# Guinness Sustainable Energy

Investment Commentary – December 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<br>Jonathan Waghorn |
| **EU Domiciled** | Guinness Sustainable Energy Fund<br>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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## COMMENTARY

### COP30 and Net Zero implications

This month, we review some of the key outcomes of COP30 and the implications for the energy transition. While the long-held goal of limiting global temperature increases to 1.5°C was reaffirmed, updated NDCs still imply warming well in excess of 2°C. We assess the conclusions of COP30 and discuss the changes that would be required across the sustainable energy subsectors to deliver a net zero transition.

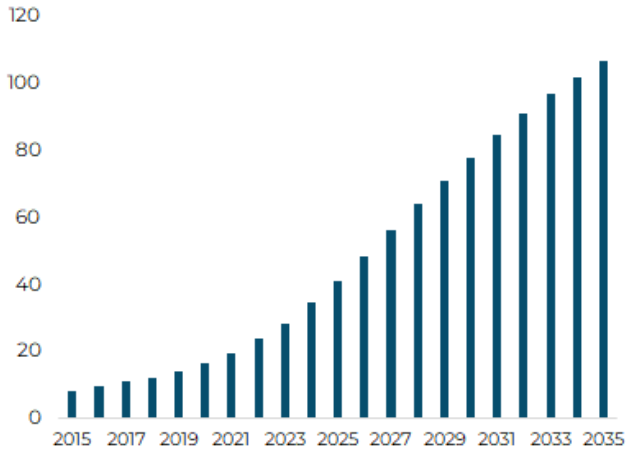
### EQUITIES

The Guinness Sustainable Energy Fund (Class Y) delivered a return of -1.3% (in USD) in November, underperforming the MSCI World Index, which returned 0.3%. Among the fund's top performers were renewable equipment manufacturers Canadian Solar and Vestas, which both delivered robust third-quarter results and decent order growth. Among the fund's bottom performers were AI-related names Legrand and Eaton, which were impacted by volatility amid concerns about the sustainability of AI data centre growth.

### CHART OF THE MONTH: DATA CENTRE POWER DEMAND

Bloomberg New Energy Finance (BNEF) see power demand from US data centres growing by 106GW over the next decade, up from 41GW in 2025. At the same time, the proliferation of AI means that inference and training will account for nearly 40% of data centre capacity, driving up overall utilization from 59% to 69%.

**US data centre power demand (GW)**




*Source: BNEF estimates, November 2025*

## NOVEMBER 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 another sign of the vast investment required to support accelerating AI growth, Brookfield Asset Management, alongside Nvidia and the Kuwait Investment Authority, has launched a $100 billion AI infrastructure programme. The capital will be used to acquire and develop critical assets including land, power generation, data centres and compute capacity. Brookfield estimates that AI-related infrastructure could require as much as $7 trillion of global investment over the coming decade, highlighting the unprecedented scale of the build-out. With energy consumption now a central bottleneck for AI expansion, the partnership highlights how securing reliable, large-scale power will be as essential as compute in meeting future demand. | Global Power Demand |  |
| In November, the US government granted Constellation Energy a $1 billion loan to restart the Three Mile Island reactor, demonstrating its support for the domestic nuclear sector. The move builds on recent federal efforts to rebuild infrastructure, secure supply chains, and accelerate deployment timelines to meet rapidly rising power demand. Constellation is restarting the plant to supply electricity to Microsoft, reflecting a broader trend of reactor restarts and life extensions. It follows last month's announcement of an $80 billion US government deal with Westinghouse to deploy a new fleet of reactors nationwide. | Nuclear Generation |  |
| In November, British utility SSE announced a £2 billion equity raise to support its five-year, £33 billion investment plan aimed at upgrading the UK's electricity networks and expanding its renewables portfolio. The company expects around 80% of this spending to go toward strengthening its regulated networks business, with the remainder directed to new renewable and flexible-generation assets. The move follows similar capital raises by Iberdrola and National Grid in recent years and shows the scale of investment required to modernise ageing UK infrastructure, integrate renewables at pace, and meet rising electricity demand as the country accelerates its transition to a decarbonised energy system. | UK Grid Investment |  |
| Global electric vehicle (EV) sales increased 23% year-on-year in October, reaching 1.9 million units, according to research house Rho Motion. Sales in Europe experienced the strongest growth, up 36% in the month, with strong demand seen in Germany, France, and the UK. Sales in China reached approximately 1.3 million units, with buying expected to accelerate further ahead of subsidy cuts in the new year. In contrast, the phase-out of North American tax credits has pushed regional sales lower, leaving the market trailing other major regions. | Electric Vehicle Sales |  |
| The International Energy Agency (IEA) released its latest World Energy Outlook, which for the first time included a "Current Policies Scenario" in which oil demand continues to grow through 2050. The report highlighted the strong structural drivers of energy use, including economic growth in emerging markets and rapidly rising electricity demand from industry, mobility and data centres. Although renewables and nuclear continue to expand at record pace, they are not yet scaling fast enough to offset demand growth, leaving fossil fuels entrenched in the energy mix. The report highlights the need for sustained investment in both clean energy deployment and grid and generation resilience in order to meet growing global demand. | The energy transition |  |

## MANAGERS' COMMENTS

### COP30 and the energy transition

**This month, we review some of the key outcomes of COP30 and the implications for the energy transition. While the long-held goal of limiting global temperature increases to 1.5°C was reaffirmed, updated nationally determined contributions (NDCs) still imply warming well in excess of 2°C. We assess the conclusions of COP30 and discuss the changes that would be required across the sustainable energy subsectors to deliver a net zero transition.**

COP30 concluded on 21st November, marking the tenth anniversary of the Paris Agreement and the adoption of global efforts to limit warming to 1.5°C. As part of the Paris Agreement's five year "ambition-raising" cycle, COP30 also required members to submit their updated NDCs, with mitigation targets and measures to 2035.

While this year's summit delivered incremental progress in key areas such as adaptation financing and developing emerging frameworks to support a just transition, it ultimately fell short in delivering the material step up in ambition needed to realign global emissions with a 1.5°C scenario. In our view, the absence of a concrete commitment to phase out fossil fuels means that COP30 will ultimately be viewed as a missed opportunity to build on the achievements of previous climate conferences.

However, from the perspective of investing in the energy transition, we found the following developments to be particularly interesting.

**Progress on Climate Financing**

Climate finance had a lesser role on the COP30 agenda than in previous years, but the summit delivered a handful of noteworthy developments. Chief among these was a commitment to "at least triple adaptation finance by 2035", signalling a growing recognition that resilience investment must scale significantly as climate impacts intensify. Delegates also reaffirmed the New Collective Quantified Goal (NCQG) to channel $300 billion per year in climate finance to developing economies, alongside the release of a report outlining a strategy to mobilise the $1.3 trillion referenced in the "Baku to Belém Roadmap to $1.3T" framework in COP29.

**Renewed commitment to renewables and efficiency**

Building on the commitments made at COP28, a coalition of more than 80 countries including the EU and its member states renewed their pledge to transition away from unabated fossil fuels, triple renewable capacity and double energy efficiency by 2030. This reaffirmation of one of COP28's central outcomes points to the growing recognition of the importance of not only accelerating clean energy deployment but also driving substantial efficiency gains in buildings, industry and transport.

Within the area of efficiency, there was also explicit action taken with the release of Mission Efficiency's detailed implementation plan. Mission Efficiency is a global coalition backed by governments, international organisations and industry partners with the mandate to support delivery of the COP28 goal to double global energy-efficiency improvements by 2030. Its COP30 plan sets out concrete policy, technology and financing measures to accelerate efficiency gains across the built environment, industry and transport.

As well as the headline announcements, other commitments included the following:

- **Transition investment:** Members of the Utilities for Net Zero Alliance, a coalition of major power and grid companies, announced commitments to increase transition investment by 25% to $150bn per year, split as $66bn in renewables and $82bn in grids. The updated investment plan means the members of the Alliance will mobilise more than $1 trillion in energy transition investments by 2030.

- **Sustainable Fuel:** commitment to quadruple the production and use of sustainable fuels by 2035, endorsed by a group of 23 countries including Brazil, Italy, Canada and Japan.

**Recognition of the need to work outside the COP timelines**

Another interesting development from COP30 was a willingness among countries, and indeed the presidency itself, to create transition plans and roadmaps outside the formal COP negotiation process. Brazil's commitment to develop voluntary frameworks on fossil-fuel transition and deforestation underscores a pragmatic move towards implementation, even when consensus cannot be reached within the usual negotiating channels. While non-binding, these parallel initiatives can still play a role in advancing clean-energy strategies and accelerating planning cycles.

**Implied warming from NDCs, pledges and targets**

To contextualise the outcomes of COP30 and the wider energy transition, we summarise some of the key findings from the UN's latest Emissions Gap Report. While the report acknowledges the significant progress made since the adoption of the Paris Agreement, its analysis finds that the emissions gap – the difference between estimated greenhouse gas emissions implied by the latest NDCs and the level of emissions consistent with the 1.5°C target of the Paris Agreement – remains stubbornly high.

According to the UN:

- **Updated NDCs still leave the world on a 2.3-2.5°C warming path**: even if all announced unconditional NDCs are fully implemented, estimated global warming will reach 2.3-2.5°C, well above the 1.5°C target of the Paris Agreement.

- **Under existing policies, warming could approach 2.8°C:** existing policies imply a warming trajectory closer to 2.8°C, assuming no further tightening. Even then, many countries are not on track to deliver their 2030 pledges, meaning that temperature rises could exceed 2.8°C.

- **The updated NDCs have had a marginal impact:** The modest improvement from last year's 2.6-2.8 °C (NDC scenario) to 2.3-2.5 °C mostly reflects methodological updates; the underlying ambition increase in new pledges is limited and will potentially be offset by the departure of the US in 2026.

**Implications of a net zero scenario**

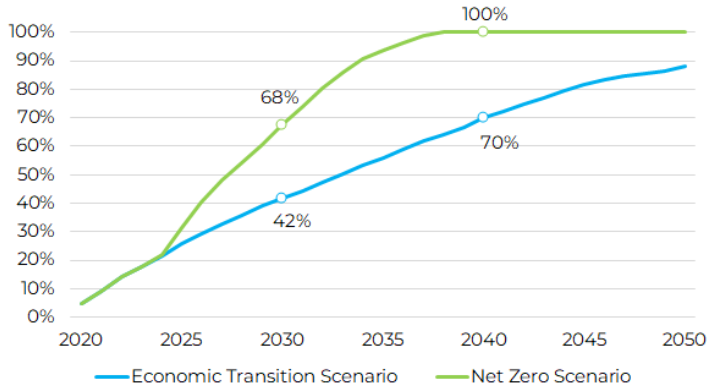
The UN's Emissions Gap Report points to many of the same conclusions as our base-case energy transition scenario. As we understand it, the industry's current capacity and plans to provide decarbonisation solutions have accelerated meaningfully in the last decade but still fall short of the level required to meet the goals of the Paris Agreement. We highlight the following changes across our subsectors that would be required to deliver a net zero transition:

- Within **efficiency**, the IEA estimate that annual energy intensity improvements must quadruple from c.1% in 2024 and average 4% per year throughout the rest of the decade. For buildings, this means that efficiency investments grow from $240bn today to reach $600bn per year to 2035. For transport and industry, average energy efficiency investment must nearly double, reaching c.$160bn and c.$70bn per year. 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.

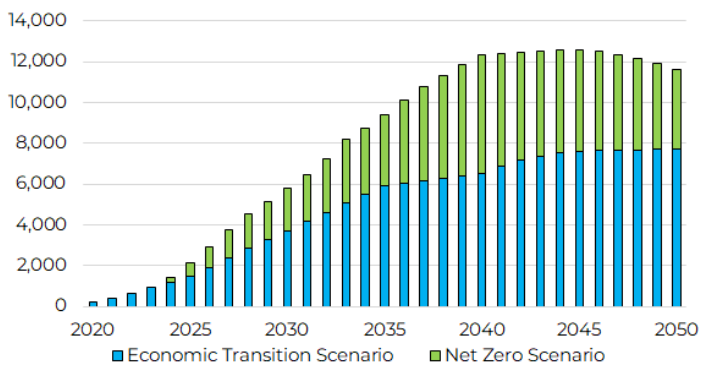
- **Alternative fuel** production growth would need to more than double by 2030 from 2023 levels (implying 11% per year growth) and then double again by 2050. Sustainable aviation fuel (SAF) would have to grow from 0.3% of global jet fuel in 2024 to around 10% in 2030 (substantially higher than our base case 2030 estimate of around 2%), before reaching 20% in 2050.

- For **electric vehicles** and **batteries**, BNEF estimate that in a net zero scenario, global EV penetration rates must hit 68% by 2030 with 100% of vehicles sold being electric by 2040 (versus their current 'base case' economic transition estimates of 42% and 70% respectively). This translates into global battery demand of 11.6 TWh in 2050 compared to 1.2 TWh in 2024, almost 50% higher than their base case assumptions.

**EV sales penetration forecasts (%)**




**Lithium-ion battery demand forecasts (GWh)**




*Source: BNEF, Guinness Global Investors, December 2025*

- **Solar** and **wind** installed capacity would need to triple 2022 levels by 2030. In doing so, renewable generation would see its share of total generation increase from 32% to 75% by 2035. While investment levels in solar are almost in line with a 1.5°C scenario, IRENA estimate that investment levels in onshore and offshore wind need to be scaled up by three times and eight times respectively.

- For **power grids**, IRENA estimate that net zero would require annual investment to almost double by 2030, reaching c.$620bn per year. As it stands, only 16% of grid investment in 2024 was directed towards new connections, with the majority going towards replacing ageing assets (44%) and reinforcing the existing grid (40%). At the same time, investment into battery storage needs to more than triple by the end of the decade, growing from c.$50bn in 2024 to $170bn per year in 2030.

- Under a net zero scenario, installed **nuclear power** capacity needs to grow 70% by 2035, adding 290GW of new generation. By 2050, capacity needs to more than double. New installations must also outpace a wall of retirements from power plants installed in in the 1970s and 1980s which are approaching the end of their useful life. Current industry ambitions to triple nuclear capacity by 2050 would see global capacity reach 1,240GW, around 160GW higher than the IEA's net zero capacity target and would require an additional $900bn of investment.

- According to the IEA, energy **investment** in the net zero scenario would need to increase from about $3.3trn to $5.6trn by 2035. Overall investment in the power sector would need to almost double by 2035, reaching $2.5trn, with the bulk of that investment ($1.3trn) going toward renewable generation.

**Conclusion**

Investment in the energy transition continues to accelerate, even if current spending remains short of what is required for a net zero pathway. COP30, together with this analysis, offers a timely reminder of the scale of capital still needed to realign global emissions with long-term climate goals. Encouragingly, with investment continuing to grow, the backdrop for sustainable energy investing remains constructive.

## PERFORMANCE

*Past performance does not predict future returns.*

The **Guinness Sustainable Energy Fund** (Class Y, 0.74% OCF) delivered a return of -1.3% in the month, while the MSCI World Index (net return) delivered 0.3% (all in USD terms).

| Guinness Sustainable Energy Fund | Ytd | 1 Yr | 3 Yrs | 5 Yrs | 10 Yrs* |
|---|---|---|---|---|---|
| Fund (Class Y) | 27.7% | 16.8% | 4.9% | 24.0% | 143.7% |
| MSCI World NR Index | 20.1% | 17.0% | 69.0% | 83.4% | 207.3% |
| *Out/Underperformance* | *7.6%* | *-0.2%* | *-64.0%* | *-59.5%* | *-63.6%* |

| | 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 -2.4% in the month in GBP, while the MSCI World Index (net return) delivered -0.6%.

| WS Guinness Sustainable Energy Fund | Ytd | 1 Yr |
|---|---|---|
| Fund (Class Y, 0.67% OCF) | 20.0% | 12.2% |
| MSCI World NR Index | 13.5% | 12.2% |
| *Out/Underperformance* | *6.5%* | *-0.1%* |

| | 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.*

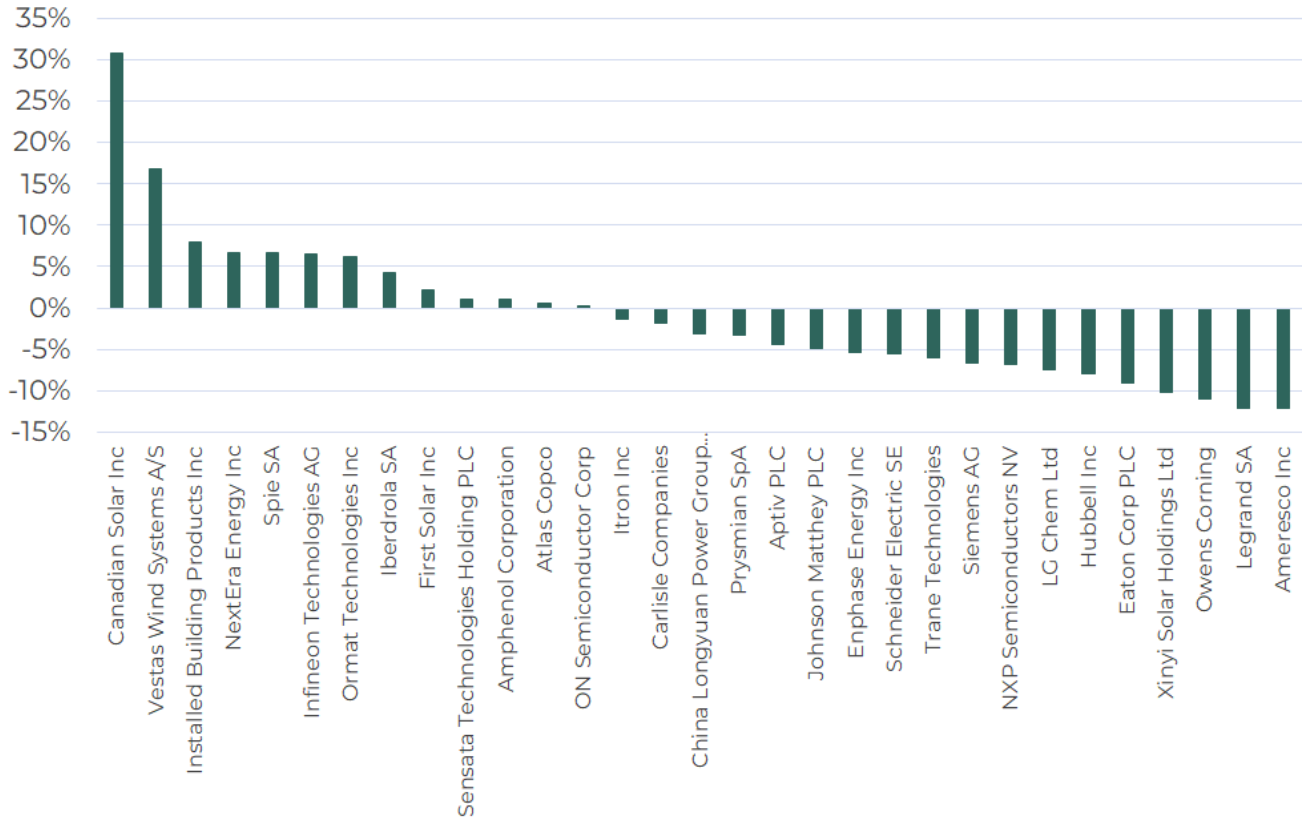
The **Guinness Sustainable Energy Fund UCITS ETF**, under our management since 25 July 2024, delivered a return of -1.5% in the month in USD, while the MSCI World Index (net return) delivered 0.3% (all in USD terms).

| Total return in USD | Ytd | 1 Yr |
|---|---|---|
| Fund (Class A Acc, 0.65% OCF) | 27.2% | 16.8% |
| MSCI World NR Index | 20.1% | 17.0% |
| *Out/Underperformance* | *7.1%* | *-0.2%* |

*Data as of 30.11.2025. 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 Canadian Solar Inc, Vestas Wind Systems A/S, Installed Building Products Inc, NextEra Energy Inc and Spie SA while the weakest performers were Ameresco Inc, Legrand SA, Owens Corning, Xinyi Solar Holdings Ltd and Eaton Corp PLC.

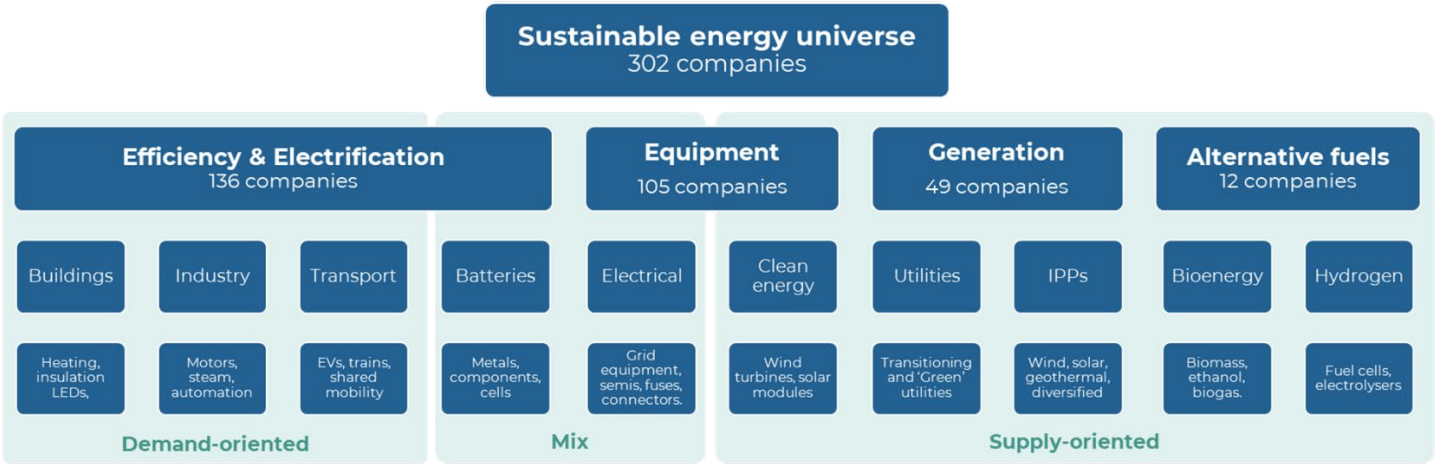
**Stock by Stock performance over the month, in USD**




*Source: Bloomberg. As of 30th November 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 to some companies with existing hydrocarbon-based fuel exposure, but this must be accompanied by 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 30 September 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:**

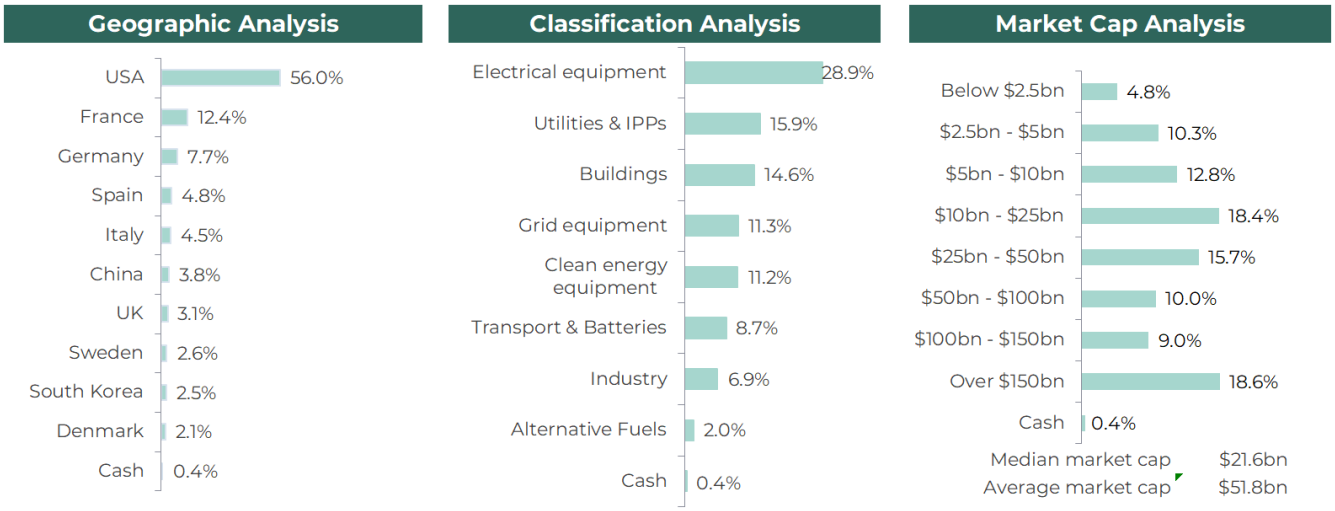
*Signatory of:*

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 30.11.2025. Source: Guinness Global Investors. Portfolio holdings are subject to change.*

## Portfolio sector breakdown

The following table shows the asset allocation of the Fund at 30th November and at previous year ends.

| Asset allocation as %NAV | Current | *Change* | Year end | Previous year ends | | | | |
|---|---|---|---|---|---|---|---|---|
| | Nov-25 | | *Dec-24* | Dec-23 | Dec-22 | Dec-21 | Dec-20 | Dec-19 |
| Electrical equipment | 28.9% | *2.2%* | 26.8% | 25.1% | 20.3% | 19.0% | 10.0% | 9.6% |
| Buildings | 14.6% | *-0.2%* | 14.8% | *9.6%* | *7.7%* | *4.2%* | *3.7%* | *10.2%* |
| Utilities & IPPs | 15.9% | *-4.6%* | 20.5% | *19.5%* | *17.7%* | *23.1%* | *24.6%* | *22.2%* |
| Grid equipment | 11.3% | *2.3%* | 9.0% | 7.6% | 7.3% | 6.6% | 6.1% | 5.5% |
| Clean energy equipment | 11.2% | *0.8%* | 10.3% | 15.8% | 19.7% | 18.7% | 28.8% | 23.5% |
| Transport & Batteries | 8.7% | *-2.6%* | 11.3% | 16.4% | 18.5% | 19.5% | 20.4% | 21.7% |
| Industry | 6.9% | *2.2%* | 4.8% | *0.0%* | *0.0%* | *0.0%* | *0.0%* | *0.0%* |
| Alternative Fuels | 2.0% | *0.2%* | 1.8% | *1.8%* | *3.0%* | *3.7%* | *3.6%* | *3.2%* |
| Cash | 0.4% | *-0.3%* | 0.7% | 4.2% | 5.8% | 5.3% | 3.0% | 4.2% |

*Source: Guinness Global Investors*

## Valuation

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

| As at 30 November 2025 | PE | | | EV/EBITDA | | | Dividend Yield | | EPS Growth (%pa) | | Cash return | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2024 | 2025E | 2026E | 2024 | 2025E | 2026E | 2025E | 2026E | 2019-24 | 2024-27 | 2025E | 2026E |
| Guinness Sustainable Energy Fund | 22.5x | 20.9x | 17.9x | 13.6x | 12.8x | 11.4x | 1.4% | 1.8% | 7.7% | 13.2% | 11.0% | 11.3% |
| MSCI World Index | 24.6x | 22.4x | 20.0x | 16.2x | 15.3x | 13.5x | 1.6% | 1.7% | 6.8% | 11.1% | 9.9% | 10.4% |
| *Fund Premium/(Discount)* | *-9%* | *-7%* | *-11%* | *-16%* | *-16%* | *-16%* | | | | | | |

*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 the end of November 2025

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

A key theme in the portfolio (at around 40% weight) is that of **electrical equipment**, where we own a number of companies that facilitate the electrification of energy demand and the build-out of the electrical grid. Holdings such as Eaton, Schneider Electric, Amphenol and Legrand participate in various niches in the design, manufacturing and servicing of electrical products across low, medium and high voltage applications, for a wide range of end markets. Hubbell holds a particular specialism in high voltage grid equipment, especially in the United States, while Prysmian manufactures the cable used in high voltage interconnectors and connections to new supply sources. Lastly, Itron has a heritage in manufacturing smart meters and is increasingly providing services and consulting to utilities around this installed base to enable more efficient utilisation of the grid.

The electrification and efficiency of buildings, industrial activities, and transportation represent a total weight of 30% and are split as follows:

- In terms of **transportation** exposure, 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. 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.

- Our **buildings** exposure comes via pure-play quality exposure to heating and cooling industries (via commercial HVAC manufacturer Trane Technologies) as well as high-quality roofing manufacturer Carlisle Companies. We have two names focused on insulation: Owens Corning, as a manufacturer of insulation (and associated products), while Installed Building Products is an installer of insulation. Our final holding here in SPIE, a French electrical engineering company that provides services for building maintenance, predominantly in France and Germany.

- Our **industrial** efficiency and electrification exposure comes from two positions, in Siemens and Atlas Copco. Siemens provides us with exposure to efficiency and electrification across a wide range of end markets, while Atlas Copco offers exposure to the efficient use of air (often referred to as the fourth utility) in manufacturing processes, via compressors and vacuum technology.

In terms of the **generation** of sustainable energy, we hold a c.16% weight to utilities and independent power producers. China Longyuan is a pure-play Chinese wind power producer and represents one of our two IPP holdings. The remaining exposure comes in the form of geothermal via Ormat, the world's only integrated producer and equipment manufacturer for geothermal projects. We also have broad-based wind/solar renewable energy generation through NextEra Energy (the largest producer of renewable energy in the world), while Iberdrola is our one utility, with particular exposure to electricity networks.

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, covering both the standard polysilicon manufacturing process (via Canadian Solar) as well as the specialist cadmium telluride process used by First Solar. Wind turbine manufacturer Vestas provides broad exposure to the strong growth that we expect in the onshore and offshore wind markets. Lastly, we have some exposure to bioenergy (and a broader range of energy efficiency projects) via Ameresco, a US-listed clean energy project developer.

## Portfolio themes as at end November 2025

| | Theme | Example holdings | Weighting (%) |
|---|---|---|---|
| 1 | Electrification of energy demand | | 26.4% |
| 2 | Modernising the power grid | | 11.3% |
| 3 | Rise of the electric vehicle and auto efficiency | | 11.2% |
| 4 | Power semiconductors | | 8.0% |
| 5 | Wind & solar equipment manufacturing | | 11.2% |
| 6 | Low carbon power generation: regulated producers | | 9.3% |
| 7 | Low carbon power generation: independent producers | | 8.5% |
| 8 | Building and industrial efficiency | | 13.6% |
| 9 | Other (inc cash) | | 0.4% |

## Portfolio at the end of October 2025 (one month in arrears for compliance reasons)

| Guinness Sustainable Energy Fund (31 October 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** |
| **ALTERNATIVE FUELS** | | | | | | | | | | | | | | |
| Ameresco Inc | US02361E1082 | 2.2% | 55.6x | 48.6x | 35.7x | 21.1x | 16.8x | 14.3x | 2.0x | 1.9x | 1.8x | 0.0% | n.m. | n.m. |
| | | **2.2%** | | | | | | | | | | | | |
| **EFFICIENCY & ELECTRIFICATION** | | | | | | | | | | | | | | |
| Carlisle Cos Inc | US1423391002 | 2.0% | 17.8x | 17.0x | 15.6x | 11.3x | 12.7x | 12.1x | 5.9x | 7.6x | 8.4x | 1.1% | 1.3% | 1.4% |
| Installed Building Products In | US45780R1014 | 3.0% | 26.9x | 24.5x | 23.8x | 14.0x | 15.6x | 15.3x | 9.8x | 8.6x | 6.5x | 1.2% | 1.2% | 1.1% |
| Owens Corning | US6907421019 | 1.8% | 7.3x | 9.4x | 9.1x | 6.0x | 6.8x | 6.8x | 2.1x | 2.0x | 1.8x | 2.0% | 2.2% | 2.2% |
| Spie SA | FR0012757854 | 3.3% | 20.0x | 15.8x | 14.2x | 10.4x | 9.4x | 8.8x | 4.0x | 3.4x | 3.0x | 2.1% | 2.6% | 2.8% |
| Trane Technologies PLC | IE00BK9ZQ967 | 4.2% | 39.6x | 34.4x | 30.1x | 25.2x | 23.8x | 21.5x | 13.5x | 12.0x | 10.5x | 0.7% | 0.8% | 0.9% |
| Siemens AG | DE0007236101 | 4.6% | 26.4x | 21.3x | 21.6x | 14.0x | 12.3x | 11.2x | 3.9x | 3.4x | 3.1x | 2.0% | 2.2% | 2.3% |
| Atlas Copco AB | SE0017486889 | 2.5% | 29.0x | 28.0x | 26.0x | 43.9x | 42.0x | 39.1x | 8.0x | 6.5x | 6.0x | 1.7% | 1.9% | 2.1% |
| Aptiv PLC | JE00BTDN8H13 | 3.2% | 9.7x | 10.5x | 9.7x | 7.8x | 7.5x | 7.2x | 2.2x | 1.9x | 1.7x | 0.0% | 0.1% | 0.1% |
| Johnson Matthey PLC | GB00BZ4BQC70 | 3.2% | 136.1x | 25.8x | 13.2x | 13.5x | 7.6x | 8.1x | 1.7x | 1.4x | 1.6x | 3.5% | 3.7% | 9.4% |
| LG Chem Ltd | KR7051910008 | 2.7% | n.m. | n.m. | 28.5x | 11.4x | 9.5x | 7.0x | 0.9x | 0.9x | 0.9x | 0.3% | 0.3% | 0.7% |
| | | **30.5%** | | | | | | | | | | | | |
| **GENERATION** | | | | | | | | | | | | | | |
| Iberdrola SA | ES0144580Y14 | 4.5% | 21.2x | 18.5x | 18.1x | 12.7x | 11.9x | 11.6x | 2.6x | 2.0x | 2.1x | 2.8% | 3.9% | 4.0% |
| China Longyuan Power Group Cor | CNE100000HD4 | 2.3% | 8.6x | 8.7x | 8.1x | 10.8x | 11.0x | 10.4x | 0.8x | 0.7x | 0.7x | 3.4% | 3.5% | 3.8% |
| NextEra Energy Inc | US65339F1012 | 4.2% | 25.2x | 22.2x | 20.7x | 21.0x | 16.2x | 14.3x | 3.3x | 3.0x | 2.8x | 2.5% | 2.8% | 3.0% |
| Ormat Technologies Inc | US6866881021 | 4.0% | 48.4x | 48.7x | 42.6x | 20.4x | 16.0x | 14.2x | 2.6x | 2.4x | 2.3x | 0.5% | 0.4% | 0.5% |
| | | **15.0%** | | | | | | | | | | | | |
| **EQUIPMENT** | | | | | | | | | | | | | | |
| Amphenol Corp | US0320951017 | 5.2% | 70.1x | 42.5x | 34.8x | 40.6x | 25.9x | 21.5x | 17.2x | 12.8x | 10.2x | 0.4% | 0.5% | 0.6% |
| Eaton Corp PLC | IE00B8KQN827 | 4.5% | 38.3x | 31.5x | 27.7x | 26.5x | 24.3x | 21.6x | 8.1x | 7.6x | 6.9x | 1.0% | 1.1% | 1.1% |
| Hubbell Inc | US4435106079 | 4.5% | 31.4x | 26.0x | 23.8x | 19.2x | 18.7x | 17.0x | 7.7x | 6.7x | 5.7x | 1.1% | 1.1% | 1.2% |
| Itron Inc | US4657411066 | 2.6% | 19.1x | 14.6x | 16.7x | 13.5x | 13.0x | 12.4x | 3.3x | 2.6x | 2.2x | 0.0% | n.m. | n.m. |
| Legrand SA | FR0010307819 | 5.1% | 34.4x | 28.7x | 25.8x | 21.6x | 18.8x | 17.4x | 5.8x | 4.8x | 4.5x | 1.3% | 1.6% | 1.8% |
| Prysmian SpA | IT0004176001 | 4.6% | 31.4x | 22.9x | 19.5x | 18.3x | 12.8x | 11.5x | 5.7x | 4.1x | 3.6x | 0.8% | 1.0% | 1.2% |
| Schneider Electric SE | FR0000121972 | 4.4% | 33.5x | 28.4x | 24.9x | 20.0x | 18.2x | 16.6x | 5.2x | 4.6x | 4.3x | 1.5% | 1.7% | 1.9% |
| Infineon Technologies AG | DE0006231004 | 3.1% | 20.7x | 23.2x | 19.0x | 11.0x | 11.1x | 9.8x | 2.9x | 2.5x | 2.3x | 1.0% | 1.0% | 1.1% |
| ON Semiconductor Corp | US6821891057 | 2.1% | 12.7x | 21.9x | 17.1x | 8.0x | 13.0x | 11.6x | 2.4x | 2.6x | 2.5x | 0.0% | 0.0% | 0.0% |
| NXP Semiconductors NV | NL0009538784 | 2.6% | 18.2x | 17.8x | 15.2x | 12.7x | 13.3x | 11.9x | 5.8x | 5.2x | 4.6x | 1.9% | 2.0% | 2.1% |
| Sensata Technologies Holding P | GB00BFMBMT84 | 2.4% | 8.0x | 9.4x | 8.8x | 5.9x | 8.3x | 8.0x | 1.6x | 1.7x | 1.5x | 1.5% | 1.5% | 1.6% |
| Canadian Solar Inc | CA1366351098 | 2.1% | 8.1x | n.m. | 38.0x | 11.8x | 11.8x | 10.3x | 0.5x | 0.5x | 0.4x | 0.0% | 0.0% | 0.0% |
| Enphase Energy Inc | US29355A1079 | 0.6% | 30.7x | 10.9x | 13.9x | 18.7x | 8.6x | 11.6x | 4.9x | 3.9x | 3.0x | 0.0% | 0.0% | 0.0% |
| First Solar Inc | US3364331070 | 3.9% | 21.1x | 18.2x | 11.8x | 14.2x | 12.6x | 8.6x | 3.6x | 3.0x | 2.5x | 0.0% | 0.0% | 0.0% |
| Xinyi Solar Holdings Ltd | KYG9829N1025 | 1.7% | 24.5x | 35.4x | 17.1x | 10.4x | 12.9x | 10.0x | 1.1x | 1.1x | 1.0x | 2.8% | 1.5% | 2.6% |
| Vestas Wind Systems A/S | DK0061539921 | 1.8% | 42.0x | 25.1x | 17.2x | 11.9x | 8.7x | 7.1x | 5.6x | 4.5x | 3.7x | 2.9% | 0.9% | 1.6% |
| | | **51.3%** | | | | | | | | | | | | |
| **Cash** | Cash | **0.9%** | | | | | | | | | | | | |

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

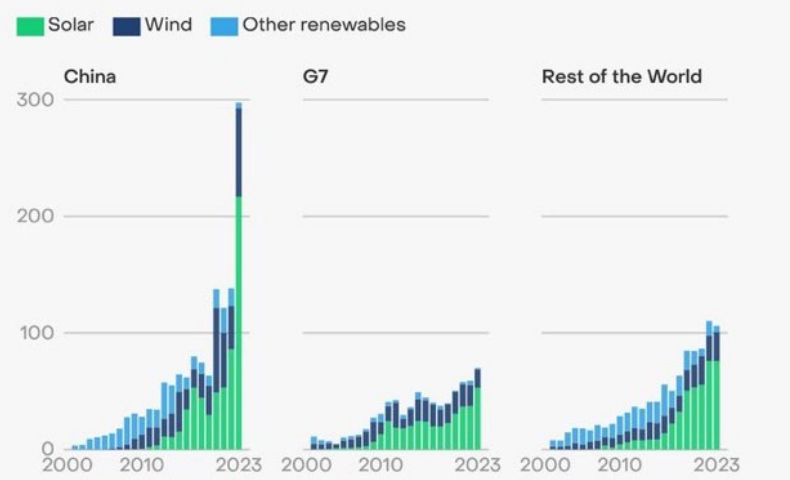
The re-election of Donald Trump has dominated sustainable energy policy in the United States. His term will be a backward step for the energy transition. It will bring a shift in US energy policy, as he targets reduced energy costs, "energy dominance," and improved competitiveness for US industry through 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 accelerates the phasing out of utility solar and wind ITC and PTC tax credits, relative to the initial IRA timelines. On the positive side, manufacturing tax credits for battery and solar equipment will remain in effect until 2032 (beyond previous expectations), with wind credits set to expire 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 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 while 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, thereby avoiding wasted investments in fossil fuels, boosting the competitiveness of Europe's businesses, and making 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 defence, infrastructure and energy transition projects over the coming decade.

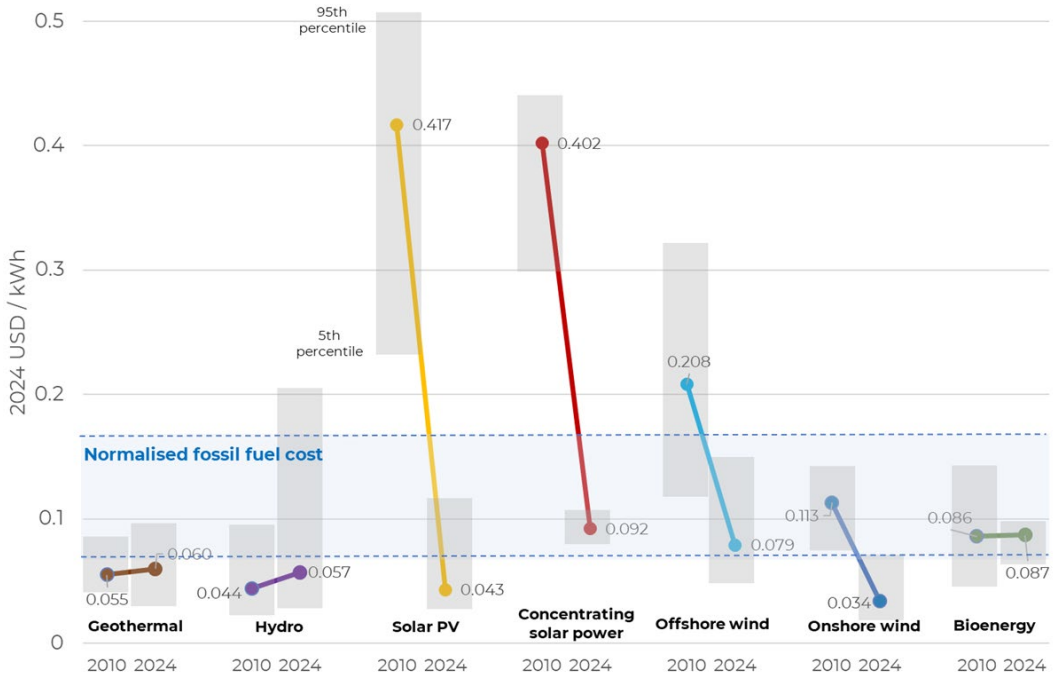
Compared to previous events, **COP 29** in November in Azerbaijan was lightly attended and appeared to make little progress toward broader decarbonization goals. Notable wins included Mexico setting a 2050 net zero target, Indonesia (operator of the fifth largest coal fleet in the world) announcing a 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, which stipulated that developed nations pay $300 bn 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 often the most cost-effective form of new electricity supply**. 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 (2010–2024)**

LCOE = levelized cost of electricity



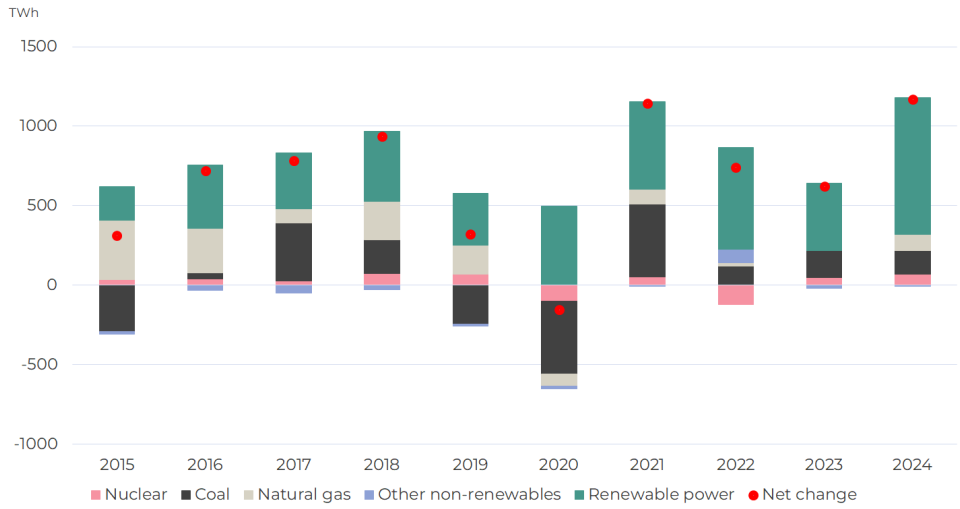

*Source: IRENA; Guinness Global Investors, December 2024*

## 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

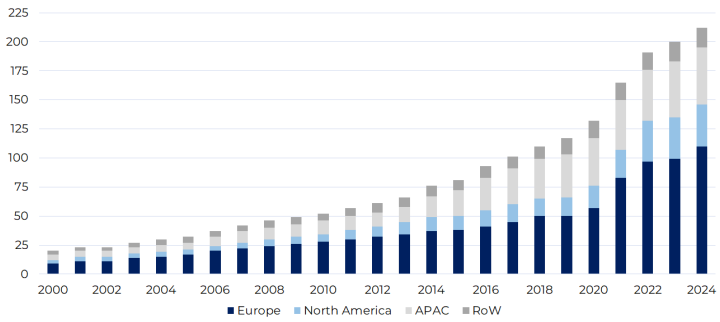
It is a common misconception that achieving rapid growth in renewable power generation will be enough to deliver government targets for pollution, energy security and decarbonisation. Renewable power generation is a key part of the solution, but we see the displacement and more efficient use of existing 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 a 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 rose to the top of the political agenda following the surge in energy prices after the Russian invasion of Ukraine in 2022.

**National policies in force targeting building efficiency**



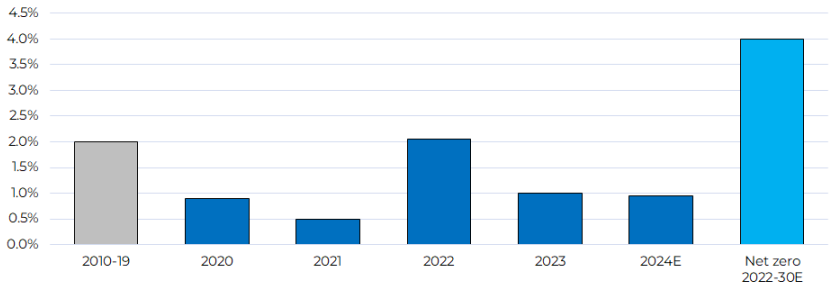

*Source: IEA, Guinness Global Investors, December 2024*

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 impacted 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**



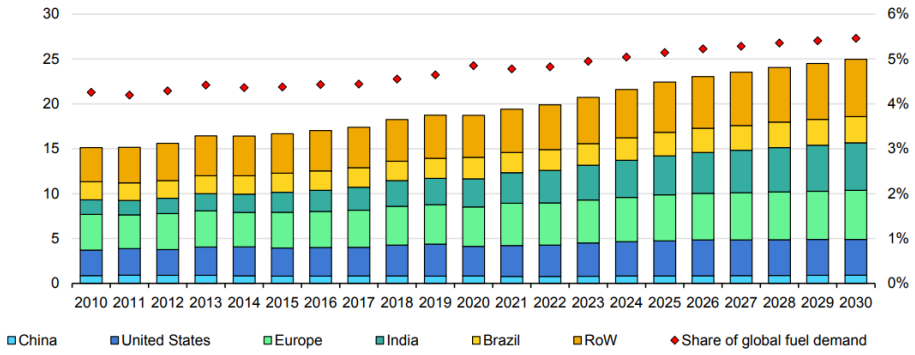

*Source: IEA, Guinness Global Investors, December 2024*

## 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*

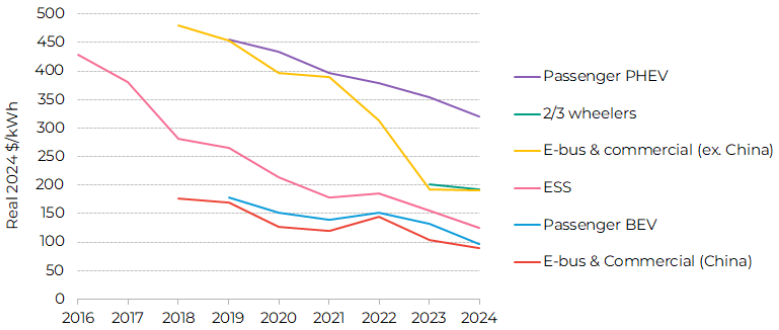
It is important to remember that alternative fuels broadly remain more expensive than their fossil fuel counterparts, meaning that policy support is key to underpinning future growth. For example, the $2/litre cost of producing biojet (often known as Sustainable Aviation Fuel, SAF) is nearly three times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

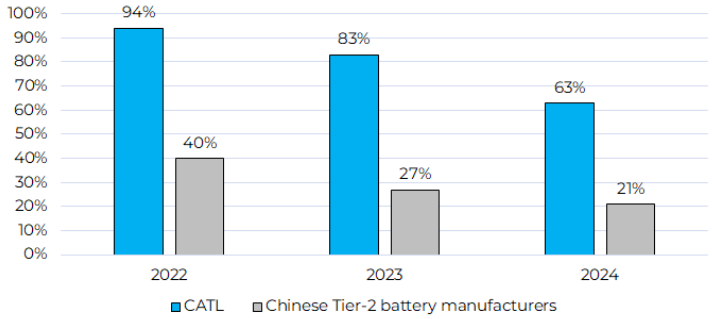



*Source: BNEF, Guinness Global Investors, December 2024*

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 expected to accelerate across the West in 2025 and 2026, we expect utilisation rates at tier 1 manufacturers to inflect positively, helping to boost margins and profitability.

**Chinese battery capacity utilisation**

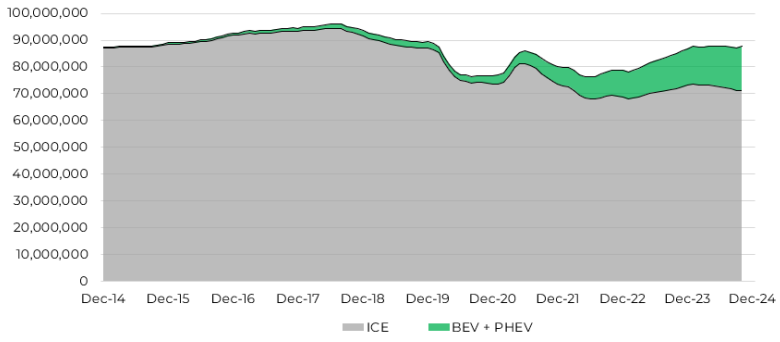



*Source: Bernstein, Guinness Global Investors, December 2024*

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**



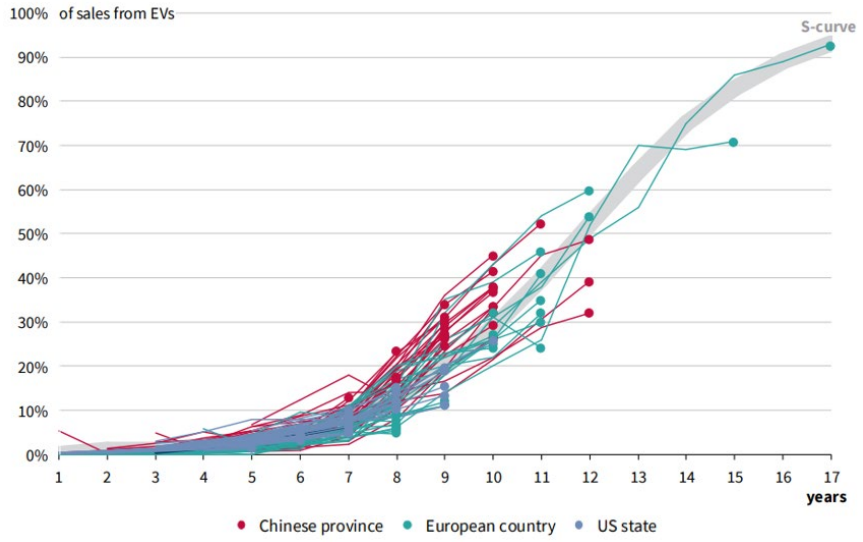

*Source: LMC, Cleantechnica, Guinness Global Investors, December 2024*

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 module 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 anticipate growth across all major geographies, resulting in full-year global installations of approximately 670 GW. China will continue to dominate, making up approximately 50% of the global market as it attempts to decarbonise 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 subsidies 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)**

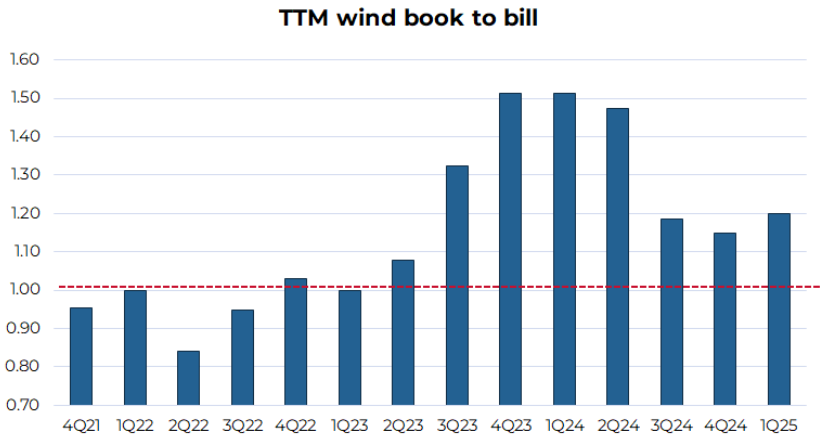
| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025E |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Onshore wind installations (annual)** | | | | | | | | | | | | | | | | |
| North America | 6 | 8 | 15 | 2 | 7 | 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 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.

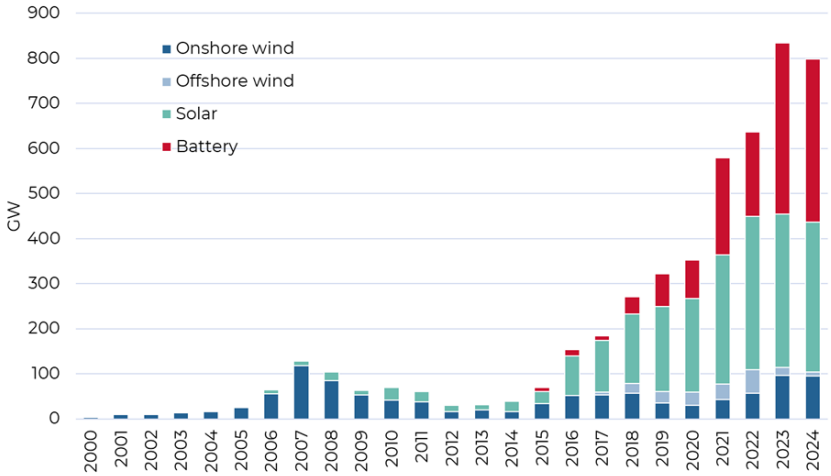
After 20 years of flat electricity consumption, we see demand growth of around 2-3% per year due to datacentres, AI querying, reindustrialisation and electrification. Political support will be required to make this happen and we stress that the outlook here is very robust despite President Trump's cuts 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. Based on our current understanding, we believe SMRs in the US will not be cheaper than gas or renewable-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.

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## 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.

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https://www.waystone.com/waystone-policies/

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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**
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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.
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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.

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**Structure & regulation**
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Telephone calls will be recorded and monitored.