Guinness Sustainable Energy

Investment Commentary – July 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.

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1H REVIEW AND OUTLOOK

The first half of 2025 saw a scaling back of the Inflation Reduction Act (IRA) in the US. Greater certainty in the US combined with more European policy support and resurgent electricity demand growth allowed the sector to outperform over the period, and we see reasons for cautious optimism in the second half. In this report, we review 1H 2025 macro developments and fund contribution and conclude that the fund's 1-year forward price/earnings (P/E) ratio discount to the MSCI World of 15% appears to excessively discount its superior earnings growth.

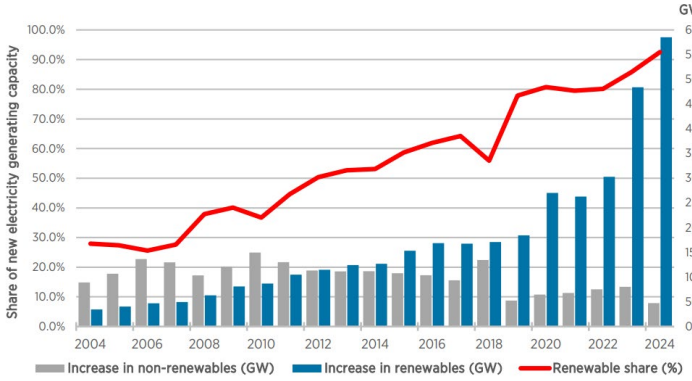
EQUITIES

The Guinness Sustainable Energy Fund (Class Y) delivered a return of 7.0% (in USD) in June, outperforming the MSCI World, which returned 4.3%. Ongoing US budget discussions and potential revisions to the IRA continued to impact sustainable energy stocks in the month. Among the fund's top performers were power semiconductor manufacturers Onsemi and NXP Semiconductor, which benefited from improving visibility across automotive and industrial end markets. The fund's bottom performers included NextEra and Enphase, both of which were negatively impacted by proposed changes to the IRA.

CHART OF THE MONTH: RENEWABLES ADDITITIONS

According to IRENA, renewables made up 92.5% of all new capacity additions in 2024, a material increase from 85.8% in 2023. As a result, renewables now account for 46.4% of total installed power capacity globally, up from 43.1% the previous year. Renewable share gains have been driven by both the increasing adoption of renewable technologies and continued net decommissioning of fossil fuel capacity. China remains the dominant driver of the renewables build out, followed by the US.

Renewable share of annual power capacity expansion



Source: IRENA, 2025

JUNE 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
Global electric vehicle (EV) sales increased 24% year-on-year in May, according to Rho Motion. EV sales in China surpassed one million units in a single month for the first time in 2025, with strong domestic demand and an emerging export market driving sales growth. EV sales in Europe rose 36% year-on-year as the market continues to benefit from supportive and consistent policy in key regions such Germany and the UK. Despite registering 7.5% year-on-year growth, EV adoption in North America continues to be impacted by tariff uncertainty and wavering policy support.	Electric Vehicle Sales	
In May, China set a new global record by installing 93 gigawatts (GW) of solar power capacity in a single month. A surge in installations had been expected as developers rush to complete projects ahead of incoming policy changes in June that adjust pricing policies and enhance grid connection requirements to better integrate renewables into the broader energy system. As a result, China's total solar additions for the first five months of 2025 reached 198 GW, averaging over 1 GW per day.	China Solar	
In another sign of renewed momentum for the US nuclear industry, Meta has signed a 20-year agreement to purchase the full output of the Clinton nuclear plant in Illinois, starting in 2027. This deal helps Meta secure stable, carbon-free power to fuel its energy-intensive AI ambitions. In the US, both utilities and technology firms face tightening electricity supplies as the country faces an inflection in power demand for the first time in decades due to the proliferation of AI data centres.	US Nuclear Industry	
Despite a slowdown in overall M&A activity, BNEF has reported that the number of climate-tech-related transactions reached its highest level in three years in the first quarter of 2025. Deal making activity was highest in the US and in particular in the energy storage sector, led by Rio Tinto's $6.6 billion acquisition of Arcadium Lithium. As previously discussed, attractive valuations and increasing power demand continue to drive M&A activity in the sustainable energy space, with Reuters reporting that there were 27 deals in the first two months of the year alone in the US worth a combined $36.4bn.	Sustainable Energy M&A	
China is undertaking a significant transformation of its power grid, with State Grid Corporation of China announcing plans to invest over 650 billion yuan ($89 billion) in 2025 alone. This substantial investment aims to address the challenges posed by the rapid expansion of renewable energy sources, such as solar and wind, which have outpaced the current grid's capacity to efficiently distribute power. The funds will be directed towards enhancing ultra-high-voltage transmission lines, upgrading distribution networks, and integrating advanced technologies like smart grid systems and energy storage solutions. These efforts are crucial for reducing renewable energy curtailment and ensuring a stable and flexible power supply to meet the country's growing energy demand.	China grid investment	

MANAGERS' COMMENTS

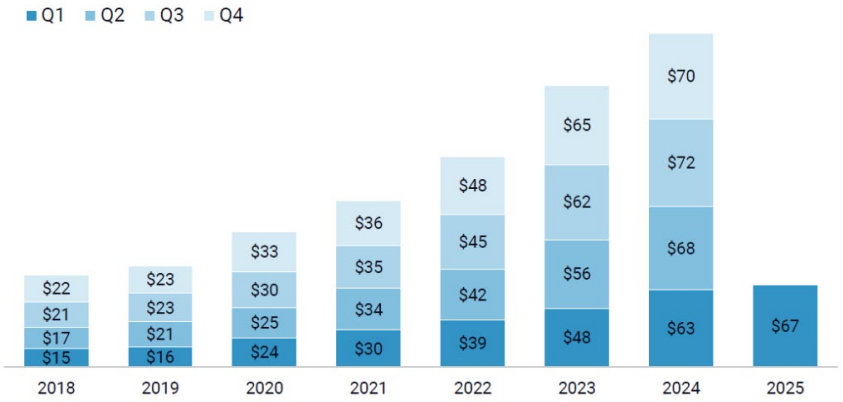
The first half of 2025 saw a scaling back of the Inflation Reduction Act (IRA) as part of Trump's One Big Beautiful Bill and, with it now behind us, we expect the US clean energy industry to return to investment mode again. Clarity over the IRA, together with more European policy support, an improving macro environment and resurgent electricity demand growth allowed the sector to outperform the broad equity market over the period and we see reasons for cautious optimism in the second half. In this report, we review 1H 2025 macro developments and fund contribution and conclude that the fund's 1-year forward P/E discount to the MSCI World of 15% appears to excessively discount its superior earnings growth.

The first half of 2025 saw the Guinness Sustainable Energy Fund delivering a total return (USD) of +11.7%, outperforming the MSCI World Index (net return) of +9.5%. The key events that have affected the energy transition, company profitability and share price performance so far this year are discussed below:

The backdrop to the global energy transition in the first half of 2025 has been dominated by **policy**; with the United States delivering a disappointing downsizing of the Inflation Reduction Act (IRA) and tariff uncertainty, while Europe provided leadership and direction in the energy transition.

In the **United States**, the budget reconciliation bill of May 2025 initially proposed fewer changes to the IRA than expected after President Trump's election. However, amendments by the House of Representatives in late May reduced the value of IRA credits, raising around $570bn. The resulting One Big Beautiful Bill eliminates electric vehicle and residential solar tax credits and speeds up the phasing out of utility solar and wind investment and production tax credits (ITC and PTC). 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 manufacturers and developers indicates 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.

US Clean Investment (Energy, Vehicles, Building Electrification) continues to grow, in spite of policy headwinds



Source: Rhodium Group / MIT-CEEPR Clean Investment Monitor, 2025

In contrast, **European** policy has been supportive of the energy transition this year. In February the European Commission introduced the Clean Industrial Deal, a policy aimed at boosting the EU's clean manufacturing sector and industrial competitiveness by adding 100GW of renewable energy capacity annually until 2030 and making €100 billion available to support energy-intensive industries such as steel, metals, and chemicals. The deal also proposes streamlining bureaucratic processes, increasing European Investment Bank-backed guarantees for renewable energy projects, and supporting power grid manufacturers. In addition, Germany's debt brake reform (Feb'25), unlocks approximately €1 trillion in additional investment into defence, infrastructure and energy transition projects over the next decade. Importantly, the case for renewables investment in Europe has not been shaken by the Iberian blackout in April 2025, with the cause believed to be poor load control and frequency management, rather than the high share of solar (55%) deployed at the time.

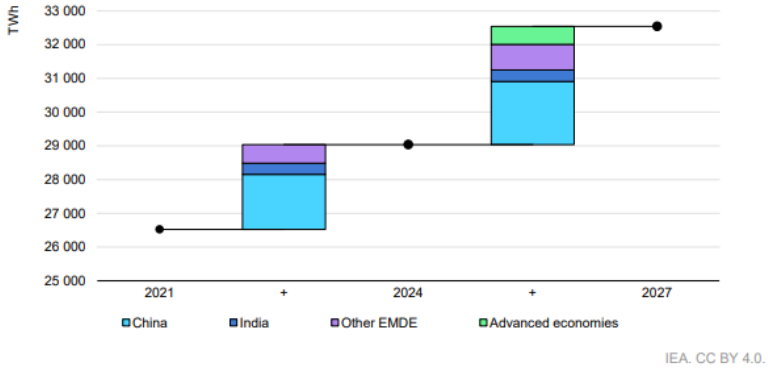
In spite of the trade and policy uncertainty, the fundamental **macro backdrop** in the first half of 2025 has proved to be fairly supportive of the sector. Interest rate cuts have continued in Europe, as inflation remains well under control. In the US, rates remain flat year to date at 4.5% (down c.100bps vs. Jun'24) and US Inflation has trended downwards year to date (2.3% in May'25 following a resurgence in Q4'24) creating some capacity for further interest rate cuts.

This backdrop has been somewhat overshadowed by the uncertainty, inflationary, and recessionary pressure introduced by the swathe of **tariffs** threatened by the Trump administration in its 'Liberation Day' announcements in April. Although the extraordinary headline tariffs have been delayed and reduced, uncertainty persists, and some consequential tariffs will certainly be implemented. A blanket 10% tariff is in effect on all goods, other than some Canadian and Mexican exempted imports, alongside 50% on steel and aluminium products and 25% on cars and auto parts. Chinese goods face a 30-55% tariff, with further tariffs facing a 90-day pause following the Geneva trade negotiation in May. We are encouraged by the commentary of our investee companies, which generally operate 'in-region, for-region' manufacturing strategies to minimize cross-border tariff exposures.

Despite the policy, macro and trade uncertainty, **global investment** in clean technologies remains on track to hit nearly $2.2tn in 2025 (according to the International Energy Agency (IEA)), 10% more than 2024 and almost twice the spend on coal, oil and gas. Investments in power grids, renewable energy and electrified transport lead the way, with China accounting for around a third of the total and EU (+12.4% annualised growth over 2019-24) and US (+9.2%) investments also delivering resilient growth. Notably, this surge is occurring despite the aforementioned policy, macro and trade uncertainties, demonstrating that electricity generated from renewable sources like onshore wind and solar remains cost-effective versus fossil fuels.

A key driver of the acceleration in clean technology investment, is the acceleration in **global electricity demand**. Having grown at 2.8% annually between 2000-23, global electricity consumption grew by an estimated 4.3% in 2024 and is expected to maintain a higher level of growth going forwards, averaging c.4% in 2025, and remaining at this elevated level until 2027. Importantly, load growth demand is increasingly coming from developed economies, such are the power demands of data centres, particularly those supporting AI. The US, for example, is expected to see load growth of 2-3% in 2025, sharply higher than the 0.5% annually over the previous 20 years.

Developed economies will contribute to global electricity growth for the first time in two decades



Source: IEA, 2025

One of the key drivers of developed market electricity demand growth is **data centres,** whose owners are increasingly looking to renewables to meet their growing electricity needs, helping to drive global corporate **power purchase agreement (PPA)** volumes to new highs. According to Bloomberg New Energy Finance, there were total signed agreements of around 60GW in 2024, up nearly 40% year-on-year. The top four buyers (Amazon, Google, Meta, and Microsoft) accounted for 40% of total demand last year. Approximately 95% of these agreements in the US were for onshore wind and solar, with predictable operating costs making them well suited for long-term contracts, offering long-term price visibility to hyperscalers, a distinct advantage over fossil fuels. The increased demand has driven US PPA prices from $25/MWh in 2019 to over $60/MWh today, with prices exceeding $100/MWh for some geothermal contracts.

We believe that renewables are being chosen to help satisfy this demand growth due to their speed to market, flexibility, and cost advantages over competitor technology. According to NextEra Energy, new US nuclear generation will take more

than 10 years to deploy and will be the most expensive source of generation available. Meanwhile, natural gas power projects are experiencing significant cost inflation and extended build times with logistical constraints.

The Guinness Sustainable Energy Fund

The Guinness Sustainable Energy Fund delivered a return of +11.7% during the first half of the year, outperforming the MSCI World Index (+9.5%). Global equity markets suffered significant volatility, with the US underperforming Europe post the 'Liberation Day' tariff announcements and then recovering somewhat thereafter. Europe's outperformance was fuelled by defence and infrastructure spending, supported by a weaker dollar.

Within our portfolio, the top contributing segments were our electrical installation and electrification sectors, while underperforming segments included our solar/wind equipment and auto-exposed electrification names. We are encouraged at the diversity and breadth of contribution within the portfolio, with our top 10 contributors equally split across US and Europe and representing all five of our master themes. Key discussion points were as follows:

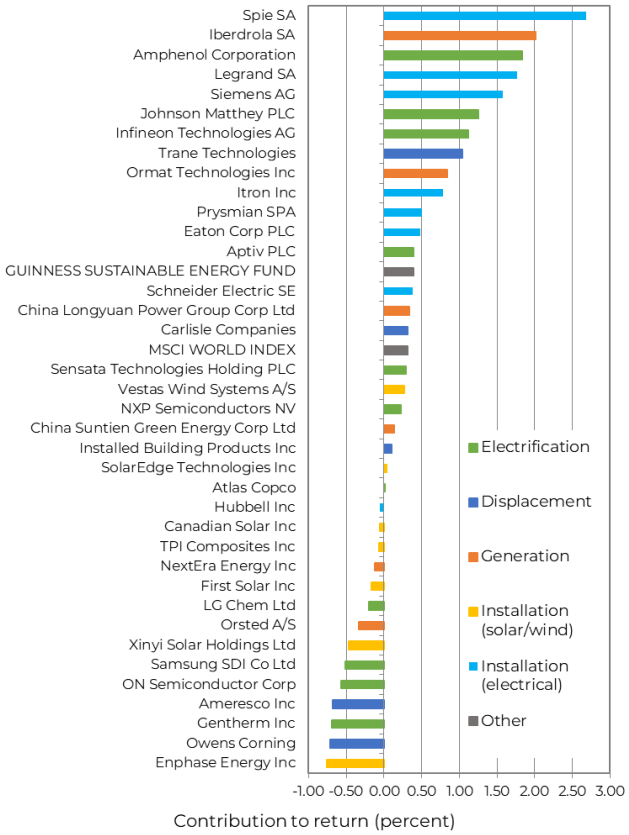
- Our electrical equipment companies all performed well, driven by an acceleration in global electrification activity, grid spending and, in select cases (such as **Legrand**), exposure to the data centre sub-sector. Top contributor **SPIE** delivered upgraded guidance at its Capital Markets Day and benefited from higher German infrastructure spending.

- **Amphenol** shares performed strongly, having materially beaten revenue and operating margins expectations in 1Q results. Amphenol's IT interconnect solutions 'IT Datacom' segment delivered +134% year-on-year growth (reflecting data centre and AI exposure) while four of its seven non-AI end markets posted mid-teens or better growth.

- Deal activity remained strong within the space, with **Johnson Matthey** contributing well, having accepted a bid for its Catalyst Technologies division for £1.8bn from Honeywell, at an implied attractive valuation of 15 times earnings. Management plan to return c.£1.4bn (60% of current market cap) to shareholders once the deal is closed.

- Poorer contributors spanned various themes and end markets. **Enphase** was directly affected by the cuts in subsidy to residential solar tax credits, **Gentherm** suffered from auto cycle weakness and uncertainties around Trump's tariffs, and **Owens Corning** suffered after highlighting weakness in the North America Residential market. **Ameresco** was weak after management noted some uncertainty around federal government projects in its $2.5 billion backlog of contracted projects.

1H 2025 contribution for Guinness Sustainable Energy Fund



Source: Bloomberg, Guinness Global Investors estimates; 30 June 2025

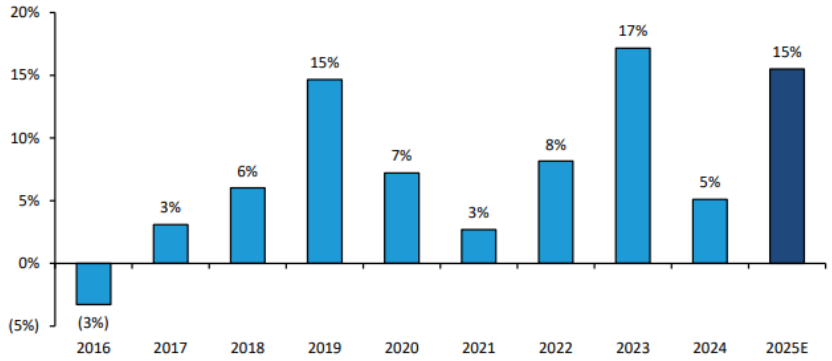
Outlook

Looking to the remainder of 2025 and beyond, we expect stabilisation in the transition after an erratic first half, giving way to more benign macro and market conditions, conducive to long-term growth:

- **Renewable power generation** is expected to grow c.1,200 TWh in 2025 (+12%), as demand from AI and data centres increases. This is against a backdrop of US electricity demand growth of 2-3%, following a decade without growth as electrification was offset by efficiency gains.

- **Grid investment** will increase to support the growth, growing at 15% in the US in 2025 (twice its historic rate of 7% per year) from a base of near $90bn in 2024. Growth reflects the delivery of federal upgrade funds through the Infrastructure Investment and Jobs Act (IIJA), underlying electricity demand growth and the growing need for battery storage.

- **Year-on-Year (%) Change in US Electrical Utilities Capex**



Source: Bernstein, June 2025

- **Building efficiency and electrification** will see sharply greater investment, increasing from $340bn in 2022 to $600bn per year from 2026-30 (10% annual growth versus a historic rate of 5%) driven by energy security, economics and tightening building standards. The EU Clean Industrial Deal (Feb'25) added various new energy efficiency targets while US policy continues to support efficiency in the construction, industrial and power sectors.

- **EV sales should be around 22 million in 2025**, representing around 25% of total passenger vehicle sales. Technological innovation in the space remains strong, with the first EVs able to offer recharging times competitive with conventional refuelling now being made available. While China remains the only scaled market where EVs are on average cheaper to buy than comparable internal combustion engine (ICE) vehicles, we continue to expect the global EV/ICE parity benchmark of $100/kWh battery prices to be reached in 2027, supporting 50% global penetration by 2030.

- **Solar** remains the cheapest form of new electricity supply, and we expect record low module prices in 2025 to spur growth in all major geographies with full-year global installations likely close to 695 GW in 2025, up nearly 15% on 2024. China will still represent around half of all installations with European and North America solar demand set to rise to 78 GW and 48 GW respectively, with a larger share being solar-plus-storage deployments.

- The global **wind** industry is on track to deliver a record level of c.143 GW of installations in 2025, with China being less than half of the market. For wind equipment manufacturers the outlook for margins is attractive as the pricing of new order intake remains elevated while raw material costs have stabilised, potentially allowing gross margins to maintain recent higher levels in 2H 2025. US policy uncertainty has brought a lower level of new orders in the first half of the year.

The outlook we summarise here is broadly consistent with current government activity and observable investment plans. To be clear, however, the growth described falls well short of the energy transition activity needed to achieve a **net zero / 1.5 degree scenario** in 2050, as targeted by the Intergovernmental Panel on Climate Change (IPCC) and reiterated at COP28. In a net zero scenario, the deployment of renewable generation capacity, penetration of EVs and battery storage, use of alternative fuels and implementation of energy efficiency measures will need to accelerate markedly.

At 30 June 2025, the Guinness Sustainable Energy Fund traded on a 2025/26 P/E ratio of 18.4x/15.4x. On a 12-month forward view, the fund trades at about a 15% P/E discount to the MSCI World Index, despite consensus forecast suggesting it will deliver superior earnings growth (13.8%pa vs the MSCI World at 9.7%pa).

Valuation and earnings growth of the Guinness Sustainable Energy Fund

As at 30 June 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	20.1x	18.4x	15.4x	12.2x	11.2x	9.8x	1.6%	2.0%	7.7%	13.8%	10.7%	11.3%
MSCI World Index	22.6x	21.0x	18.8x	13.8x	12.7x	11.5x	1.8%	1.9%	6.6%	9.7%	9.7%	10.3%
Fund Premium/(Discount)	*-11%*	*-13%*	*-18%*	*-12%*	*-12%*	*-15%*						

*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 (30 June 2025)

The 12-month forward P/E of the fund has de-rated against the MSCI World Index for around two years, falling from around a 40% premium to a 15% discount. This is back to the level seen in early 2020, before the announcement of the European Green Deal, China's decarbonisation plans and the inflection in electricity demand growth and grid upgrading requirements.

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

Source: Guinness Global Investors (30 June 2025)

We consider this valuation discount to be at odds with the superior earnings growth that consensus expects to be delivered by the fund. Since the end of 2018, consensus 12-month forward earnings expectations have consistently exceeded those of the MSCI World, with periods of relative strength often aligned with periods of fund outperformance. Between 2024 and 2027, consensus expects our portfolio to deliver compound annual earnings growth of 13.8%, which is nearly 1.5x the earnings growth rate of the MSCI World.

This valuation dislocation appears to be attracting long-term financial and strategic buyers looking to grow their exposure to a multi-decade growth theme for a discount, resulting in an uptick in M&A across our investment universe in the last two years. Bloomberg New Energy Finance notes that the number of climate-tech M&A deals with a value of over $1 billion dollars has increased from 13 in 2022 to 20 in 2024, with three in Q1'25 alone, a quarter which saw the largest number of deals in the last three years (79).

Catalysts for the rest of the year include the return of policy clarity in the United States as well as funding announcements related to the EU Green Deal or European energy security. The sector would also be a beneficiary of looser monetary policy, lower inflation and lower US treasury yields while higher fossil fuel prices would further improve the relative economics of renewable technologies. We expect investor interest in sustainable energy equities to recover in 2H'25 reflecting these catalysts and we expect that the current attractive valuation level will act as a catalyst as well.

We believe that the Guinness Sustainable Energy portfolio of around 30 broadly equally weighted positions, chosen from our universe of around 250 companies, provides concentrated exposure to the theme at attractive valuation levels that are particularly attractive relative to consensus earnings growth expectations.

Key themes in the Guinness Sustainable Energy Fund

	Theme	Example holdings	Weighting (%)
1	Electrification of the energy mix		27.4%
2	Modernising the power grid		11.8%
3	Rise of the electric vehicle and auto efficiency		10.5%
4	Power semiconductors		9.4%
5	Wind & solar: equipment manufacturing		7.8%
6	Low carbon power generation: regulated producers		8.9%
7	Low carbon power generation: independent producers		7.2%
8	Building and Industrial efficiency		14.8%
9	Other (inc cash)		2.2%

Source: Guinness Global Investors (30 June 2025)

PERFORMANCE

Past performance does not predict future returns.

The **Guinness Sustainable Energy Fund** (Class Y, 0.68% OCF) delivered a return of 7.0% in the month, while the MSCI World Index (net return) delivered 4.3% (all in USD terms).

Guinness Sustainable Energy Fund	Ytd	1 Yr	3 Yrs	5 Yrs	10 Yrs*
Fund (Class Y)	11.7%	2.1%	10.6%	66.1%	71.9%
MSCI World NR Index	9.5%	16.3%	65.6%	97.2%	175.3%
Out/Underperformance	*2.2%*	*-14.1%*	*-55.0%*	*-31.1%*	*-103.4%*

	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 7.1% in the month in GBP, while the MSCI World Index (net return) delivered 4.9%.

WS Guinness Sustainable Energy Fund	Ytd	1 Yr
Fund (Class Y, 0.67% OCF)	2.0%	-6.1%
MSCI World NR Index	0.1%	7.2%
Out/Underperformance	*1.9%*	*-13.3%*

	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%*

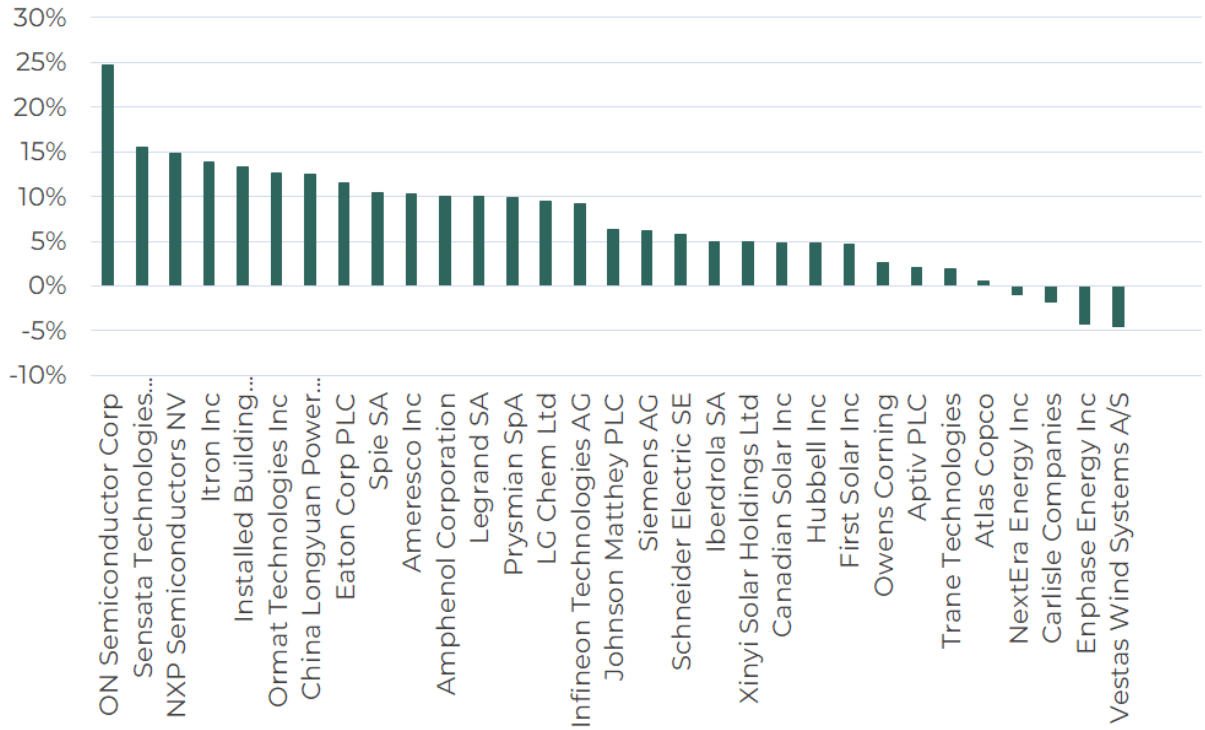
The Fund was launched on 30.12.2022.

Data as of 31.05.2025. 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.

Guinness Global Investors has been the investment manager of the **Guinness Sustainable Energy Fund UCITS ETF** since July 2024. We will include performance data for this vehicle in due course.

Within the Fund, the strongest performers were Onsemi, Sensata, NXP Semi, Itron and Installed Building Products while the weakest performers were Vestas, Enphase, Carlisle, NextEra Energy and Atlas Copco.

Stock by Stock performance over the month, in USD

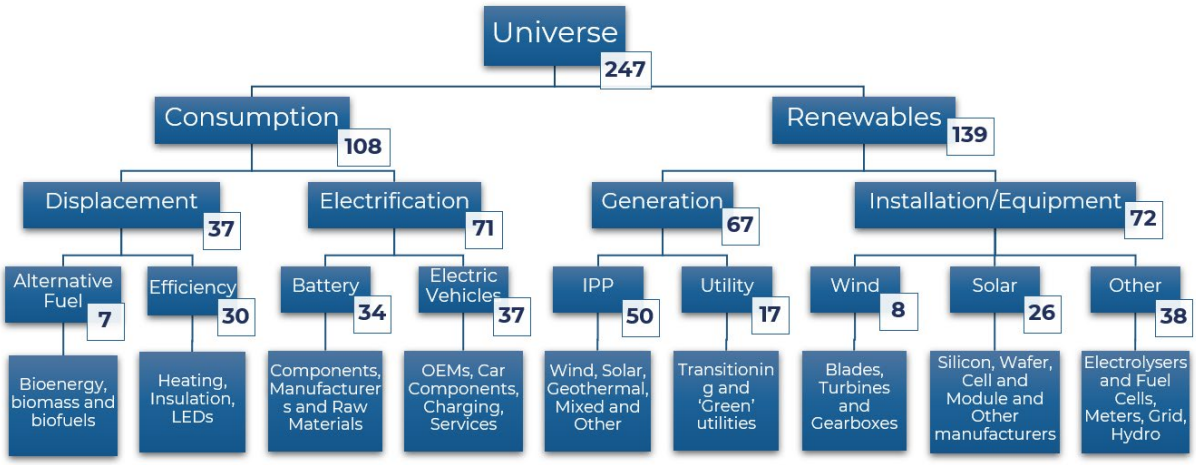


Source: Bloomberg. As of 30th June 2025

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 250 companies which are classified into four key areas:

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



Source: Guinness Global Investors; data as of 31.12.2025

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 around 30 stocks (currently 31). 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:

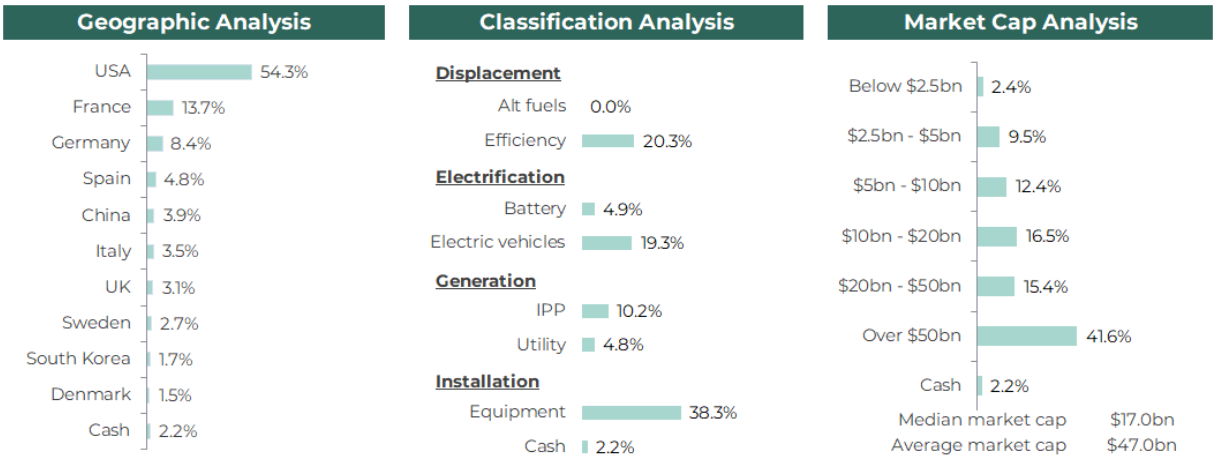
Signatory of:

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 month end. Source: Guinness Global Investors. Portfolio holdings are subject to change.

Portfolio sector breakdown

The following table shows the asset allocation of the Fund at month end and at previous year ends.

Asset allocation as %NAV	Current	*Change*	Year end	Previous year ends					
	Jun-25		*Dec-24*	Dec-23	Dec-22	Dec-21	Dec-20	Dec-19	Dec-18
Consumption	**44.4%**	**2.9%**	**41.6%**	**43.9%**	**44.9%**	**43.4%**	**36.7%**	**41.7%**	**26.5%**
Displacement	20.3%	*2.4%*	*17.9%*	15.3%	15.0%	11.8%	9.9%	13.4%	16.4%
Alternative Fuel	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*3.9%*
Efficiency	*20.3%*	*2.4%*	*17.9%*	*15.3%*	*15.0%*	*11.8%*	*9.9%*	*13.4%*	*12.5%*
Electrification	24.1%	*0.5%*	*23.6%*	28.5%	29.9%	31.6%	26.8%	28.2%	10.1%
Batteries	*4.9%*	*-1.7%*	*6.6%*	*10.2%*	*11.6%*	*8.9%*	*10.8%*	*12.6%*	*3.9%*
Electric vehicles	*19.3%*	*2.2%*	*17.0%*	*18.4%*	*18.2%*	*22.8%*	*16.0%*	*15.7%*	*6.2%*
Renewables	**53.4%**	**-4.4%**	**57.7%**	**51.9%**	**49.3%**	**51.3%**	**60.4%**	**54.1%**	**69.7%**
Generation	15.1%	*-5.4%*	*20.5%*	19.5%	17.7%	23.1%	24.6%	22.2%	27.3%
IPP	*10.2%*	*-5.1%*	*15.4%*	*10.9%*	*8.7%*	*14.5%*	*17.0%*	*18.9%*	*26.7%*
Utility	*4.8%*	*-0.3%*	*5.2%*	*8.6%*	*9.0%*	*8.6%*	*7.6%*	*3.2%*	*0.6%*
Installation	38.3%	*1.1%*	*37.2%*	32.4%	31.6%	28.2%	35.8%	32.0%	42.5%
Equipment	*38.3%*	*1.1%*	*37.2%*	*32.4%*	*31.6%*	*28.2%*	*35.8%*	*32.0%*	*42.5%*
Cash	2.2%	*1.5%*	*0.7%*	4.2%	5.8%	5.3%	3.0%	4.2%	3.8%

Source: Guinness Global Investors

Valuation

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

As at 30 June 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	20.1x	18.4x	15.4x	12.2x	11.2x	9.8x	1.6%	2.0%	7.7%	13.8%	10.7%	11.3%
MSCI World Index	22.6x	21.0x	18.8x	13.8x	12.7x	11.5x	1.8%	1.9%	6.6%	9.7%	9.7%	10.3%
Fund Premium/(Discount)	*-11%*	*-13%*	*-18%*	*-12%*	*-12%*	*-15%*						

*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 June 2025

Our portfolio is typically allocated across 30 (currently 31) 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 June 2025

	Theme	Example holdings	Weighting (%)
1	Electrification of the energy mix		27.4%
2	Modernising the power grid		11.8%
3	Rise of the electric vehicle and auto efficiency		10.5%
4	Power semiconductors		9.4%
5	Wind & solar: equipment manufacturing		7.8%
6	Low carbon power generation: regulated producers		8.9%
7	Low carbon power generation: independent producers		7.2%
8	Building and Industrial efficiency		14.8%
9	Other (inc cash)		2.2%

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

Guinness Sustainable Energy Fund (31 May 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%	26.1x	22.3x	20.6x	16.2x	16.3x	15.0x	6.4x	5.7x	5.0x	1.3%	1.4%	1.5%
Trane Technologies	IE00BK9ZQ967	5.0%	38.0x	33.3x	29.7x	24.4x	23.2x	21.2x	13.0x	11.5x	10.0x	0.8%	0.9%	0.9%
Installed Building Products Inc	US45780R1014	2.4%	17.3x	16.8x	15.4x	9.5x	11.1x	10.4x	6.3x	0.9x	0.8x	1.9%	1.8%	1.6%
Carlisle Companies	US1423391002	2.9%	20.8x	17.3x	15.3x	13.1x	12.7x	11.9x	6.9x	7.2x	6.0x	1.0%	1.1%	1.2%
Owens Corning	US6907421019	2.4%	7.7x	9.9x	9.1x	6.1x	6.9x	6.7x	2.3x	2.1x	1.8x	1.9%	2.0%	2.1%
Ameresco Inc	US02361E1082	1.1%	19.4x	17.1x	12.2x	13.2x	10.7x	9.1x	0.7x	0.7x	0.6x	0.0%	n.m.	n.m.
Atlas Copco	SE0017486889	3.0%	27.6x	26.3x	24.3x	17.1x	16.3x	15.2x	7.6x	6.0x	5.4x	1.8%	2.0%	2.1%
		21.3%												
Electrification/Battery														
LG Chem Ltd	KR7051910008	1.7%	n.m.	26.5x	8.0x	8.5x	6.4x	4.7x	0.4x	0.4x	0.4x	0.5%	0.7%	1.8%
Johnson Matthey PLC	GB00BZ4BQC70	3.3%	112.5x	22.9x	10.5x	11.7x	6.0x	5.8x	1.4x	1.3x	1.2x	4.2%	4.6%	12.1%
		5.0%												
Electrification/Electric Vehicles														
Aptiv PLC	JE00BTDN8H13	3.2%	8.0x	9.4x	8.4x	7.0x	7.1x	6.7x	1.8x	1.5x	1.4x	0.0%	0.0%	0.0%
Amphenol Corporation	US0320951017	4.2%	45.2x	33.7x	30.6x	26.7x	20.2x	18.7x	11.1x	9.1x	7.6x	0.6%	0.7%	0.8%
ON Semiconductor Corp	US6821891057	2.2%	10.7x	18.3x	13.5x	6.9x	11.9x	9.4x	2.0x	2.1x	1.9x	0.0%	0.0%	0.0%
Infineon Technologies AG	DE0006231004	3.8%	20.4x	25.1x	18.0x	10.7x	11.8x	9.3x	2.8x	2.5x	2.3x	1.0%	1.1%	1.1%
NXP Semiconductors NV	NL0009538784	3.0%	16.7x	16.7x	14.1x	11.7x	12.4x	10.8x	5.3x	5.0x	4.5x	2.1%	2.1%	2.4%
Sensata Technologies Holding PLC	GB00BFMBMT84	2.4%	6.5x	8.2x	7.5x	5.3x	7.6x	7.4x	1.3x	1.3x	1.1x	1.8%	1.9%	1.9%
		18.8%												
Generation/IPP														
China Longyuan Power Group Corp Ltd	CNE100000HD4	2.6%	7.7x	7.2x	6.6x	10.1x	9.5x	8.9x	0.7x	0.6x	0.6x	3.8%	4.0%	4.5%
Ormat Technologies Inc	US6866881021	3.5%	33.8x	35.0x	30.7x	15.7x	12.2x	10.9x	1.8x	1.7x	1.6x	0.6%	0.6%	0.6%
NextEra Energy Inc	US65339F1012	4.5%	21.9x	19.3x	18.0x	18.8x	14.6x	12.8x	2.9x	2.5x	2.4x	2.9%	3.2%	3.5%
		10.5%												
Generation/Utility														
Iberdrola SA	ES0144580Y14	5.0%	19.1x	16.9x	16.3x	11.3x	10.7x	10.1x	2.3x	2.0x	2.0x	3.5%	4.2%	4.4%
		5.0%												
Installation/Equipment														
Schneider Electric SE	FR0000121972	4.8%	29.6x	24.3x	21.7x	17.1x	15.4x	14.0x	4.6x	3.8x	3.5x	1.7%	1.9%	2.1%
Legrand SA	FR0010307819	4.8%	24.2x	21.7x	20.4x	15.5x	14.4x	13.5x	4.1x	3.5x	3.2x	1.9%	2.2%	2.4%
Eaton Corp PLC	IE00B8KQN827	4.7%	32.1x	26.7x	23.6x	22.2x	20.7x	18.6x	6.8x	6.5x	6.0x	1.2%	1.3%	1.3%
Siemens AG	DE0007236101	4.8%	22.4x	18.2x	18.2x	14.0x	12.3x	11.0x	3.3x	2.9x	2.7x	2.3%	2.5%	2.7%
Itron Inc	US4657411066	3.6%	22.0x	21.2x	19.4x	16.7x	17.3x	15.4x	3.8x	3.3x	2.9x	0.0%	n.m.	n.m.
Spie SA	FR0012757854	4.1%	20.0x	15.9x	14.5x	9.6x	8.9x	8.4x	4.0x	3.2x	2.9x	2.1%	2.5%	2.8%
Prysmian SpA	IT0004176001	3.5%	19.4x	15.4x	13.3x	12.7x	9.6x	8.7x	3.5x	2.8x	2.4x	1.3%	1.6%	1.8%
Xinyi Solar Holdings Ltd	KYG9829N1025	1.4%	16.1x	12.6x	7.6x	7.6x	7.8x	6.3x	0.7x	0.7x	0.7x	4.2%	4.3%	5.0%
Enphase Energy Inc	US29355A1079	1.0%	41.6x	16.7x	13.5x	25.9x	13.9x	11.0x	6.6x	5.9x	4.1x	0.0%	0.0%	0.0%
First Solar Inc	US3364331070	2.9%	12.5x	10.5x	7.0x	8.2x	7.1x	5.0x	2.1x	1.8x	1.5x	0.0%	0.0%	0.0%
Canadian Solar Inc	CA1366351098	1.3%	4.1x	n.m.	7.6x	8.6x	8.7x	5.8x	0.3x	0.2x	0.2x	0.0%	0.0%	0.0%
Vestas Wind Systems A/S	DK0061539921	1.7%	32.5x	18.2x	13.1x	8.9x	6.4x	5.4x	4.3x	3.5x	2.9x	3.8%	1.4%	2.6%
		38.6%												
Cash	Cash	**0.7%**												

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

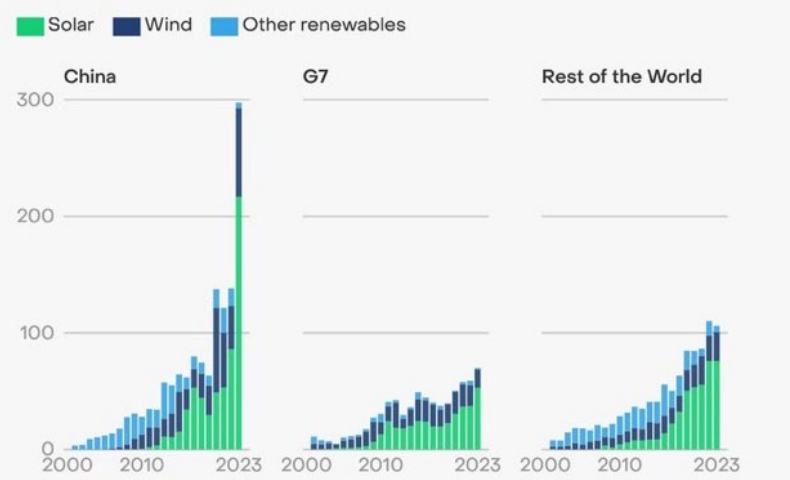
Sustainable energy policy in the **United States** has been dominated by the re-election of Donald Trump. His term will be a backward step for the energy transition and will bring a shift in US energy policy as he targets reduced energy costs, "energy dominance", and improved competitiveness for US industry 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 manufacturers and developers indicates 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 slowdown 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.

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.

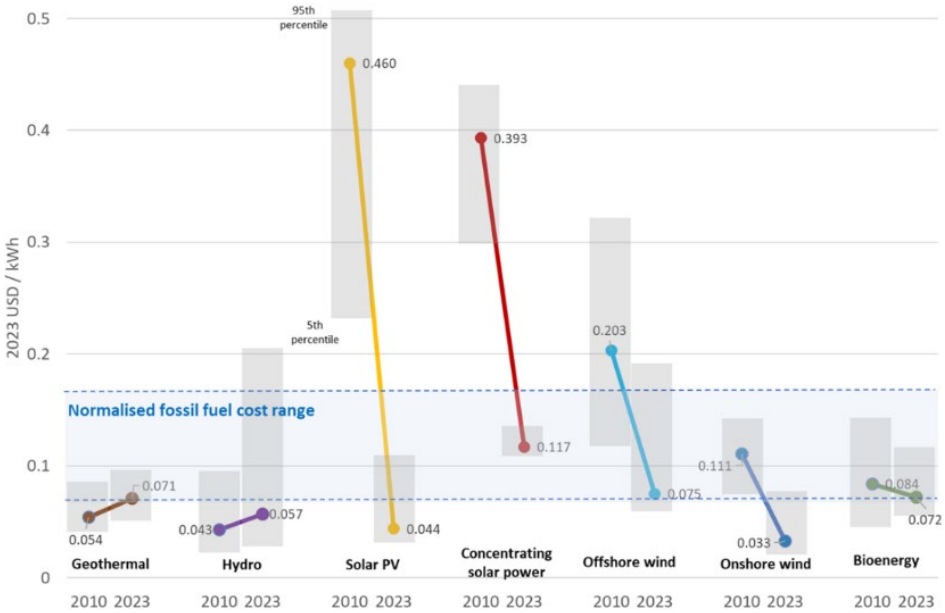
On a positive note, **global investment in clean technologies** grew and is likely to have hit nearly $2 trn in 2024 according to the IEA – almost twice the spend on coal, oil and gas in the year, and up from $1.7 trn in 2023. Higher-than-anticipated borrowing costs have been offset by easing supply 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



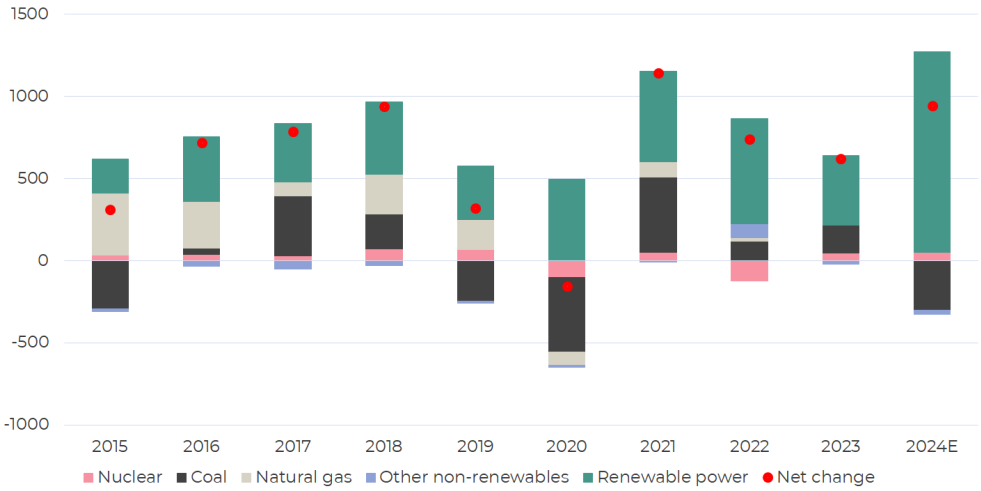
Source: IRENA; Guinness Global Investors, December 2024

Installations and power generation

Around 690 GW of **new renewable generation capacity** was installed in 2024, 170 GW higher than the record installations in 2023 and more than triple the 194 GW installed pre-COVID in 2019. At around 460 GW, solar represented around three quarters of the new capacity additions. Wind came next, at around 110 GW, followed by hydropower, then bioenergy.

Renewable electricity generation in 2024 is likely to have increased by 1,300 TWh (around 13%), reaching over 10,600 TWh and outpacing global electricity demand (estimated 970 TWh or 3% 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. The growth in renewable power generation implies a 2% fall in global fossil fuel generation (-330 TWh).

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

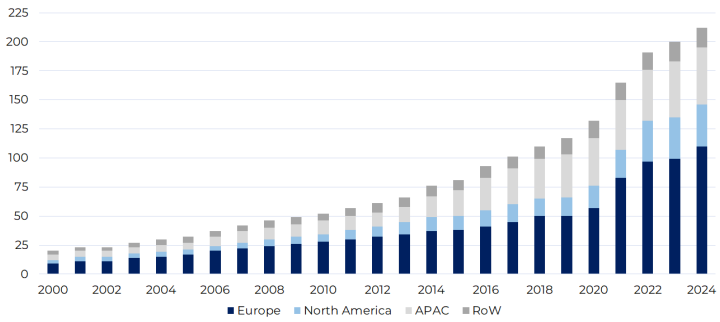
It is a common misconception that achieving rapid growth in renewable power generation will be enough to deliver government targets for pollution, energy security and decarbonisation. Renewable power generation is a key part of the solution, but we see the displacement and more efficient use of existing 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



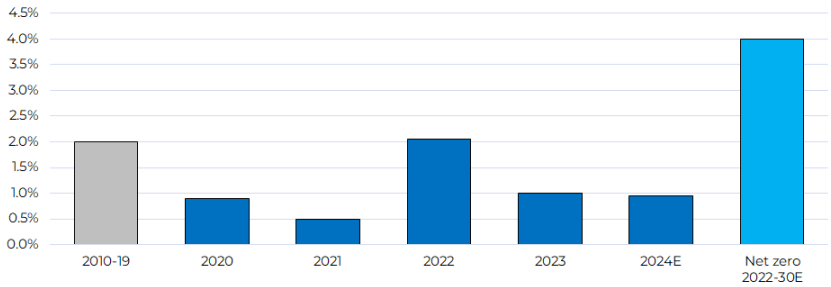
Source: IEA, Guinness Global Investors, December 2024

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 is expected to have 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



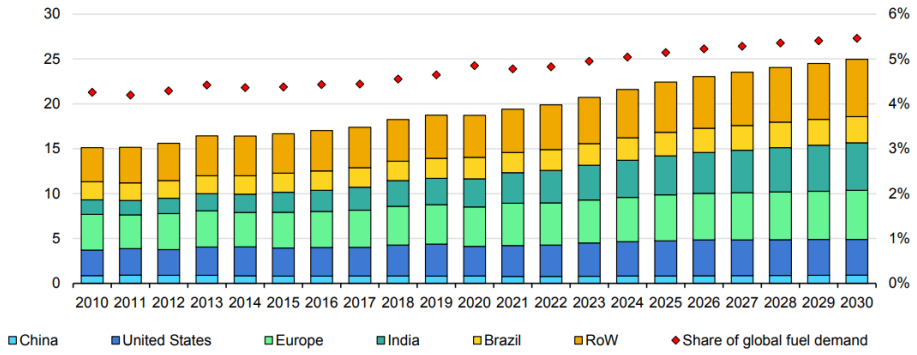
Source: IEA, Guinness Global Investors, December 2024

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

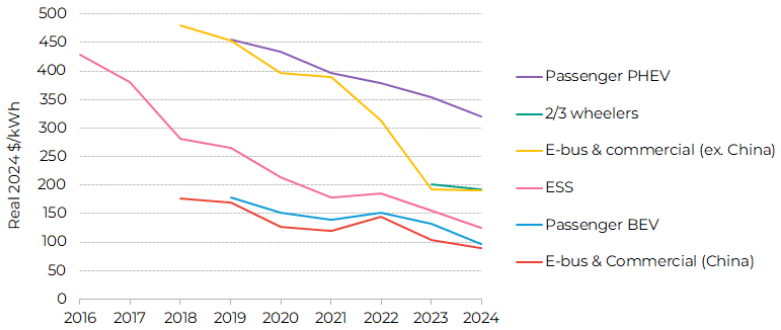
It is important to remember that alternative fuels broadly remain more expensive than their fossil fuel counterparts, meaning that policy support is key to underpinning future growth. For example, the $2/litre cost of producing biojet (often known as Sustainable Aviation Fuel, SAF) is nearly three times 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** is expected to have reached 1.2TWh in 2024, up 29% 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

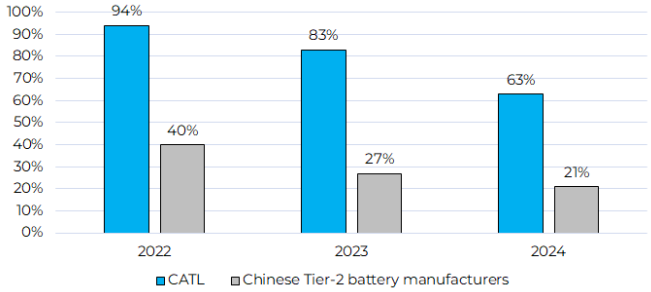


Source: BNEF, Guinness Global Investors, December 2024

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

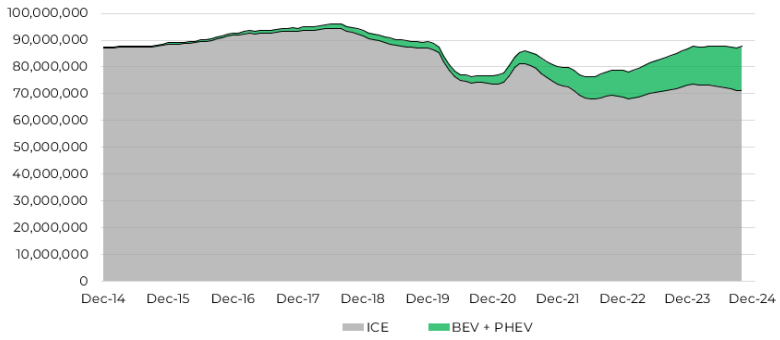


Source: Bernstein, Guinness Global Investors, December 2024

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". With the election of Donald Trump, trade barriers look set to rise further in 2025 and beyond. Given Trump's hostile stance towards China, we see it as highly likely that the US will incentivise 'friendly' countries to bring their technology and build battery manufacturing capacity in the US, presenting an opportunity for Japanese and South Korean manufacturers.

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

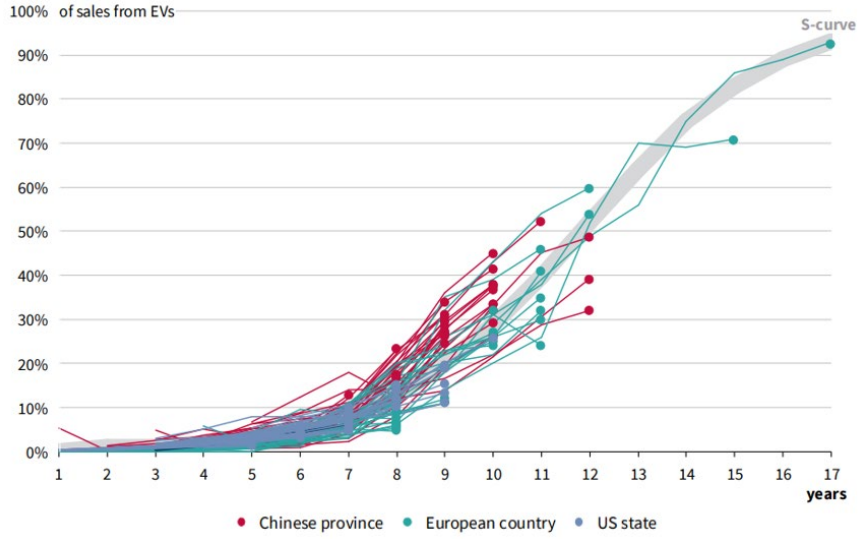


Source: LMC, Cleantechnica, Guinness Global Investors, December 2024

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 manufacturer CATL has developed a lithium iron phosphate battery with a 1,000km range), 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.

Looking to 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, BNEF, 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 89% between 2010 and 2023 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 124 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 ($65/MWh in Q3 2024 according to Levelten) and remain near all-time highs in Europe (€89/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)

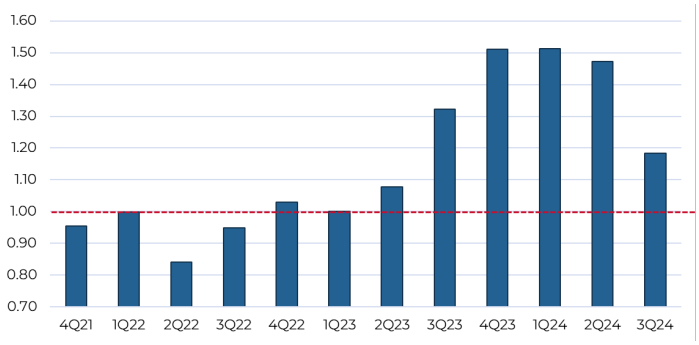
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025E
Onshore wind installations (annual)																
North America	6	8	15	2	7	10	9	8	8	10	17	14	10	8	8	10
Latin America	0	0	0	0	5	3	3	3	4	3	3	6	4	6	6	4
Europe	9	10	12	11	11	11	12	13	8	9	14	14	15	16	11	18
China	17	18	14	15	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) at c.1.2x on a trailing 12-month basis as of Q3'24, comfortably above 1.0x. 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, December 2024

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.

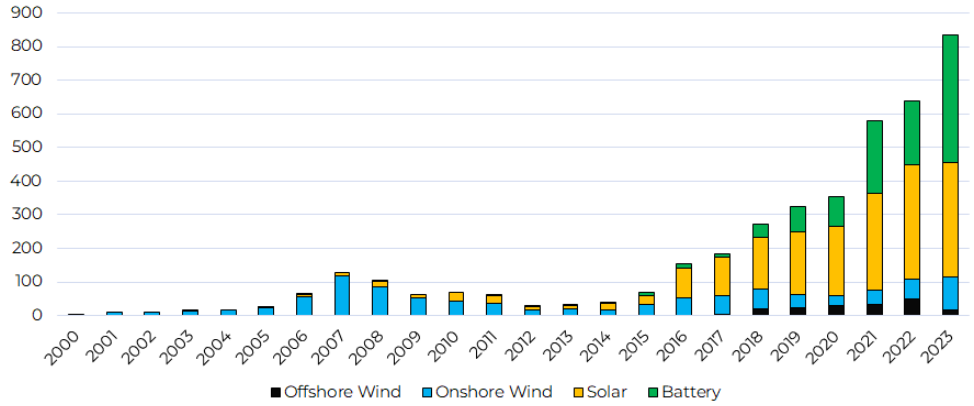
After 20 years of flat electricity consumption, we see demand growth of around 2-3% per year due to datacentres, AI querying, reindustrialization and electrification. Political support will be required to make this happen and we stress that the outlook here is very robust regardless of what President Trump achieves with 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

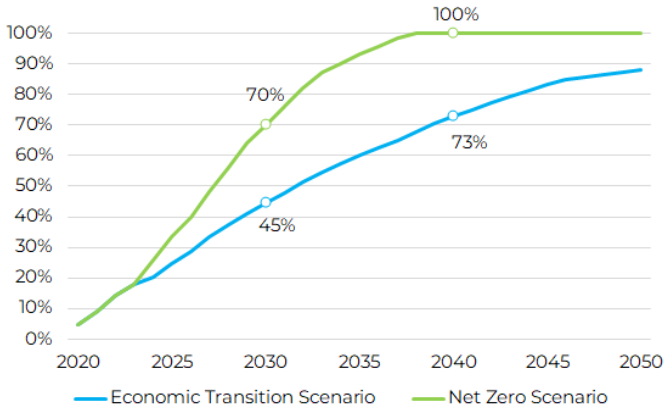
Throughout this document, we refer to our base-case energy transition scenario that reflects our understanding of the industry's current capacity and plans to provide decarbonisation solutions. This scenario is not consistent with net zero and we highlight the following changes across our subsectors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

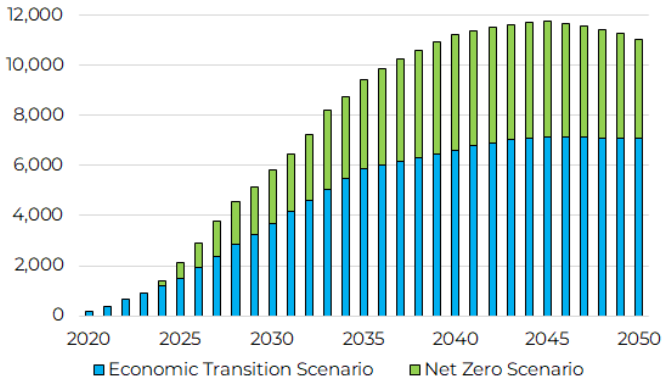
- **Alternative fuel** production growth would need to more than double by 2030 from 2023 levels (implying 11% per year growth) and then double again by 2050. SAF would have to grow from 0.3% of global jet fuel in 2024 to around 10% in 2030 (substantially higher than our base case 2030 estimate of around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

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GUINNESS SUSTAINABLE ENERGY FUND

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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.

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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.