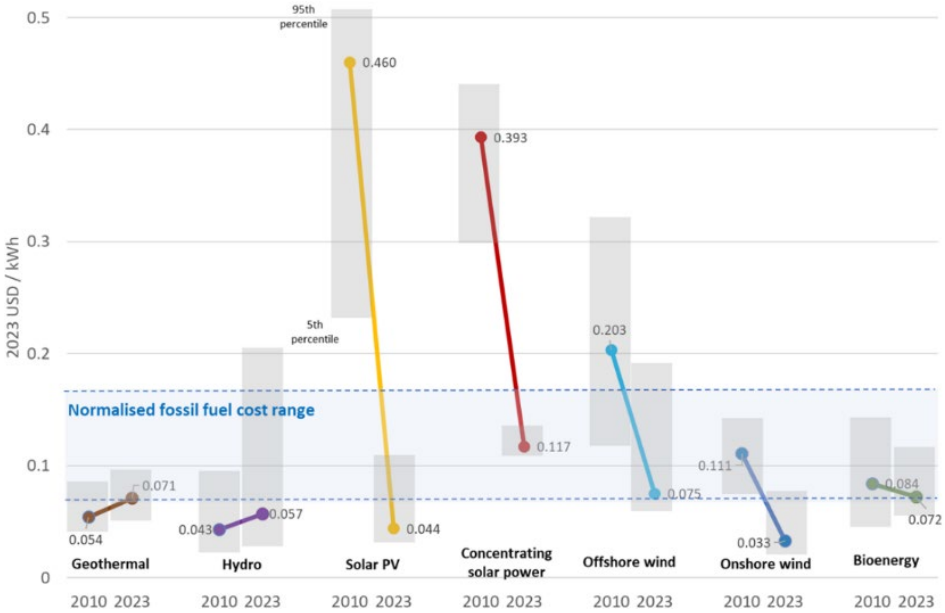
Compared with previous events, **COP 29** in November in Azerbaijan was lightly attended and appeared to do little to progress broader decarbonisation goals. Notable wins included Mexico setting a 2050 net zero target, Indonesia (operator of the fifth largest coal fleet in the world) announcing a 2040 coal phase-out target (16 years earlier than the prior target) and progress was also made towards a global carbon credit platform. The COP was billed in advance as having a particular focus on climate finance, but the ultimate agreement that developed nations pay $300bn per year to developing nations was seen by many as being insufficient.

On a positive note, **global investment in clean technologies** grew, reaching $2 trn in 2024 according to the IEA – almost twice the spend on coal, oil and gas in the year, and up from $1.7 trn in 2023. Higher-than-anticipated borrowing costs have been offset by easing supply chain pressures and falling prices, especially for solar PV and battery technologies. The greater investment means that clean energy is becoming a greater share of global GDP growth (having averaged 10% in 2023) with the number of clean energy jobs growing and accounting for more than half of employment in the global energy sector

Renewable electricity is the cheapest form of new electricity supply in most situations. According to Levelized Cost of Electricity (LCOE) estimates from the International Renewable Energy Agency (IRENA), the cost of wind and solar projects commissioned in 2023 ranged from $0.03-0.11/kWh, well below the fossil fuel cost range of $0.08-0.17/kWh. Despite increases in project financing costs and inflation across the broader economy, the LCOE of solar and onshore wind projects fell by 12% and 3% respectively, vs 2022. This illustrates that renewables remain cost competitive and this keeps the long-term driver of renewables adoption intact.

Global LCOE of newly commissioned utility-scale renewable power generation technologies (2010–2023)

LCOE = levelized cost of electricity



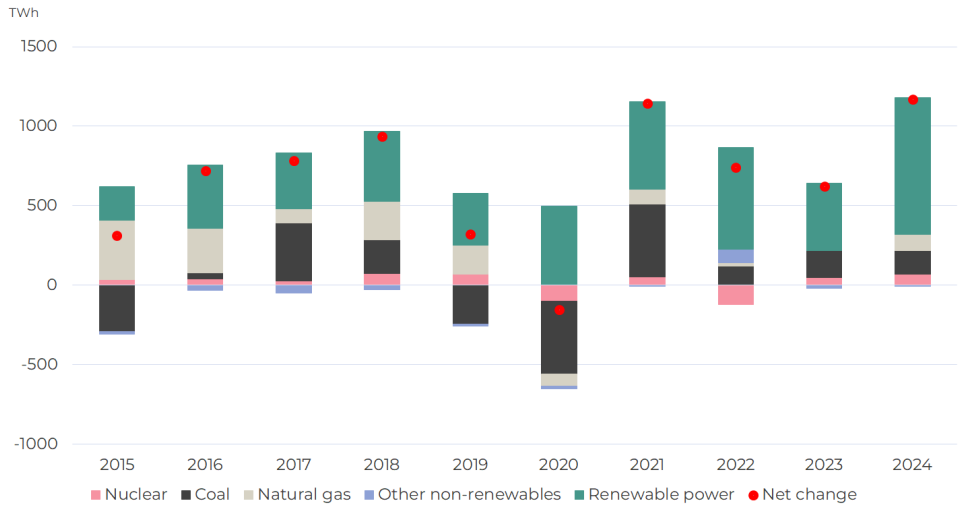
Source: IRENA; Guinness Global Investors, December 2024

Installations and power generation

Around 580 GW of **new renewable generation capacity** was installed in 2024, 100 GW higher than the record installations in 2023 and more than triple the 185 GW installed pre-COVID in 2019. At over 400 GW, solar represented around three quarters of the new capacity additions. Wind came next, at just over 100 GW, followed by hydropower, then bioenergy.

Renewable electricity generation in 2024 increased by 858 TWh (around 10%), reaching over 9,800 TWh and outpacing global electricity demand (1,170 TWh or 4% growth in 2024). Most of the rise in renewable power generation can be attributed to the increase in installed solar and wind capacity, although it was also boosted by a strong recovery in hydro output after drought conditions in various regions the year before.

Change in electricity generation (TWh) 2015-2024E



Sources: IEA; Ember; Guinness Global Investors

More than half of the electricity demand growth in 2024 came from five technologies: electric vehicles (EVs), heat pumps, electrolysers, air conditioning and datacentres. The spread of these technologies is accelerating the growth in electricity demand, but overall energy demand is not growing as fast, since electrification is more efficient than fossil fuels.

Energy displacement: efficiency and alternative fuels

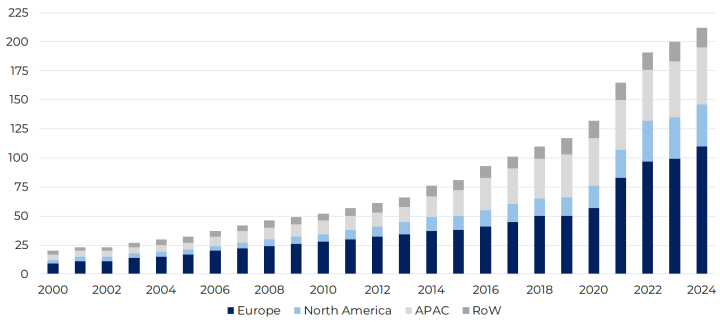
It is a common misconception that achieving rapid growth in renewable power generation will be enough to deliver government targets for pollution, energy security and decarbonisation. Renewable power generation is a key part of the solution, but we see the displacement and more efficient use of existing energy sources as just as critical, and arguably more urgent, in achieving these goals. The IEA refers to the theme of energy efficiency as being the 'first fuel' that should be considered in delivering the energy transition. It is the one energy source that every country can access in abundance today.

In our base case, we assume global energy demand growth over the next 30 years of around 1% pa. This assumes significant efficiency improvements relative to an historical energy demand growth rate of around 2% pa. Within the energy displacement sector, the key areas of focus are **efficiency** and **alternative fuels**.

Energy efficiency

It is hard to understate the importance of **energy efficiency**. Energy efficiency and energy security raced up the political agenda following the spike in energy prices following the Russian invasion of Ukraine in 2022.

National policies in force targeting building efficiency



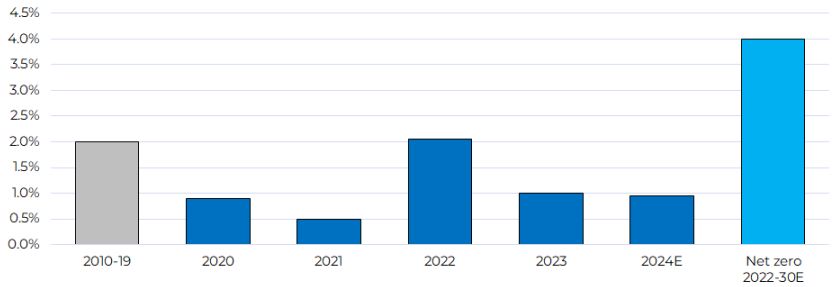
Source: IEA, Guinness Global Investors, December 2024

The increase was most pronounced in Europe, where the REPower EU plan aimed to rapidly reduce dependence on Russian natural gas imports and fast-track the green transition. In 2024, the EU set new goals to achieve 100% zero-emission buildings by 2050, adding to existing targets to install 10 million heat pumps by 2027 and reduce final energy consumption by 13% by 2030.

Elevated energy prices drove three years of double-digit growth in global efficiency spending from 2020 to 2022. Investment then retreated 7% in 2023 as higher interest rates weighed on housebuilders and renovation activity and a 16% decline in Chinese construction significantly impacting the delivery of green buildings globally. In 2024, despite continued headwinds, spending remained resilient, falling just 3% to $270bn, 35-40% higher than 2019 levels.

We believe that Europe's decision to end its reliance on Russian gas is likely to lead to structurally higher natural gas (and therefore electricity) prices in Europe and Asia. Higher energy prices should support efficiency project economics, ultimately providing a tailwind to the COP28 goal to double the global average annual rate of energy efficiency improvements from around 2% to over 4% every year until 2030.

Global annual improvement in primary energy intensity



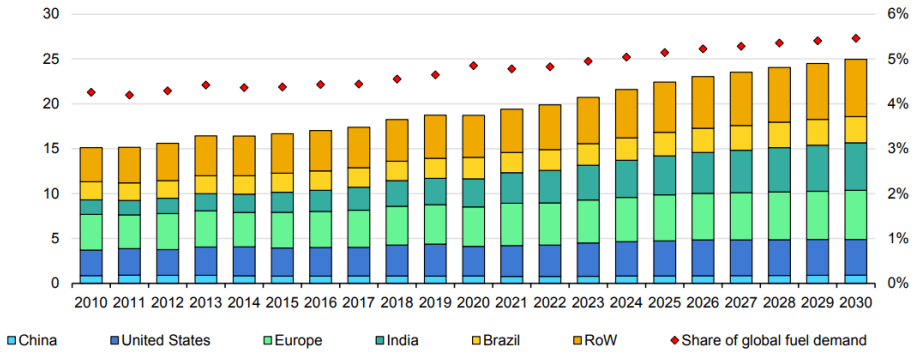
Source: IEA, Guinness Global Investors, December 2024

Alternative Fuels

Alternative (or renewable) fuels are set to play an important role in tackling emissions in carbon-intensive, hard-to-abate sectors. Global demand for these fuels in 2024 was around 21.5 exajoules (EJ) across industry, buildings and transportation, satisfying around 5% of their energy needs. Solid biofuels were the most prominent, making up 75% of alternative fuel consumption globally, followed by liquid biofuels at 20%, and biogas trailing at 5%. Four countries – the United States, India, Brazil, and China – represented over 50% of global demand.

Alternative fuel consumption is expected to grow steadily at around 2.5% per year out to 2030, reaching 25EJ, with over 65% of demand growth coming from India, China, Brazil, the US and Europe. Solid bioenergy contributes over 60% of the total demand growth with liquid biofuels, used predominantly in transportation, representing around 25% of the total growth.

Global renewable fuel demand (EJ)



Source: IEA (incl. estimates), December 2024

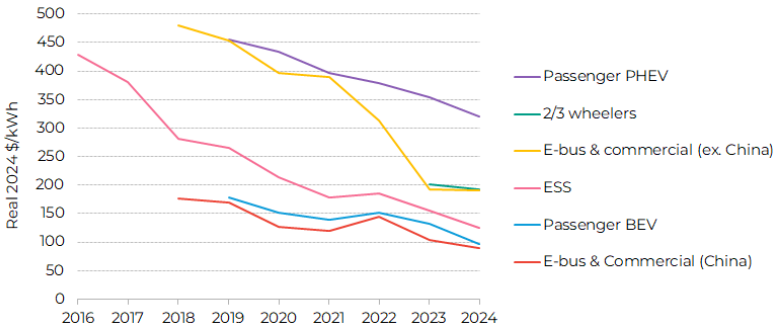
It is important to remember that alternative fuels broadly remain more expensive than their fossil fuel counterparts, meaning that policy support is key to underpinning future growth. For example, the $2/litre cost of producing biojet (often known as Sustainable Aviation Fuel, SAF) is nearly three times as much as the $0.75/litre cost of producing traditional jet fuel. Blending targets will still be needed to encourage the uptake of liquid biofuels while limiting the financial impact to consumers.

Electrification: batteries and electric vehicles

Global **battery demand** reached 1.2TWh in 2024, up 25% year-on-year and up nearly 500% since 2020. Battery prices (across all applications) fell a further 20% to $115/kWh in 2024, due to rapid growth of lower-cost Chinese manufacturing. Assuming a continuation of the 18% historic learning rate, Bloomberg New Energy Finance forecasts battery prices could fall to around $70/kWh by 2030.

The battery market is primarily driven by passenger electric vehicles (EVs), representing 70% of demand, with energy stationary storage (ESS) a distant second at 14%. Looking ahead, we expect passenger vehicles to remain the dominant driver, with emergent demand from commercial vehicles acting as a tailwind, resulting in an average annual growth in battery demand of around 20% per year out to 2030. The price of batteries for EVs fell below $100/kWh for the first time in 2024, driven by economies of scale and an increase in the adoption of lithium iron phosphate (LFP) chemistries. Thanks to its greater stability and lower cost, LFP's share of the global cathode mix has grown from 17% in 2020 to 44% in 2024. China now boasts the lowest battery pack prices globally at $94/kWh, 20-30% lower than the US and Europe, and is the only region to see average prices below $100/kWh.

Historical volume-weighted average pack prices by sector

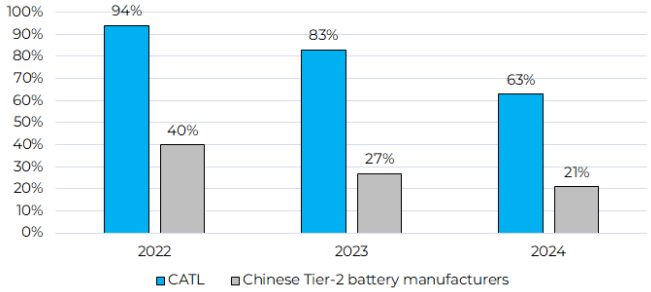


Source: BNEF, Guinness Global Investors, December 2024

Weaker-than-expected EV demand in 2024 led to falling battery manufacturing utilisation rates across the industry, falling as low as 21% for tier 2 manufacturers in China compared to 63% for industry leader CATL. Smaller players facing persistently low utilization and weak profitability are starting to respond by curtailing investment or exiting the industry entirely.

Benchmark Minerals noted that at least 25 gigafactory projects across China and Europe were cancelled or postponed in 2024, leading to downward revisions to long-term supply estimates. With EV penetration due to accelerate across the West in 2025 and 2026, we expect utilization rates at tier 1 manufacturers to inflect positively, helping to boost margins and profitability.

Chinese battery capacity utilization

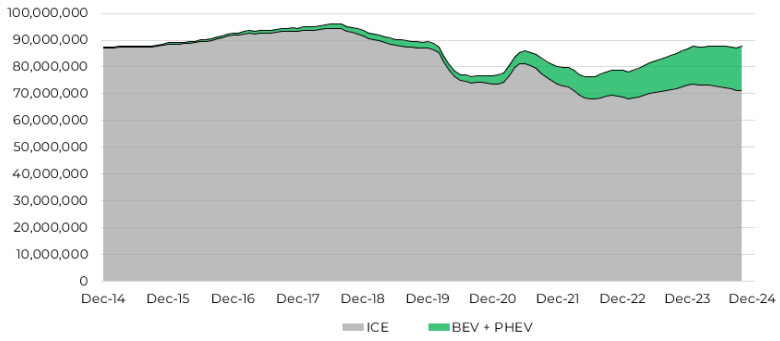


Source: Bernstein, Guinness Global Investors, December 2024

2024 saw rising trade tensions after the Biden administration more than tripled tariffs on Chinese imports of lithium-ion batteries (7.5% to 25%) and quadrupled tariffs on Chinese EVs (25% to 100%) in an attempt to shield domestic manufacturers from China's "unfair economic practices". Since taking office, President Trump has signed a flurry of executive orders, including the revocation of President Biden's 2021 EV targets, and implemented tariffs with key trade partners. Although uncertainty around auto tariffs persists, the announcement of a temporary pause provided markets with some near-term clarity. Subsequently, attention shifted towards the Republican's first budget (the One Big Beautiful Bill) and its implications for the scaling back of the Inflation Reduction Act. As had been widely expected, the revised bill eliminated electric vehicle tax credits post 2025, but crucially, support for battery manufacturing in the US is set to last until 2032, a positive development that was beyond previous expectations.

Electric vehicles continued to gain popularity in 2024, growing 20% year-over-year to 17 million units (a 20% penetration rate). Meanwhile, internal combustion engines (ICEs) continue to lose share, with sales having fallen by around 25% since their peak in 2017.

Rolling 12-month light vehicle sales by drivetrain



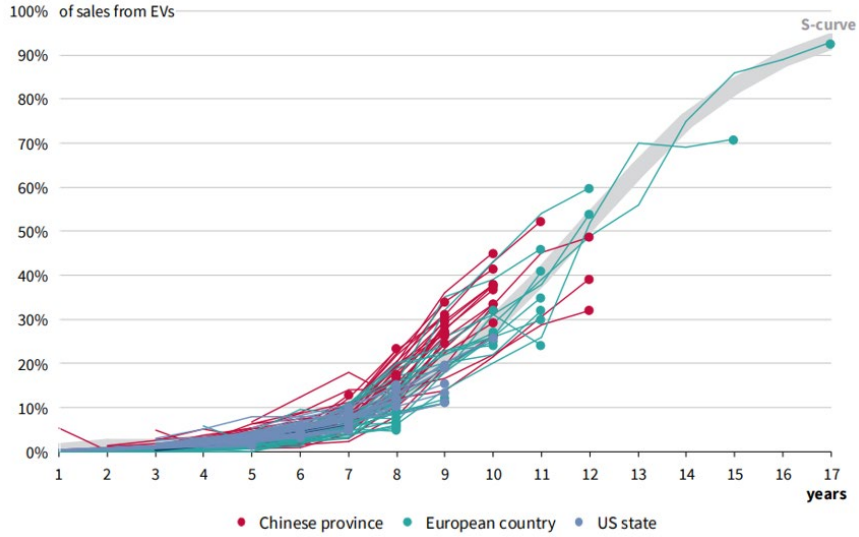
Source: LMC, Cleantechnica, Guinness Global Investors, December 2024

Slowing EV sales growth was largely attributable to higher financing costs, a post-COVID inflationary spike in vehicle prices and a weakening macroeconomic environment. Lower interest rates and cheaper batteries will improve EV affordability and should act as further positive catalysts for the sector.

We take confidence from Norway, which has banned ICE vehicle sales this year after seeing EV penetration rise from just 10% in 2013 to over 90% in 2024. While Norway is a small high-income country, it is interesting that its EV adoption curve is being tracked very closely by China, which achieved EV penetration rates of over 50% in the second half of 2024. Indeed, RMI analysis covering over 110 countries, states, and provinces across Europe, the US, and China found a universal S-curve pattern

in EV deployment, with EV sales taking six years to get to 5%, and only another six years to get to 50%. If growth continues along these S-curves, RMI estimates that electric vehicles will make up over 80% of new vehicle sales in China and Europe by 2030 with the United States reaching that level by 2035.

EV share of car sales



Source: RMI, December 2024

Ultimately, we believe EVs will be cheaper to buy, cheaper to run and cheaper to maintain, driving the journey towards 50% global EV sales penetration in 2030 and over 90% sales penetration in 2040. Whilst regulatory and policy-based initiatives have been necessary to grow the EV industry to critical size, EVs can ultimately offer better technology (Chinese battery manufacturers CATL and BYD have both developed batteries capable of offering ~500km range on just a 5-minute charge), better efficiency (EVs convert over 85% of energy stored into motion, compared to less than 40% for ICE vehicles) and better economics (60% of all EVs sold in China in 2023 were cheaper than the ICE equivalent) that will allow them to dominate.

Renewable installations: solar, wind, power grids and nuclear

Solar

Solar deployments grew significantly again in 2024, with global installations of around 600 GW, up around four times (40% per year) since 2020 and nearly double the 22% annual growth achieved between 2014 and 2019. The rapid uptake is undoubtedly due to the vast improvements in both solar technology and solar economics, with module prices continuing to tumble, falling by 90% over the past 10 years to a record low of just 9 cents per watt in 2024. The profitability of module manufacturers suffered as oversupply caused modules prices to fall below the cash cost of manufacturing at times.

Solar continues to become more efficient. Around 20 years ago, solar modules were 5% efficient, 10 years ago they were 15% efficient, current modules are around 25% efficient and current research suggests that we may achieve 50% efficiency over the longer term. This could open the door to solar power costs falling 50-75% to as little as 1-3 cents per kilowatt hour (c/kWh), thereby cementing its position at the bottom of the electricity cost curve.

In 2025, we expect growth across all major geographies to result in full-year global installations of around 670 GW. China will continue to dominate, making up approximately 50% of the global market as it attempts to decarbonize its power grid and achieve peak emissions before 2030. Growth should remain robust in North America driven by hyperscalers looking to lock in solar power purchase agreements which offer zero-carbon electricity with long-term price visibility and one of the fastest times to power. Datacentres also provide a tailwind in Europe, which is expected to grow at a more restrained pace after more than doubling over the previous three years.

Global solar module installations, 2010-2025E (GW)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025E
OECD solar installations (annual)																
North America	1	2	4	6	7	8	15	12	12	15	22	26	26	40	48	53
Germany	7	7	8	3	2	1	1	2	4	4	5	6	7	15	15	16
Spain	0	0	0	0	0	0	0	0	0	5	4	6	9	9	8	9
Rest of Europe	3	4	5	5	5	8	5	7	9	14	15	21	28	46	55	56
Australia	0	1	1	1	1	1	1	1	4	3	4	6	4	6	4	5
South Korea	0	0	0	1	1	1	1	1	2	4	6	4	3	3	3	4
Japan	1	1	2	7	10	11	8	7	7	7	9	6	6	5	4	5
Total OECD	**17**	**23**	**24**	**24**	**25**	**31**	**32**	**31**	**39**	**53**	**65**	**75**	**86**	**128**	**141**	**152**
Change	*10*	*7*	*0*	*0*	*2*	*5*	*1*	*0*	*7*	*14*	*12*	*10*	*18*	*42*	*55*	*25*
Non-OECD solar installations (annual)																
China	0	3	3	14	13	19	30	53	44	33	52	69	107	260	309	330
India	0	0	1	1	1	2	5	10	11	11	4	13	19	14	27	29
Rest of non-OECD	1	3	3	4	6	4	8	7	12	21	29	26	40	42	123	156
Total Non-OECD	**2**	**5**	**8**	**18**	**21**	**27**	**46**	**72**	**67**	**65**	**85**	**107**	**172**	**316**	**458**	**515**
Change	*1*	*3*	*2*	*11*	*2*	*6*	*19*	*26*	*-5*	*-2*	*20*	*22*	*58*	*144*	*286*	*198*
Total solar installations (annual)	**19**	**29**	**31**	**42**	**46**	**56**	**75**	**101**	**106**	**118**	**150**	**182**	**252**	**444**	**599**	**667**
Change	*11*	*10*	*2*	*11*	*4*	*10*	*19*	*26*	*5*	*12*	*32*	*32*	*76*	*192*	*347*	*223*

Source: BP, BloombergNEF, PV InfoLink, IEA and Guinness Global Investors estimates, December 2024

Thinking longer-term, solar power sits at the bottom end of the power generation cost curve, and significant increases in solar power generation are inevitable and necessary in a low-carbon energy system. Record-low module prices will only improve the volume outlook and the down cycle in pricing will end, providing opportunities for manufacturers to regain normalised profitability levels. To offset the intermittency, we will need to see solar & storage projects being more broadly economic in order to displace new build fossil fuel power generation. Storage project costs have dropped by around 90% since 2010 meaning that, over the last couple of years, the cheapest solar & storage projects (LCOEs in the range of 4.6-6.0 c/kWh) are already competitive with the cheapest new gas/coal-fired power projects (LCOEs in the range of 3.9-4.5 c/kWh and 6.8-6.9 c/kWh respectively). Higher-cost projects still require subsidy and incentives but costs are likely to fall.

Wind

Turning to the **wind industry**, manufacturing capacity grew by 21 GW in 2024, vs 12 GW in 2023. Total installations grew to a record 122 GW as manufacturers continued to recover from supply chain bottlenecks, raw material and labour market cost inflation and onerous non-profitable contracts that were priced before inflationary conditions hit in 2021. Wind operators also saw greater stabilisation in 2024 with no new significant project cancellations as the interest rate easing cycle started to improve project economics. In addition, power purchase agreements (PPAs) for wind reached record highs in the US ($68/MWh in Q4 2024 according to Levelten) and remain near all-time highs in Europe (€90/MWh). This sustained pricing, as interest rates started to decline, shored up new project economics and provided much-needed certainty to operators who have sat on the sidelines for the last two or three years.

Looking into 2025, we estimate a record level around 145 GW of new installations, an increase of around 21 GW versus 2024. Encouragingly, well over half of that increase is ex-China, suggesting a material ramp in growth in the sector in the key North American and European regions.

Global wind installations, 2010-2025E (GW)

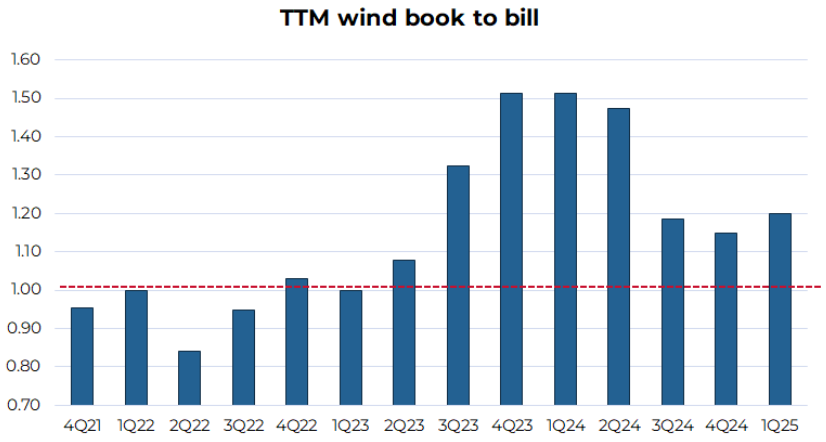
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025E
Onshore wind installations (annual)																
North America	6	8	15	2	7	10	9	8	8	10	17	14	10	8	8	10
Latin America	0	0	0	0	5	3	3	3	4	3	3	6	4	6	6	4
Europe	9	10	12	11	11	11	12	13	8	9	14	14	15	16	11	18
China	17	18	14	15	21	29	22	17	19	26	54	42	44	54	77	81
India	1	1	2	2	2	3	4	4	2	2	1	2	2	3	3	5
RoW	3	4	4	3	4	5	5	5	4	4	4	8	5	4	5	8
Total onshore	**35**	**40**	**46**	**33**	**49**	**61**	**55**	**49**	**46**	**55**	**93**	**84**	**79**	**91**	**110**	**126**
Change	*-3*	*5*	*6*	*-14*	*17*	*11*	*-6*	*-6*	*-3*	*9*	*38*	*-9*	*-5*	*12*	*19*	*16*
World ex China	*18*	*22*	*32*	*18*	*29*	*32*	*33*	*32*	*27*	*29*	*40*	*43*	*36*	*38*	*33*	*45*
Offshore wind installations (annual)																
China	0	0	0	0	0	1	1	1	2	3	4	14	5	8	7	12
UK	1	0	1	1	0	1	0	1	2	2	1	1	3	1	0	3
Germany	0	0	0	0	0	2	0	2	0	2	0	1	0	1	1	1
RoW	0	0	0	1	0	0	0	1	0	1	2	1	1	2	6	3
Total offshore	**1**	**0**	**2**	**2**	**1**	**4**	**1**	**4**	**4**	**8**	**7**	**17**	**9**	**12**	**14**	**19**
Change	*1*	*-1*	*1*	*1*	*-1*	*4*	*-4*	*3*	*0*	*3*	*-1*	*10*	*-8*	*3*	*2*	*5*
World ex China	1	0	1	2	1	3	0	4	3	5	3	3	4	4	7	6
Total wind installations	**36**	**40**	**48**	**35**	**50**	**65**	**56**	**53**	**50**	**63**	**100**	**101**	**88**	**103**	**124**	**145**
Change	*-2*	*4*	*8*	*-13*	*16*	*15*	*-9*	*-3*	*-2*	*12*	*38*	*1*	*-13*	*15*	*21*	*21*

Source: BP, IEA, BNEF, Guinness Global Investors estimates, December 2024

We see a near 60% increase in installations to around 200 GW by the end of the decade, with onshore growing at 6% pa and offshore growing at 20% pa. The starting point for the industry is healthy, with industry-level book to bill (the ratio of new orders to existing sales) having been comfortably above 1.0x on a trailing 12-month basis for the last eight quarters. This suggests that the industry has a strong pipeline of work.

We finally remain encouraged by the potential of the Offshore sector to drive growth in the wind industry, as we enter the second half of the decade. Within Europe alone, there is c.26 GW of awarded and approved capacity set to come on-stream by 2030, the equivalent of 2-3 years of onshore growth globally. We would expect this to grow and note that there are 9.2 GW of projects tendered offshore France in November 2024 that will soon join this backlog.

Trailing 12-month European wind book to bill



Source: company data, Guinness Global Investors estimates, June 2025

Global power grids

Global power grids will have to be substantially upgraded and extended to cope with higher wind and solar generation as electricity demand inflects upwards. This includes high-voltage transmission (covering large distances), medium-voltage distribution (covering shorter distances) and low-voltage equipment (used within buildings). Within high and medium-voltage applications, we continue to see strong growth in transmission and distribution (T&D) spending. The Edison Electric Institute calculated US T&D investment at $95bn in 2024, up 9% versus 2023. We expect a healthy outlook for US grid investment, averaging 8-10% growth per year to 2030, as network owners and operators look to replace and upgrade ageing infrastructure (typically 30-50 years old or over), harden the grid against extreme weather and build out new capacity.

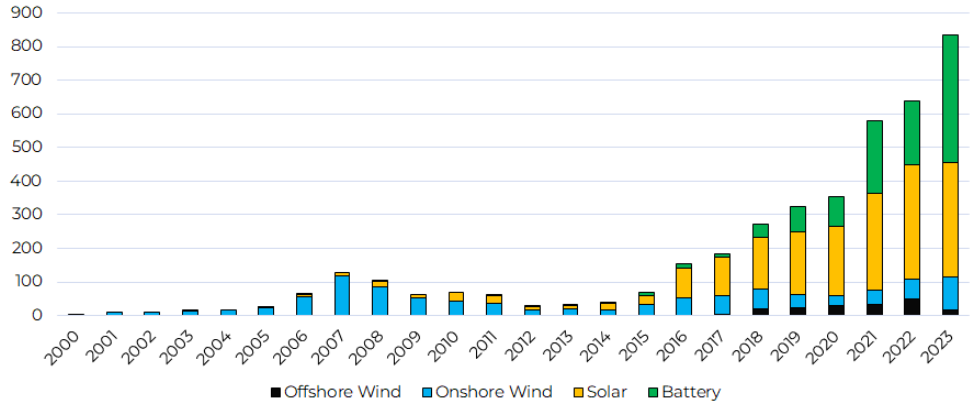
After 20 years of flat electricity consumption, we see demand growth of around 2-3% per year due to datacentres, AI querying, reindustrialization and electrification. Political support will be required to make this happen and we stress that the outlook here is very robust despite President Trump's cuts to the IRA. The inflection started in 2024 in the US, but we expect pressure in Europe as well, where – despite the region being 12-24 months behind the US – data centre capacity is still forecast to grow at 20% per year to reach 35 GW in 2030. Three meaningful bottlenecks to this growth exist, relevant both in a US and a global context, and provide opportunities for companies to make superior margins:

- **Labour:** Bernstein estimates that the US will need 50% more linemen by 2035, forecasting a 12,000-worker shortage if the industry continues to grow at its historic rate. Experienced engineers are in short supply.

- **Transformers:** The average US transformer is 35-40 years old and the US imports around 80% of its large transformers. Supply chains are stretched with prices up 60-80% since early 2020 and lead times tripling to c.150 weeks since 2021. Electrical equipment manufacturers, especially US domestic manufacturers, are well placed.

- **Permitting:** The Lawrence Berkley National Laboratory sees the US interconnection queue at its highest level on record, while WoodMac expects that permit applications from as far back as 2020 will not be approved until later this decade. The opportunity for superior margins could last for a few years.

US cumulative interconnection queue



Source: Generation, Lawrence Berkeley National Laboratory, December 2024

These are long-term trends that will require multi-year investment programmes and it is therefore not surprising that **nuclear power** came back into consideration in the US as concerns grew about grid stability. While not necessarily considered to be a 'renewable' power source, and despite its chequered past, nuclear power will play a role in the global energy transition and there is no credible net zero scenario which doesn't forecast growth in 'carbon-free' nuclear. The 2024 nuclear renaissance saw hyperscalers sign deals to restart old reactors, support small modular reactors (SMRs) and invest in start-up companies developing nuclear fusion technologies.

A key focus remains SMRs, which are frequently touted as a solution to provide baseload low-carbon power generation. However, as far as we are aware, only two SMRs are currently in operation globally: one in Russia (in a maritime setup) and the other in China. With limited information about either, the development schedule and the underlying economics of both are unclear. From what we know, we think SMRs in the US will not be cheaper than gas or renewables-based power

generation. In late 2023, NuScale cancelled its planned SMR Carbon Free Power Project (CFPP) in Utah as its costs escalated (requiring 9 c/kWh to be economic, after a 3 c/kWh IRA subsidy) and its start date slipped (back to 2029, from an original plan of 2026). While carbon-free baseload power at $9 c/kWh could certainly be considered 'economic', we would expect project delays and cost overruns to take this substantially higher.

So, beyond restarting idled nuclear plants, nuclear power does not appear to be set for meaningful growth. We expect the first power from new SMR facilities to come after 2032, but even then, it is unlikely that SMRs have any meaningful impact until the late 2030s, in our opinion. This leads to a situation where global power grids will need to be extended and strengthened in order to cope with higher levels of variable renewable power.

IMPLICATIONS OF A NET ZERO SCENARIO

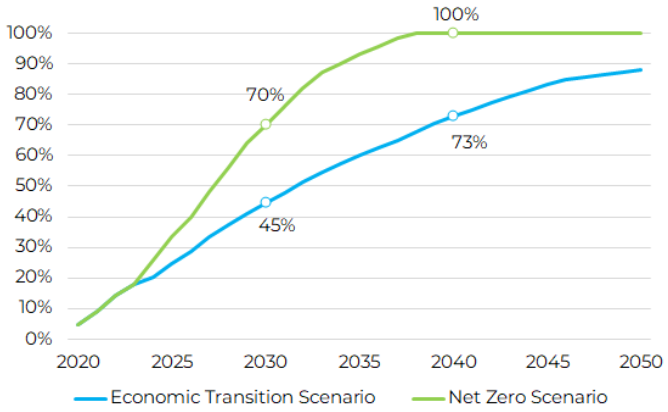
Throughout this document, we refer to our base-case energy transition scenario that reflects our understanding of the industry's current capacity and plans to provide decarbonisation solutions. This scenario is not consistent with net zero and we highlight the following changes across our subsectors that would be required to deliver a net zero transition:

- Within **efficiency**, annual improvements in energy intensity would need to quadruple from 1% in 2024 to average 4% per year out to 2030 globally. For buildings, this translates into efficiency, electrification and end-use investment increasing to around $850bn per year this decade (from $340bn today). For industry, investment must step up from $50bn in 2024 to $125bn per year out to 2030. It is worth noting that our base case scenario already assumes significant energy efficiency gains with world energy demand forecast to grow at 1% per year, half the historic rate of 2% per year.

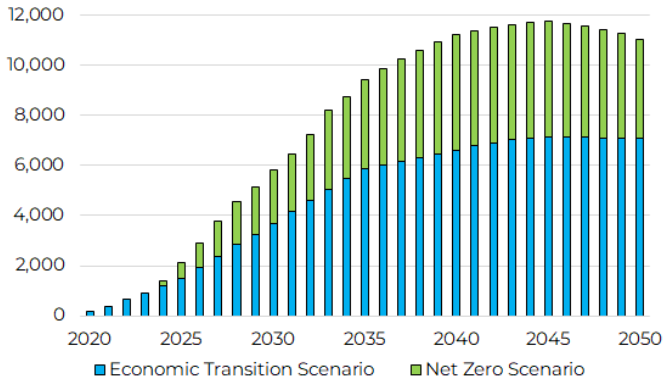
- **Alternative fuel** production growth would need to more than double by 2030 from 2023 levels (implying 11% per year growth) and then double again by 2050. SAF would have to grow from 0.3% of global jet fuel in 2024 to around 10% in 2030 (substantially higher than our base case 2030 estimate of around 2%).

- For **electric vehicles** and **batteries**, BNEF estimate that in a net zero scenario, global EV penetration rates must hit 70% by 2030 with 100% of vehicles sold being electric by 2040 (versus their current 'base case' economic transition estimates of 45% and 73% respectively). This translates into global battery demand of 5.8 TWh in 2030 compared to 1.2 TWh today, almost 60% higher than their base case assumptions, which themselves imply an annual growth rate of 20% per year from current levels.

EV sales penetration forecasts (%)



Lithium-ion battery demand forecasts (GWh)



Source: BNEF, Guinness Global Investors, December 2024

- **Solar** and **wind** generation by 2050 would need to be more than double the levels anticipated under our base case scenario, which already assumes a 4x increase in the wind generation base and a 10x increase in the solar base.

- For **power grids**, net zero would require global grid investment to grow at around 14% per year to the end of the decade, more than doubling from around $370bn today to over $800bn by 2030, 50% higher than our base case estimate.

- Under a net zero scenario, **nuclear** power capacity needs to expand by around 15 GW every year to the end of the decade, reaching 545 GW by 2030. Despite this only constituting 30% growth from current levels, new installations must outpace a wall of retirements from power plants installed in the 1970s and 1980s which are now coming to the end of their useful lives.

- According to McKinsey, annual **investment** on low-emissions technologies would need to increase from about $1.5trn to around $7trn over the next three decades, while annual investment in renewable capacity in 2025-2030 would need to be triple the 2023 levels in order to achieve 16%pa renewable growth required near term to achieve a NZE trajectory.

IMPORTANT INFORMATION

Issued by Guinness Global Investors, a trading name of Guinness Asset Management Ltd, which is authorised and regulated by the Financial Conduct Authority.

This report is primarily designed to inform you about the Guinness Sustainable Energy Fund and the WS Guinness Sustainable Energy Fund. It may provide information about the Funds' portfolios, including recent activity and performance. It contains facts relating to the equity markets and our own interpretation. Any investment decision should take account of the subjectivity of the comments contained in the report.

This document is provided for information only and all the information contained in it is believed to be reliable but may be inaccurate or incomplete; any opinions stated are honestly held at the time of writing but are not guaranteed. The contents of the document should not therefore be relied upon. It should not be taken as a recommendation to make an investment in the Funds or to buy or sell individual securities, nor does it constitute an offer for sale. OCFs for all share classes are available on www.guinnessgi.com. If you decide to invest, you will be buying shares in the Fund and will not be investing directly in the underlying assets of the Fund.

GUINNESS SUSTAINABLE ENERGY FUND

Documentation
The documentation needed to make an investment, including the Prospectus, Supplement, the Key Investor Information Document (KIID), Key Information Document (KID) and the Application Form, is available in English from www.guinnessgi.com or free of charge from the Manager: Waystone Management Company (IE) Limited 2nd Floor 35 Shelbourne Road, Ballsbridge, Dublin DO4 A4E0, Ireland; or the Promoter and Investment Manager: Guinness Asset Management Ltd, 18 Smith Square, London SW1P 3HZ.

Waystone IE is a company incorporated under the laws of Ireland having its registered office at 35 Shelbourne Rd, Ballsbridge, Dublin, D04 A4E0 Ireland, which is authorised by the Central Bank of Ireland, has appointed Guinness Asset Management Ltd as Investment Manager to this fund, and as Manager has the right to terminate the arrangements made for the marketing of funds in accordance with the UCITS Directive.

Investor Rights
A summary of investor rights, including collective redress mechanisms, is available in English here:
https://www.waystone.com/waystone-policies/

Residency
In countries where the Fund is not registered for sale or in any other circumstances where its distribution is not authorised or is unlawful, the Fund should not be distributed to resident Retail Clients. **NOTE: THIS INVESTMENT IS NOT FOR SALE TO U.S. PERSONS**.

Structure & regulation
The Fund is a sub-fund of Guinness Asset Management Funds PLC (the "Company"), an open-ended umbrella-type investment company, incorporated in Ireland and authorised and supervised by the Central Bank of Ireland, which operates under EU legislation. If you are in any doubt about the suitability of investing in this Fund, please consult your investment or other professional adviser.

Switzerland
This is an advertising document. The prospectus and KID for Switzerland, the articles of association, and the annual and semi-annual reports can be obtained free of charge from the representative in Switzerland, REYL & Cie S.A., Rue du Rhône 4, 1204 Geneva. The paying agent is Banque Cantonale de Genève, 17 Quai de l'Ile, 1204 Geneva.

Singapore
The Fund is not authorised or recognised by the Monetary Authority of Singapore ("MAS") and shares are not allowed to be offered to the retail public. The Fund is registered with the MAS as a Restricted Foreign Scheme. Shares of the Fund may only be offered to institutional and accredited investors (as defined in the Securities and Futures Act (Cap.289)) ('SFA') and this material is limited to the investors in those categories.

Australia
For professional investors only.

WS GUINNESS SUSTAINABLE ENERGY FUND

Documentation
The documentation needed to make an investment, including the Prospectus, the Key Investor Information Document (KIID) and the Application Form, is available in English from www.waystone.com/our-funds/waystone-fund-services-uk-limited/ or free of charge from Waystone Management (UK) Limited, PO Box 389, Darlington DL1 9UF.
General Enquiries: 0345 922 0044
E-Mail: wtas-investorservices@waystone.com.

Waystone Fund Services (UK) Limited is authorised and regulated by the Financial Conduct Authority.

Residency
In countries where the Fund is not registered for sale or in any other circumstances where its distribution is not authorised or is unlawful, the Fund should not be distributed to resident Retail Clients.

Structure & regulation
The Fund is a sub-fund of WS Guinness Investment Funds, an investment company with variable capital incorporated with limited liability and registered by the Financial Conduct Authority.

GUINNESS SUSTAINABLE ENERGY UCITS ETF

Documentation
The documentation needed to make an investment, including the Prospectus, the Key Investor Information Document (KIID), Key Information Document (KID) and the Application Form, is available in English from www.guinnessgi.com, www.hanetf.com or free of charge from the Administrator: J.P Morgan Administration Services (Ireland) Limited, 200 Capital Dock, 79 Sir John Rogerson's Quay, Dublin 2 DO2 F985; or the Investment Manager: Guinness Asset Management Ltd, 18 Smith Square, London SW1P 3HZ.

Residency
In countries where the Fund is not registered for sale or in any other circumstances where its distribution is not authorised or is unlawful, the Fund should not be distributed to resident Retail Clients. **NOTE: THIS INVESTMENT IS NOT FOR SALE TO U.S. PERSONS**.

Structure & regulation
The Fund is a sub-fund of HANetf ICAV, an Irish collective asset management vehicle umbrella fund with segregated liability between sub-funds which is registered in Ireland by the Central Bank of and authorised under the UCITS Regulations.

Telephone calls will be recorded and monitored.