

IMPACT REPORT 2023

GUINNESS SUSTAINABLE ENERGY



This is a marketing communication. Please refer to the prospectuses, KIDs and KIIDs for the Funds, which contain detailed information on their characteristics and objectives, before making any final investment decisions.

POSITIVELY DIFFERENT

GUINNESS
GLOBAL INVESTORS

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EXECUTIVE SUMMARY

The Guinness Sustainable Energy strategy invests in companies playing a key role in global decarbonisation, providing a vehicle for investors to align their capital with this positive impact. In this report, we disclose our estimates of the positive impact delivered by companies held by the strategy at the end of 2022, based on calendar year 2022 data.

In the **first section**, starting on page 7, we discuss our sustainable energy universe construction and how the businesses we seek to invest in map to the UN Sustainable Development Goals (SDGs). We conclude that the portfolio holdings map closest to SDGs 7, 9, 11 and 13. We also discuss business activity that detracts from the SDGs.

The **second section** of the report, starting on page 12, assesses the positive and negative decarbonisation impact of the strategy's holdings. Our estimate and conclusions are as follows:

- i. The companies held in our portfolio, at the enterprise level, helped to deliver around 34,000 million kWh of energy savings, 22,000 million miles of electrified travel, 43,000MW of clean energy generation capacity and 243,000 GWh of renewable energy generation in 2022.
- ii. The companies in our portfolio sold products and services that help to displace 527 tonnes of CO₂e per \$1m of portfolio assets, based on estimates for energy saved, electric miles travelled, and clean energy generated compared to the use of fossil fuel technologies. For context, this would be equivalent to planting around 8,700 tree seedlings, providing energy for 66 homes for 1 year, avoiding driving 1.35 million miles or displacing the consumption of 1,200 barrels of oil.
- iii. In delivering this positive impact, we estimate that the companies in our portfolio generated an annualised 'carbon cost' of 40 tonnes of CO₂e. Our carbon cost figure is based on Scope 1 and 2 (S1+S2) emissions data adjusted for asset life where available to provide a comparable annualised negative impact figure.
- iv. The aggregate improvement in positive impact of companies owned at the end of 2022 increased by +9% year-on-year.

The **third section**, starting on page 21, explains our engagement framework of Disclosure, Target Setting and Incentivisation with case studies of engagement activity over the last year to support our approach. We also address our engagement activities around negative material operational or ESG concerns and controversial business activity.

Within our **appendices**, starting on page 26, we provide historical and background information on impact alignment, our methodology on SDG and business activity mapping as well as discussion points around impact methodology.

We are mindful that impact reporting is still evolving and that there is room for discussion around the approaches adopted. Please note that the estimate for carbon displaced is a proprietary calculation using unaudited numbers and is not equivalent to a carbon offset to Guinness Global Investors nor our clients. The figure illustrates the extent to which the strategy is fulfilling its objective to invest in companies which help facilitate the low-carbon transition. The carbon cost figure is also illustrative and distinct from weighted average carbon intensity. Both figures are calculated based on the equally weighted model portfolio for the Guinness Sustainable Energy strategy rather than the actual portfolio weights of any investment vehicle applying it. The positive impact is owned by the consumer who purchases the underlying products and services. Throughout the report we have provided detail on the methodologies we have used, including case studies, which are provided for illustrative purposes only.

INTRODUCTION FROM THE INVESTMENT TEAM

After years of promise, the energy transition is now ramping up in earnest. Russia's invasion of Ukraine and growing geopolitical tensions with China have awoken the Western world to the importance of energy security. This sentiment, combined with net zero commitments, improving green economics and a means of rejuvenating a stalling industrial base, has given policymakers all the impetus they need to forge ahead.

And forge ahead they have. The Inflation Reduction Act (IRA) in the US earmarked \$369bn in incentives and tax breaks for clean technology deployment, kickstarting a fundamental transformation of the US economy. Private capital has enthusiastically received the message and followed where government has led. Goldman Sachs estimates that the total pool of capital that is likely to be mobilised as a function of this legislation is \$1.6 trillion, approximately 6% of GDP. Projects representing \$270bn of investment have been announced in the last 12 months alone, more than the prior seven years combined. An incremental 185GW of clean power installations have been announced – equating to approximately 80% of existing clean power capacity.

The investment and job creation associated with this package has not gone unnoticed in Europe, where tangible funding commitments are starting to be announced. The German parliament recently approved the "Climate and Transformation" package, committing €212bn of funding towards building efficiency and renewables between 2024-27. Similar to the IRA, estimates of fully mobilised capital are substantial, with some estimates topping €1 trillion over the next decade. This legislation is likely to serve as a blueprint for a broader roll-out of the EU's Green Industrial Policy, signalling the arrival of a new wave of climate stimulus.

Despite this recent activity, we are still in the foothills of a multidecade transformation. Fossil fuels still account for 83% of the global energy mix and despite a substantial ramp-up in global spending, the world is falling materially short of the \$4.5 trillion annual spending that the International Energy Agency (IEA) estimates is required to reach net zero. Companies that sell products and services which reduce or displace conventional energy demand are set to play an outsized role in arguably the most important thematic for the next 30 years. By delivering concentrated exposure to companies playing a key role in global decarbonisation, the Guinness Sustainable Energy strategy provides a means for investors to align their capital with this positive impact.

Our report starts with an explanation of our philosophy, our thoughts on impact investing, and how we align our universe with climate solutions. We then describe our impact findings, focusing on CO2 emissions displaced by the products and services of our investee companies, before describing some of the areas of negative impact and controversy within our portfolio. Impact measurement and reporting is still relatively nascent. We rely on calculations made on a best-efforts basis and many of the figures we produce are proprietary and unaudited. We have included explanations of our methodologies in this report, in an effort to guide the reader through the assumptions we have taken.



Jonathan Waghorn



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PHILOSOPHY

THE ENERGY TRANSITION IS HAPPENING

Over the next 30 years, the world will transition towards a sustainable energy system.

The transition will be driven by five key factors:

- **Population and GDP growth:** By 2050, the population is expected to grow by 25% and GDP is expected to double. More people with more money demanding more goods and services are expected to drive a 40% increase in global energy demand.
- **Climate change:** According to NASA, 2022 tied for the Earth's 5th warmest year since 1880, with the last nine years being the warmest years on record. Limiting global warming will require rapid, far-reaching, and co-ordinated action across governments, businesses and communities.
- **Pollution:** A recent report published in the Lancet Planetary Health Journal states that pollution is responsible for approximately 9 million deaths per year, corresponding to 1 in 6 deaths worldwide.
- **Energy security:** Major climate policy announcements in the US (Inflation Reduction Act) and Europe (Net Zero Industrial Act) are explicitly designed to reduce reliance on Chinese solar imports and Russian natural gas imports respectively by localizing clean energy supply chains.
- **Economics:** Oxford Economics estimates that as global heating goes beyond 1.1 degrees Celsius, productivity growth falls faster worldwide than previously estimated. They find that an increase of 2.2 degrees Celsius globally by 2050 has the potential to reduce global GDP by up to 20%.



WHAT WE INVEST IN

The Guinness Sustainable Energy strategy’s investment objective is to provide investors with long-term capital appreciation by investing in companies that contribute towards reduced global carbon emissions. Specifically, the strategy invests in companies engaged in the generation and storage of sustainable energy, and the electrification and efficiency of energy demand.

Guinness Sustainable Energy strategy exposure by theme

Theme	Example Holdings	Weighting (%)
1 Electrification of the energy mix	 	20.2%
2 Rise of the electric vehicle and auto efficiency	 	24.2%
3 Battery manufacturing		8.1%
4 Expansion of the wind industry		9.1%
5 Expansion of the solar industry		18.2%
6 Heating, lighting and power efficiency	 	16.2%
7 Geothermal		4.0%

Model weights at 31st December 2022. Source: Guinness Global Investors

WHAT WE DO NOT INVEST IN

The strategy excludes companies which:

- Are involved in the extraction of oil, natural gas or coal;
- Manufacture controversial weapons; or
- Derive over 30% of revenues from thermal coal power generation.

The strategy’s exclusions are also consistent with the Norwegian Council on Ethics (Norges Bank) exclusion list, which screens out some of the larger fossil fuel utilities, tobacco, and companies which breach globally accepted norms.

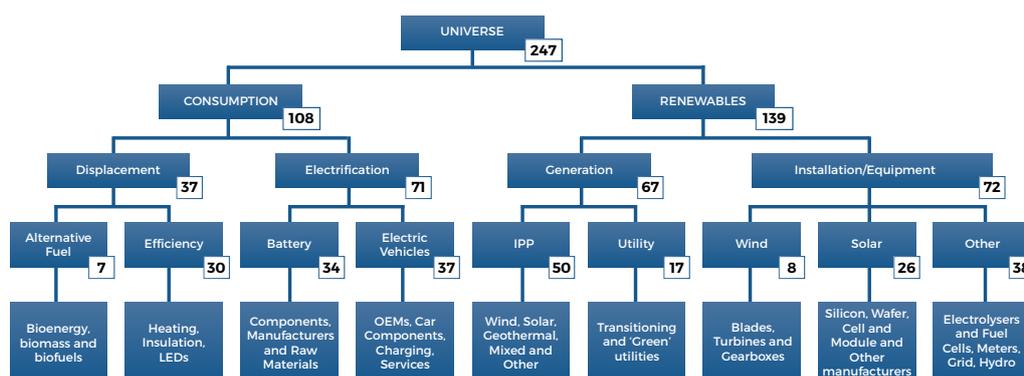
MAPPING TO THE SUSTAINABLE DEVELOPMENT GOALS (SDGS)

UNIVERSE CONSTRUCTION

The Guinness Sustainable Energy strategy delivers concentrated exposure to companies in the sustainable energy sector, providing a positive environmental solution for investors' portfolios.

Our investment universe is unique to Guinness Global Investors. It was first created in 2018 by identifying c.600 companies associated with the energy transition. We screened out c.400 companies due to size, liquidity or relevance, leaving an investible universe of around 200 companies. This universe is updated annually and currently stands at around 250 companies at the end of 2022 (the reference point for this report). We apply our investment process and approach to portfolio construction, resulting in an equally weighted portfolio of 30 positions. We do not limit ourselves to 'pure plays', opening our universe up to some companies with existing conventional fuel exposure, but this must be allied with a commitment to transitioning their business models towards sustainable energy sources. Our universe, at the end of 2022, is summarised below:

Guinness Sustainable Energy investment universe



Universe as of 31st December 2022. Source: Guinness Global Investors

This model has four key sustainable energy subsectors:

- **Displacement:** companies selling products and services which displace energy consumed via improving energy efficiency or providing alternative fuels.
- **Electrification:** companies selling products and services which help to enable electrification of transportation and provide energy stationary storage for the grid.
- **Generation:** utilities and Independent Power Producers (IPPs) with a material proportion of business exposure to low-carbon electricity generation.
- **Installation:** companies involved in installing low-carbon infrastructure, manufacturing finished products (turbines), key components (solar glass), and services (grid connection).

We believe that the companies which fall into these business areas sell products and services which are vital to delivering the transition towards a low-carbon economy. As we can only invest in companies which fall into one of these four verticals, we believe that our portfolio is strongly aligned with the positive decarbonising impact associated with these products and services.

UNIVERSE ALIGNMENT WITH THE SDGS

The 17 United Nations Sustainable Development Goals are backed up with 169 targets, which act as a framework for “peace and prosperity for people and the planet, now and in the future”. They were adopted by all UN member states in 2015 as a blueprint for sustainable development to 2030. The SDGs have been widely adopted by the private sector as common language for communicating positive (and negative) impact.

The United Nations Sustainable Development Goals



We believe that there is strong alignment between our four sustainable energy subsectors and the following four SDGs:

- 

Displacement companies provide energy efficiency solutions and services (Targets 7.1, 7.3). Generation companies provide low-carbon energy, helping to increase the share of renewable energy in the global grid mix (Target 7.2).
- 

Installation companies install, upgrade, and service low-carbon energy infrastructure, enabling greater adoption of clean technologies (Target 9.4).
- 

Electrification companies enable the electrification of mobility, facilitating the transition towards sustainable transport systems (Target 11.2).
- 

Collectively, these companies provide the products, services, and solutions which allow governments to integrate climate change measures into national policies, strategies and planning (Target 13.2).

PORTFOLIO ALIGNMENT WITH THE SDGS

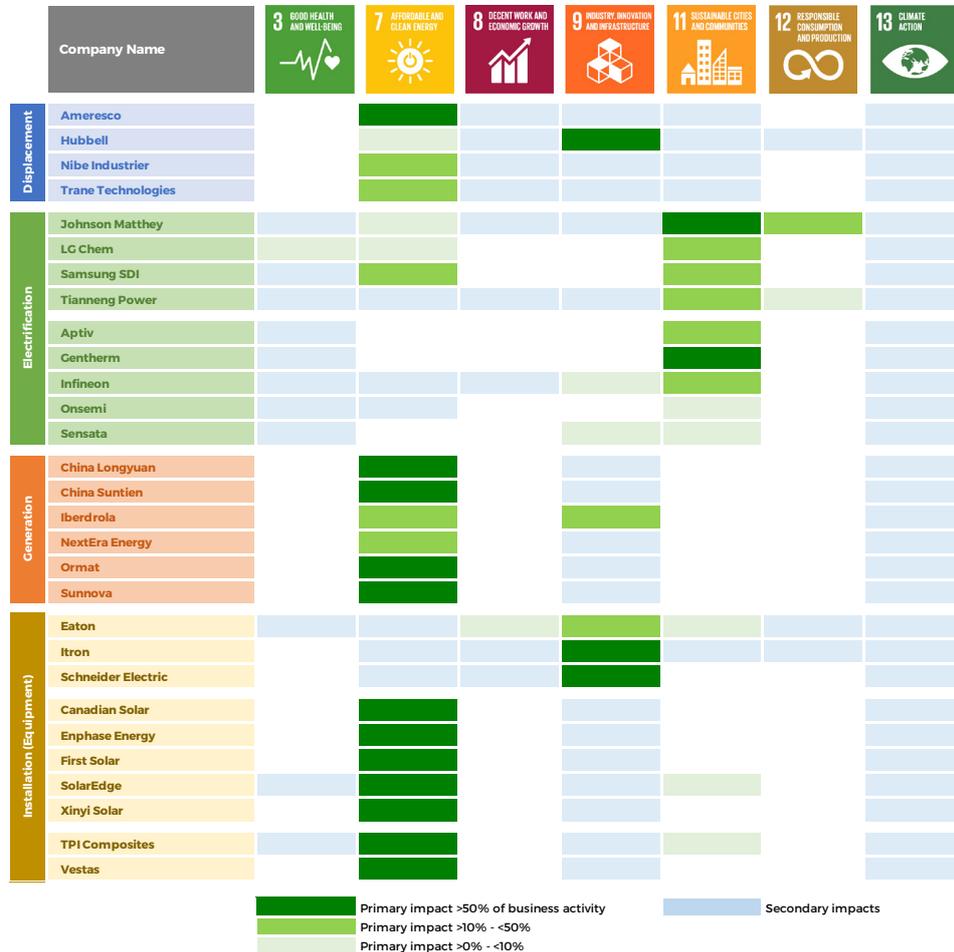
We have conducted an impact mapping exercise; matching up divisional business activity to relevant SDG targets to understand the impact our portfolio delivers beyond carbon displacement. Where a company’s divisional activity contributes to more than one impact area, we assign the most relevant SDG/target as the division’s “primary” impact and describe the overlapping / other impacts as “secondary” impact(s). We do not deliberately target these secondary impacts, yet the business activity of some of our portfolio companies also contributes towards the following SDGs:

- Target 3.9: Help reduce the number of deaths and illnesses from hazardous air pollution by enabling the electrification of transportation.
- Targets 8.4 & 11.6: Improve global resource efficiency and reduce the per capita impact of cities, through providing energy and water efficiency products and services.

- Target 12.5: Reduce waste by licencing efficient production processes and recycling batteries, helping to reduce waste generation.

The primary and secondary contributions of our investee companies are shown below:

Guinness Sustainable Energy strategy: SDG impact mapping



Portfolio holdings as of 31st December 2022. Source: Guinness Global Investors

We are also aware that some of the business activity of companies in the portfolio detracts from the SDGs. When conducting due diligence, we attempt to consider both a company's positive and negative impact, seeking only to invest in companies which we view as having a net benefit on the energy transition. We detail below some of the adverse impacts our portfolio companies have.

Many of our displacement and installation names, are manufacturing companies. Some of these companies are diversified with exposure to unfavourable end markets. For example, Hubbell is a leading manufacturer of electrical transmission and distribution equipment, but also sells products such as gas connectors into oil and gas end markets. Within the electrification sector, we consider companies involved in the battery and electric vehicle supply chains. Many companies supplying components for electric vehicles also generate revenues from supplying parts for internal combustion engine vehicles.

We consider both utilities and independent power producers within our generation names. Many Independent Power Producers (IPPs) and utilities will own legacy fossil fuel generation assets, contributing towards increased global carbon emissions, exacerbating the climate crisis. On average, our Utility and IPP holdings have 19%

of their business activities exposed to fossil fuel generation and distribution. We will own these companies on the condition that a sizeable proportion of their business is already dedicated to renewable generation and a clear commitment has been made towards growing this further whilst phasing out fossil fuels. For example, Longyuan has grown its renewable capacity from just under 600MW to over 29,000MW from 2006-22 and is now the world's largest operator by capacity. It also currently owns 1,875MW of legacy coal capacity but aspires to exit this business by 2025.

CASE STUDY: LG CHEM

LG Chem is one of the world's largest manufacturers of batteries and battery materials with customers including Volkswagen, General Motors and Tesla. In 2022 it reported 49% of sales from battery manufacturing and a further 7% from its Advanced Materials division, where over 50% of revenues are derived from battery materials. However, the company also generated 40% of its sales from petrochemicals, an energy-intensive business which relies on fossil fuel feedstocks and contributes towards global warming.

Despite this, we believe LG Chem deserves a place in our portfolio for three main reasons:

- It is aggressively investing to expand its battery business: The company is expected to grow its battery manufacturing capacity from 200 GWh in 2022 to 540 GWh in 2025. It is also targeting to grow its battery material sales sixfold by 2030 compared to 2022 levels. In contrast, sales from the company's Petrochemicals division have remained relatively stagnant for the past decade.
- It is transitioning its petrochemicals business to produce more sustainable materials: The company targets to boost sales from recycled, bio/biodegradable and renewable energy materials to KRW 8trn in 2030 compared to KRW 1.9trn in 2022.
- Its climate targets are accompanied with appropriate oversight, and accountability: LG Chem has committed to 100% renewable energy consumption by 2050; targets carbon neutral growth by 2030, and net zero emissions by 2050. The Transition Pathway Initiative awarded LG Chem its highest score for management quality, suggesting that the company has board oversight for climate and climate change targets are incorporated into remuneration for senior executives.

Despite some of our companies contributing toward negative impacts, we believe that the companies owned in the Guinness Sustainable Energy strategy deliver a net positive impact. Where companies derive less than 50% of sales, profits or cash flow from sustainable energy, we would look for substantially more than 50% of investment to be going into sustainable energy, meaning that the driver of future growth (and typically therefore the driver of equity value) over the coming years comes from sustainable energy.

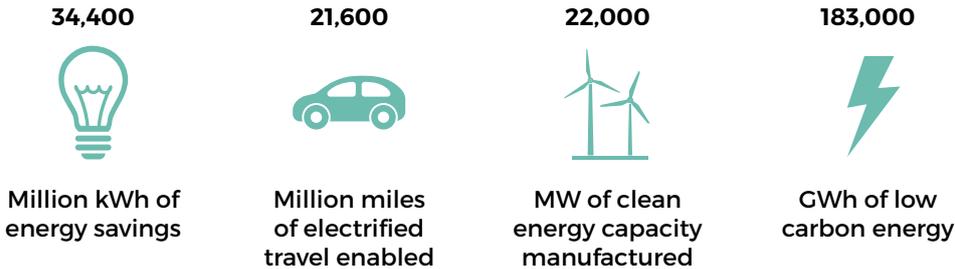


IMPACT OF COMPANIES IN THE GUINNESS SUSTAINABLE ENERGY PORTFOLIO

AGGREGATE ENTERPRISE LEVEL IMPACT FIGURES

In this report, we present the positive impact associated with our investee companies by estimating the carbon dioxide emissions displaced and generated through use of their products and services. Please note that these are unaudited figures, which rely on internal estimates.

For 2022, we estimate that in aggregate, the companies in our portfolio achieved all of the following:

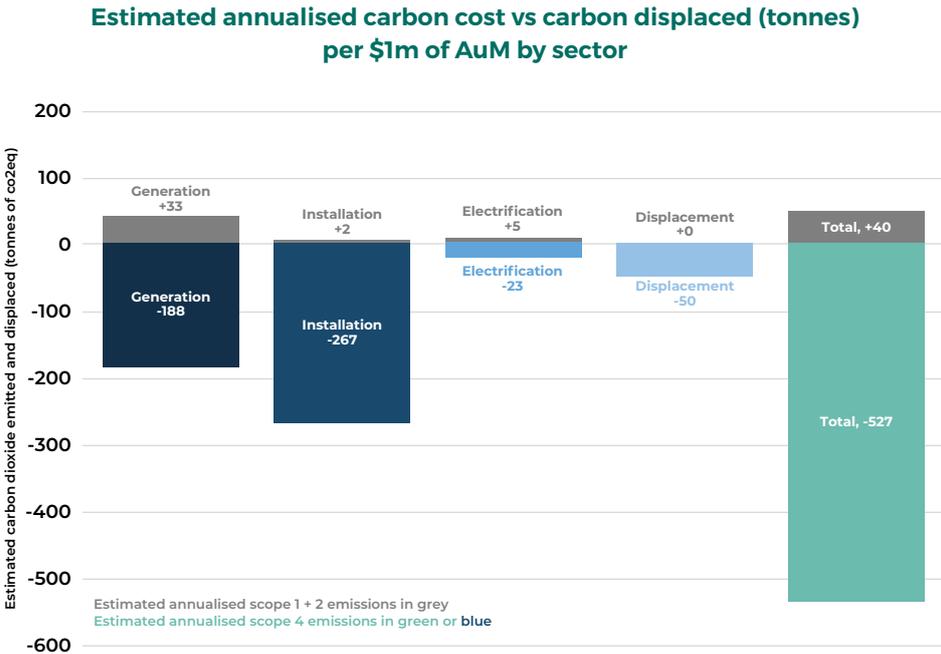


Data for portfolio holdings as of 31st December 2022. Source: EPA, Guinness Global Investors

ANNUALISED CARBON DISPLACED PER \$1M OF PORTFOLIO ASSETS

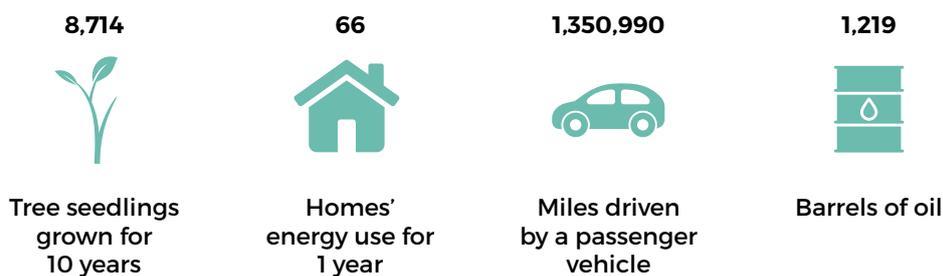
In 2022, we estimate that:

- The annualised carbon cost (Scope 1+2 emissions) associated with our portfolio was 40 tCO₂e/\$m portfolio assets
- The annualised carbon displaced (Scope 4 emissions) associated with our portfolio was 527 tCO₂e/\$m portfolio assets.



Data for portfolio holdings as of 31st December 2022. Source: Guinness Global Investors

According to the Environmental Protection Agency (EPA), 527 tonnes of CO₂ is equivalent to one of the following:



Source: EPA, Guinness Global Investors

We find it interesting to look behind our headline finding of 527 tCO₂e displaced / \$1m of portfolio assets to understand what makes up this figure. As last year, the installation subsector was the largest contributor, accounting for 51% of carbon displaced. Within the installation sector, Canadian Solar was a significant contributor. Canadian Solar is a leading solar photovoltaic module brand, provider of solar energy and battery storage solutions, and developer of utility-scale solar power and battery storage projects. Global electricals giant Schneider Electric was the second largest contributor. We also own Xinyi Solar, a Chinese installation name in the solar module supply chain which also provided a good contribution. As Xinyi is fairly energy-intensive, and as China's grid is still reliant on coal power generation, the company has relatively high Scope 1 and 2 emissions. We expect this to improve over time as China decarbonises its electricity grid.

Within the generation group, our two Chinese wind names (China Suntien and China Longyuan) once again achieved some of the highest displacement per dollar of investment, compared to European and North American generation exposure in the portfolio. This is not particularly surprising given the relatively low valuations of the Chinese names relative to the scale of their generation assets.

The electrification sector makes up only 4% of the CO₂e displaced. In our calculation of an EV component company's positive impact, we estimate the number of electric miles they have enabled and then apply a scaling factor based on the product's contribution to the cost of a mid-range electric vehicle. Despite playing vital roles in electric drivetrains, EV components such as Aptiv's high voltage cabling are typically responsible for just 2-3% of the overall cost of an electric vehicle. For a number of our EV names, this results in a relatively low positive impact contribution, although we expect this sector to make some of the biggest gains in positive impact over the next few years. We talk more about scaling factors in our worked example later on in this report.

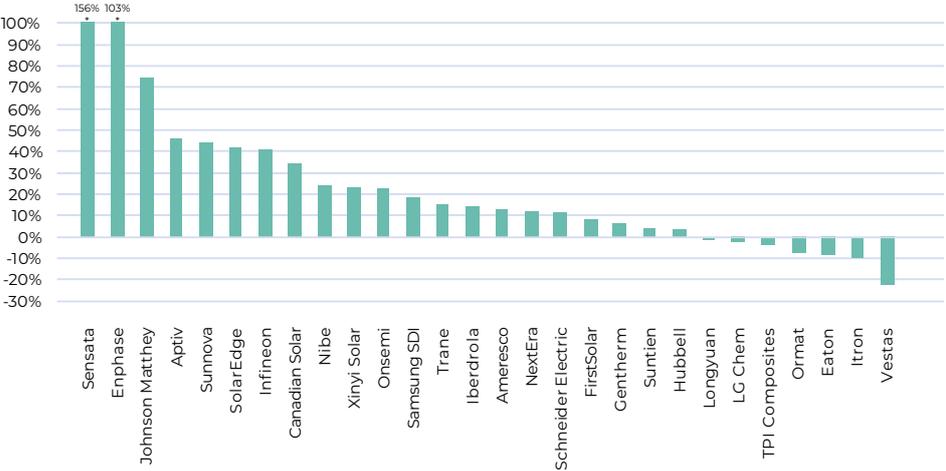
We note that our headline figure of 527 tCO₂e displaced / \$1m of portfolio assets is lower than last year. The main driver behind this was the changes in holdings and weights of our portfolio companies over calendar year 2022. Stripping this out, the aggregate positive impact of companies owned in the portfolio at the end of 2022 increased by +9% year-on-year. Other factors which had less of an impact included: updates and revisions to assumptions, methodologies and product lives.

Our calculations described here incorporate the Scope 1 (direct emissions from owned or controlled sources), Scope 2 (indirect emissions from the purchased electricity, steam, and heat purchases) plus the estimated 'Scope 4' emissions displaced through the use of the products and services they deliver. We also include some initial analysis of the portfolio's available Scope 3 (all other indirect emissions that occur in a company's value chain) data.

CHANGE IN IMPACT VERSUS 2021

We use our own process of measuring and disclosing investee company impact as a way to identify companies to prioritise for engagement.

Percentage change in estimated annualised CO2 displaced by company, 2022 vs 2021. Aggregate portfolio improvement excluding market cap changes = +9%



Data for portfolio holdings as of 31st December 2022. Source: Guinness Global Investors

Assuming we owned 100% of the companies in our portfolio, the aggregate improvement in gross carbon emissions displaced increased by +9% year-on-year. Some of the companies which saw the biggest increases in positive impact were Sensata, Enphase, Johnson Matthey, Hubbell, Aptiv, Sunnova, and SolarEdge.



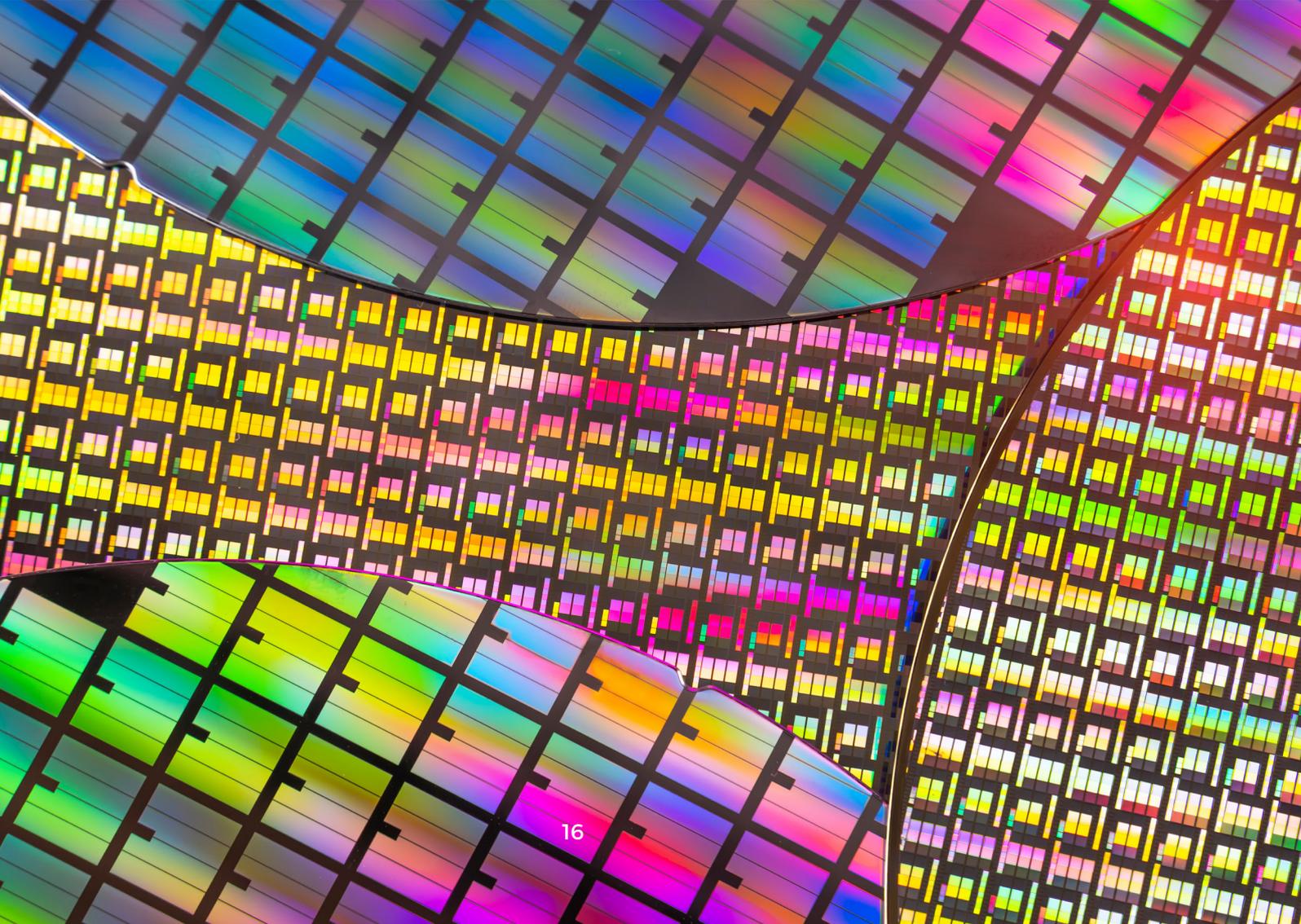
- **Sensata** saw its gross CO2 displaced increase by over 150%.
 - This was driven by an estimated 120% increase in automotive electrification sales thanks to expanded business with existing customers and an increase in new business wins.
 - This result was aided by the increase in global electric vehicle sales in 2022, jumping from 6.5 million units (c.8% of passenger vehicle sales) in 2021 to 10.1 million units (c.12%) in 2022.
- **Enphase's** positive impact grew by 103%.
 - The company's cumulative shipments of solar microinverters increased from 8.6GW in 2020 to 12GW in 2021 to 19GW in 2022.
 - This suggests that annual shipments have doubled from 3.4GW in 2021 to 7.0GW in 2022.
- **Johnson Matthey** saw its impact increase by 74%.
 - In Johnson Matthey's 2022/23 annual report, it reports that its technologies helped avoid 848,643 tCO2e entering the atmosphere compared to conventional technologies versus 470,706 tCO2e last year.
 - This is because the company was able to sell more products and services into alternative fuel (sustainable aviation fuel, hydrogen, fuel cell) and chemical and industrial (catalysts) end markets.
- **Sunnova's** estimated Scope 4 emissions increased by over 40%.
 - In 2022, Sunnova increased its MW deployed by 499MW, bringing its cumulative MW deployed on US residential rooftops to 1.6GW.
 - The company estimates that its rooftop solar systems have produced 5.5 billion kWh of clean energy since 2012.



This year we identified seven companies which saw their positive impact fall year-on-year: Vestas, Itron, Eaton, Ormat, TPI Composites, LG Chem, and Longyuan.

Vestas reported lower expected emissions avoided over the lifetime of the capacity produced and shipped during the period due to a reduction in turbine shipments in 2022 in a slower international wind market. Itron saw sales of its metering products and services fall year-on-year due to semiconductor shortages. Eaton saw a reduction in its positive impact as we estimated its sales of transmissions and distribution equipment into utility end markets declined slightly year-on-year. Ormat reported lower emissions saved by geothermal in comparison to natural gas in 2022 despite growing its geothermal electricity generation. We believe this is due to a small improvement in the capacity factor for natural gas generation in the USA in 2022 versus 2021 rather than anything company specific. TPI Composites reported a small decline in estimated CO2e savings over the lifetime of blades primarily due to lower estimated megawatts of capacity shipped due to a slower international wind market. LG Chem saw its positive impact fall by 1% in 2022 as lower utility storage shipments offset growth in EV battery and cathode sales. China Longyuan reported slightly lower emissions avoided despite seeing an increase in clean electricity sales. We believe this may be due to a decline in the emissions intensity of China's power grid.

In all cases, the observed decline in positive impact was due to temporary fluctuations, calculation changes, or one-offs rather than any deviation in corporate strategy. Overall, we are happy that our holdings are well aligned to deliver a positive environmental impact by growing revenues and profits from climate solutions. We will continue to monitor their progress in future reports.



METHODOLOGY

Data collection

We gather relevant operational and environmental metrics for all portfolio companies where data is available or can be reasonably estimated. Please see Appendix 1 for details on the type of data we use.

Calculation of company impact

We apply reasonable assumptions to translate the data into an estimate for annualised CO₂e displaced (positive impact) in the current year. This is increasingly being described in the industry as Scope 4 emissions. After, we apply a scaling factor to revise our impact estimates downwards to reflect the product's contribution to the final impactful product cost.

CASE STUDY: FIRST SOLAR SCALING FACTOR

First Solar is a vertically integrated global provider of photovoltaic (PV) solar energy solutions. It pioneered the development of thin film technology as an alternative to crystalline silicon. In the absence of clean energy technologies such as solar power, additional fossil capacity would have been added to generate this electricity, leading to higher carbon emissions.

However, on their own, solar panels cannot generate clean energy. They require other hardware (cables, racking systems, wiring, inverters, etc) and soft costs (installation labour, permitting, interconnection, margin, etc). It would not be fair to award the solar generation that First Solar has enabled 100% of the emissions displaced by that solar generation. We therefore apply a scaling factor.

According to Bloomberg New Energy Finance (BNEF), in 2022 the cost of a utility-scale PV system was \$0.69/watt, with the average cost of solar modules being \$0.25/watt (36%). For First Solar, 36% is our scaling factor.

Annualising

The S1+S2 emissions of a manufacturer of solar modules represent the upfront carbon cost which has to be recognised in order to enable 30 years of carbon displacement through solar energy generation. One way of measuring impact would be to subtract the S1+S2 emissions from the emissions displaced by the solar farm over its 30-year operational life. However, we believe a better way of presenting this data is on an annualised basis. We divide both the carbon emitted to create the product (S1+S2 emissions) and the estimated lifetime carbon displaced, by the product's estimated useful product life. This provides an estimate for annualised carbon cost (S1+S2 emissions / product life) and an annualised carbon displaced (lifetime carbon displaced / product life).

Calculating impact per \$1m of portfolio assets

A holding of \$1m in an equally weighted portfolio of 30 stocks, would result in an indicative \$33,333 holding in each company. We divide that holding by the company's market capitalization to get a percentage share of ownership. We can then multiply this by the annual carbon displaced (positive impact) and annual carbon cost (negative impact) estimates to present an estimate for the investor's owned positive and negative impact per \$1m of portfolio assets. This is then aggregated across all of our portfolio holdings in order for us to present a figure for owned carbon displaced and owned carbon cost per \$1m of portfolio assets.

WORKED EXAMPLE: FIRST SOLAR

Positive Impact (estimated carbon displaced)

Data collection:

In 2022, First Solar (FSLR) shipped 8.9 GW of solar capacity, an increase of c.28% from the 7.0 GW shipped in 2021. In its 2023 Sustainability Report, the company disclosed that the 50GW of PV modules sold since 2002 and additional backlog of 78GW will be used to displace 83 million tCO₂e per year during their 30+ year product life.

Calculation of company impact:

To estimate the emissions displaced in 2022, we take FSLR's 2022 figure for annual emissions avoided (83m tCO₂e) and divide it by its combined installed capacity and backlog (128GW = 50GW + 78GW) to derive a figure of 0.65m tCO₂e displaced per GW per year. We then scale this by the 8.9GW shipped in 2022 to arrive at an estimate of 5.8m tCO₂e avoided in 2022. As discussed earlier, solar modules represent c.36% of the cost of a utility-scale solar system. If we apply a c.36% scaling factor, we reach an estimate for annualised carbon displaced of 2.1m tCO₂e.

Negative Impact (estimated carbon emissions generated)

Data collection:

In 2022, FSLR disclosed that it emitted Scope 1 + 2 emissions of 571,343 suggesting that 0.57m tCO₂e was emitted in order to manufacture and sell 8.9GW of solar modules.

Annualising

First Solar's positive impact data collected reflects annual data, so no further work is required. The upfront carbon cost (S1+S2) which has been recognised to enable 30 years of solar generation is 0.57m tCO₂e. Dividing this by an average product life of 30 years allows us to derive an annualised carbon cost of 0.02m tCO₂e per year.

Impact per \$1m of portfolio assets

\$33,333 invested in FSLR (\$16.0bn market capitalization as of 31st December 2022) leads to a 0.0002% ownership stake. If we multiply this stake by the positive and negative impacts, we reach an annualised carbon displaced (positive impact) figure of 4.37 tCO₂e and an annualised carbon cost (negative impact) figure of 0.04 tCO₂e generated.

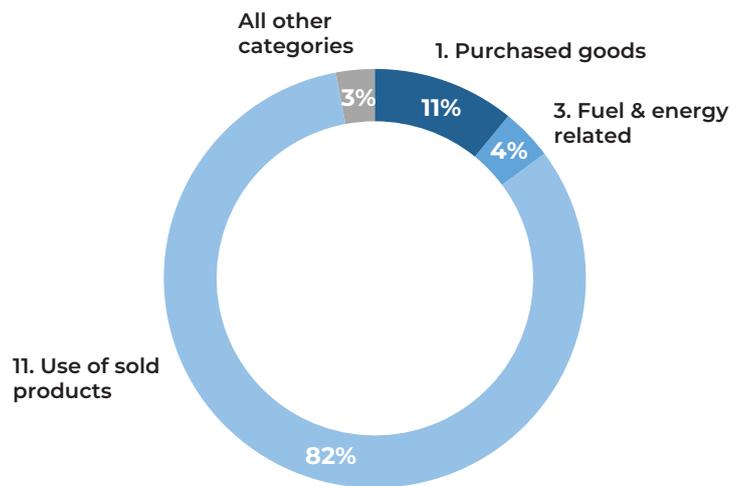


SCOPE 3 EMISSIONS

Last year, we found that just three GHG Protocol categories made up 92% of our portfolio's Scope 3 emissions: 67% Category 11 (Use of products sold), 14% Category 1 (Purchased goods & services), 11% Category 3 (Fuel & energy related). After collecting the available data from CDP and company disclosures for 2022, we found that once again, these three categories dominated the portfolio's Scope 3 emissions: 83% Category 11, 11% Category 1, 4% Category 3.

In 2022, the contribution to Category 11 has increased to 83% from 67%. This increase was primarily driven by the addition of Trane Technologies to our portfolio. Trane Technologies sells energy-efficient cooling products which use refrigerants and consume electricity, generating significant use-phase emissions over their useable lives.

Scope 3 emissions breakdown by category

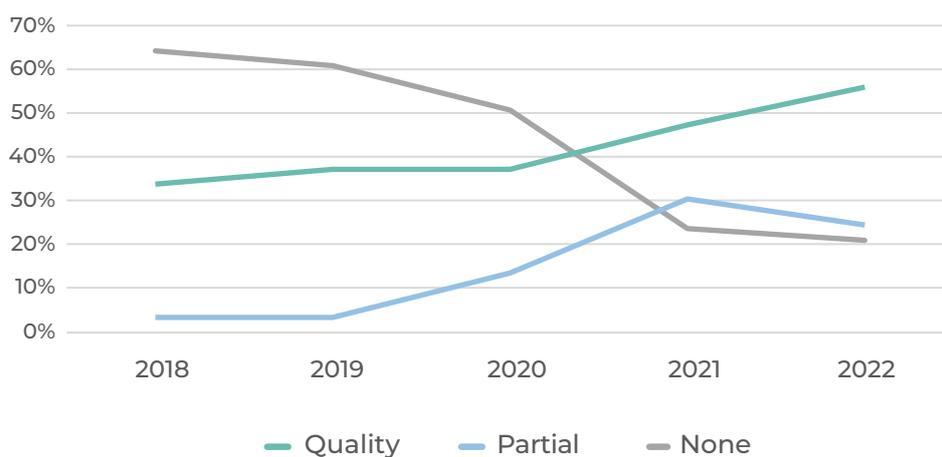


*Data for portfolio holdings as of 31st December 2022.
Source: Company reports, CDP, Guinness Global Investors*

Scope 3 reporting is still developing, with many companies not reporting any information at all or producing partial disclosures covering one or two of the 15 categories (typically business travel and employee commuting) but not all of them. At present:

- 55% of portfolio companies report high-quality Scope 3 data;
- 24% of portfolio companies report partial Scope 3 data; and
- 21% of portfolio companies do not report any Scope 3 data.

Level of Scope 3 disclosure for portfolio companies over time



Data to 31st December 2022. Source: Company reports, CDP, Guinness Global Investors

Disclosure is slowly improving, however, incomplete data makes quantitative Scope 3 analysis difficult at present. The quality of this data is also questionable:

- Some categories were relevant but not yet calculated;
- Different companies may use different methodologies for similar categories;
- Different companies rely to different extents on supply chain partner data;
- There can be significant swings in calculations from year to year; and
- Third party estimates can vary materially.

We have conducted some initial analysis, incorporating Scope 3 data into our carbon cost calculations. As many of the companies we own operate within the same industries and are often customers or suppliers to one another, there is likely to be a degree of double counting of upstream and downstream emissions. As a result, we do not currently have enough confidence in the Scope 3 data to publish these results. Having said this, we were encouraged to find that our estimated emissions avoided greatly outweighed the carbon cost even when it included Scope 3 emissions.

Our ambition is to continue to improve our Scope 3 reporting and analysis as disclosure improves.

ENGAGEMENT BY THE GUINNESS SUSTAINABLE ENERGY TEAM

As a public equities investment house with \$7.4bn in assets under management (as of 31.12.2022), we recognise that our engagement 'clout' is likely to be limited compared, say, to that of a private equity firm which takes majority stakes in its investee companies. However, we believe that successful long-term engagement shares parallels with Richard Thaler's nudge theory; the idea that behaviour and decision making can be influenced through positive reinforcement and suggestions for improvement. We are but one actor trying to nudge companies in the right direction. However, when multiple actors, either independently or collectively, nudge in the same direction of positive change, it is far harder for companies, industries and governments to ignore.

ENGAGEMENT FRAMEWORK

In our engagement efforts, we seek to ensure that the strategies of our portfolio companies are aligned with delivering the low-carbon transition. The desired outcomes of our engagement are to grow our companies' positive impacts, reduce their negative impacts, and shrink their operational emissions. Taking inspiration from Climate Action 100+, our engagement framework revolves around 3 key pillars:

- **Disclosure:** Once a risk is measured, it can be managed through target setting.
- **Target setting:** Once a target has been set, it can be incentivised through remuneration.
- **Incentivisation:** Once a target is incentivised, it is more likely to be achieved.

We engage both directly and collectively with participants across the energy spectrum.

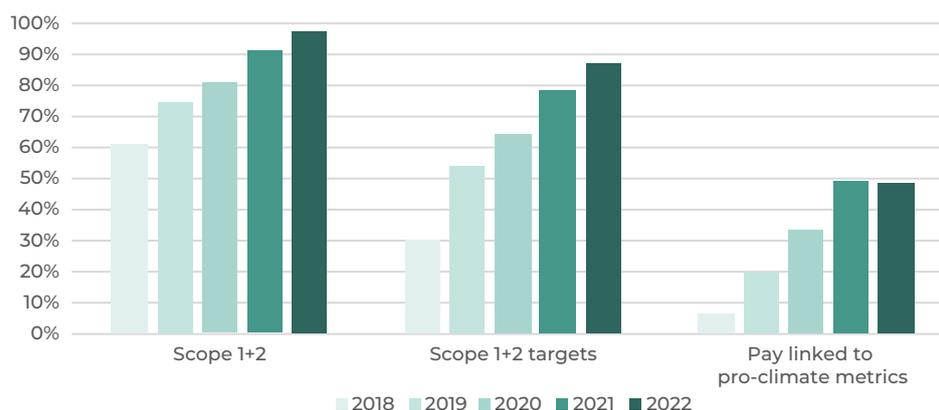
When we engage on **disclosure**, we commonly ask companies to produce an ESG report, measure and disclose Scope 1 and 2 emissions, complete the CDP climate survey, produce TCFD aligned disclosures, measure and disclose Scope 3 emissions, disclose green product revenues, or measure and disclose estimates for carbon emissions avoided thanks to customers using their products.

When we engage on **target setting**, we often ask companies to set operational emissions reduction targets, set renewable energy targets, set net zero targets, register carbon reduction targets with the Science Based Targets initiative (SBTi), set Scope 3 targets, set green product sales targets, or set targets to phase out fossil fuels from their generation mix.

When we engage on **incentivisation**, we might ask companies to ensure there is board level oversight of climate issues, disclose which metrics are used in management pay, allow shareholders to vote on the frequency of say on pay votes, consider incorporating ESG metrics in their remuneration plans, consider switching away from undesirable structures and metrics (TSR) and towards pro-climate metrics: sustainable profitability (return on capital), growing positive impact (green sales / reducing customer CO2 emissions), reducing negative impact (phasing out fossil fuel generation), or reducing operational emissions (CO2 emissions reduction).

We track each company's progress against these indicators in our proprietary engagement matrix. While it is almost impossible for individual investors to claim direct responsibility for engagement successes, we provide some examples below where we believe we have contributed to changing company behaviour for the better.

Proportion of portfolio companies with Scope 1 and 2 emissions disclosure, Scope 1 and 2 emissions reduction targets, and pay linked to pro-climate metrics



Based on portfolio data to 31st December 2022.

Source: CDP, MSCI, Glass Lewis, Company reports, Guinness Global Investors

This chart shows an extract from our engagement matrix, showing a steady increase in portfolio companies disclosing Scope 1 and 2 emissions, setting corporate carbon reduction targets, and linking pay to pro-climate metrics over time.

ESCALATION

We often engage and interact with our companies via email, calls and face-to-face meetings. These interactions typically start with a member of investor relations or the management team. Where we have highlighted an issue which we do not think has been given sufficient attention or consideration, we reserve the right to escalate the engagement through meeting with more senior members of management, voting against directors, and writing directly to members of the board. Ultimately, if the issue remains unresolved after repeated engagement attempts, we reserve the right to divest.

CASE STUDY: DISCLOSURE

Canadian Solar (CSIQ) is a leading manufacturer of solar modules, a provider of solar energy and battery storage solutions, and a developer of utility-scale solar power and battery storage projects. In 2021, we completed an in-depth ESG review of the company, noting that its disclosures were lagging those of Canadian-incorporated and US-listed peers by failing to produce a remuneration report and failing to complete the CDP climate survey.

In May 2022, we engaged with company representatives, asking them to improve remuneration disclosures and report to CDP. The company told us that it was considering responding to CDP, but failed to provide sufficient reassurance that either of these were being taken seriously. As a result, at the June 2022 AGM, we voted against the Chair of the Audit Committee and the Chair of the Remuneration Committee, signalling our dissatisfaction with the company's disclosure levels and engagement response.

In February 2023, we wrote to Canadian Solar's CFO, giving the company notice that we were intending to escalate our voting action to target more directors on the Remuneration and Audit Committees should the company continue to fail to produce a remuneration report and not complete the CDP climate survey. In April 2023, we received a response from the company informing us that it planned to submit a CDP climate response in July 2023 and were engaging with third party consultants to work on executive compensation disclosures which they would consider publishing in 2024. We deemed this to be a satisfactory response and chose to support the chairs of both committees at the 2023 AGM.

CASE STUDY: TARGET SETTING

Hubbell (HUBB) is a diversified electrical product manufacturer and a leading supplier of electrical transmission and distribution equipment. When reviewing the company's ESG credentials in 2021, we noted that the company had a relatively modest target to reduce Scope 1 and 2 emissions by 10% by 2025. Encouraging the company to set a more ambitious target was set as our top engagement priority.

In March 2022, HUBB published its sustainability report, announcing that it had achieved its 2025 emissions reduction target well ahead of schedule. In June 2022, we wrote to Hubbell, asking them to set a long-term emissions reduction target and register it with the Science Based Targets initiative (SBTi). We met the company in September to reiterate these requests and were told that setting a science-based target was currently being considered.

In March 2023, the company updated its sustainability report, setting a new goal to reduce its absolute Scope 1 and 2 emissions by 30% by 2030, further claiming that this goal had been developed using "leading science-based methodologies". We were pleased to see the company setting a more ambitious mid-term target but continue to encourage them to set a long-term net zero goal with the SBTi. The engagement is ongoing.

CASE STUDY: INCENTIVISATION

Ormat is a leading vertically integrated geothermal generation company. It regularly provides clear 3-4 year guidance, setting capacity targets for geothermal generation and more recently for battery storage. In our ESG review of the company, we identified a sub-optimal CEO pay structure, where 100% of the performance stock unit (PSU) award was linked to relative total shareholder return (TSR) rather than its capacity guidance.

Aligning executive compensation with these capacity targets would incentivise strong operational execution while growing the company's positive impact (low-carbon electricity generation) and being a fair reflection of management performance. None of this can be said for TSR. Indeed, one study conducted by Pearl Meyer, Cornell University and the Institute of Compensation Studies, even found a weak negative relationship between TSR-linked incentive plans and TSR performance.

In March 2021, we spoke with the company, encouraging it to consider linking CEO pay to capacity targets. We reiterated this request in writing in July 2021 and a call with the CFO and general counsel in November 2021. The company told us that it thought TSR was a more relevant metric and failed to convince us that our concerns were being taken seriously. At the May 2022 AGM, we chose to signal our dissatisfaction with the company's response by withholding our support for re-election of the chair of the board and the advisory vote on executive compensation.

We asked again about pay in June 2022, but no further progress was communicated. In February 2023, we wrote to the CEO and CFO, giving the company notice that we were intending to escalate our voting action to withhold our support for the chair of the Remuneration Committee.

In March 2023, Ormat published its updated proxy statement and we were pleased to see that 50% of the PSU award would be linked to capacity targets with the remaining 50% linked to relative TSR. We continue to encourage the company to reduce the allocation to TSR in executive pay in favour of pro-climate metrics.

CASE STUDY: BATTERY SUPPLY CHAIN

The energy transition depends on batteries. Batteries rely on metals such as lithium, nickel, and cobalt. Ethical concerns within the battery metal supply chain have been well documented in recent years. Lithium extraction in South America (c.60% of global supply) consumes vast amounts of the region's limited water supply, impacting local communities; cobalt production in the Democratic Republic of Congo (DRC) (c.70% of global supply) faces child labour and safety concerns from artisanal miners; and nickel processing in Indonesia (c.40% of global supply) has seen its carbon footprint and biodiversity impact come under increasing scrutiny. Some of these controversial metals leak into global supply chains via opaque refineries in China, ending up in batteries and electric vehicles sold in the West.

Electric vehicle manufacturers, battery manufacturers and investors cannot ignore these issues. We have closely tracked our two battery manufacturing names, LG Chem and Samsung SDI, over the past few years as they have developed their approaches to responsible sourcing.

- **LG Chem** established a responsible sourcing policy in 2020, joined the Responsible Mineral Initiative (RMI) and Responsible Labor Initiative (RLI) in 2021 to step up its efforts on supply chain due diligence, and joined the Fair Cobalt Alliance (FCA) in 2022 with a view to contributing to the eradication of forced labour and child labour in artisanal mines in the DRC.
- **Samsung SDI** joined the 'Cobalt for Development' project in 2019 to improve working conditions in cobalt mines in the DRC, joined the RMI in 2020, became the first battery company to call for moratoriums on deep seabed mining to protect marine ecosystems in 2021, and joined the UN Global Compact in 2022, pledging to adhere to the 10 core principles across human rights, labour, environment and anti-corruption in all business activities.

In a push to increase transparency, reduce dependence on China and improve the sustainability credentials of their batteries, both Samsung SDI and LG Chem are signing long-term supply agreements with non-Chinese suppliers; are investing in cobalt and nickel free chemistries (e.g. LFP, Li-S, NMX, NMA); have committed to 100% renewable electricity use; are partnering with battery recycling specialists; and are members of the Global Battery Alliance (GBA), which hopes to develop a sustainable battery value chain by 2030 through its 'battery passport' initiative.

We wrote to both companies in April 2023, encouraging them to set a target for battery metals sourced under the GBA battery passport initiative. LG Chem told us they had participated in the battery passport pilot project with Tesla; they intend to expand the use of the battery passport; and that they are considering setting out a specific roadmap for battery passport in the near future. Samsung SDI informed us that they had joined the Global Battery Alliance that month and were planning to be active participants. We believe both companies display strong risk management when it comes to responsible sourcing and are helping to establish a sustainable battery supply chain of the future.

CLIMATE-RELATED INITIATIVES

Below, we list the climate-related investor initiatives that Guinness Global Investors is involved with:



CLIMATE ACTION 100+

Climate Action 100+ is the largest investor engagement initiative on climate change encouraging the largest corporate greenhouse gas emitters to take necessary action on climate change. The Climate Action 100+ Net Zero Company Benchmark assesses the performance of focus companies against the initiative's three high-level goals: disclosure, emissions reduction, and governance.



CDP'S NON-DISCLOSURE CAMPAIGN

The CDP is an international non-profit organisation that helps companies disclose their environmental impact. The CDP's Non-Disclosure Campaign (NDC) is a collaborative initiative engaging with companies that have failed to respond to either the climate change, forests or water security questionnaire. By engaging companies across global markets, this campaign hopes to standardize the measurement of environmental impacts, improve comparability between companies, and drive corporate environmental action.



INVESTOR AGENDA - GLOBAL INVESTOR STATEMENT

The Investor Agenda is made up of seven major groups (AIGCC, CDP, Ceres, IIGCC, IIGCC, PRI and UNEP FI) working with investors to pull together the best guidance on tackling the climate crisis. The Investor Agenda's Global Investor Statement outlines key climate policies and urges governments to radically step up their climate ambitions.



WORLD BENCHMARKING ALLIANCE - INVESTOR LETTER AND INVESTOR STATEMENT

In 2022, the World Benchmarking Alliance (WBA), Ninety One and Newton, in coordination with Climate Action 100+ sent a letter on just transition to 100 oil and gas companies, calling for them to engage with relevant stakeholders and publish disclosures regarding their just transition planning. In 2023, the WBA followed up by sending an Investor Statement on the Just Transition to all 100 oil and gas companies. The statement is intended to be a signal to companies directly and other actors of influence of the importance investors are putting on the just transition.



UK SUSTAINABLE INVESTMENT AND FINANCE ASSOCIATION

UKSIF is the membership association for sustainable and responsible financial services in the UK. Through policy engagement, knowledge sharing, and networking it seeks to achieve its mission of promoting sustainable finance and making the UK the 'world's first net-zero financial centre'. They have a 30-year track record of successfully influencing government policy, championing the role of sustainable finance as a tool to help decarbonise the economy and advance a sustainable future.

APPENDIX 1: IMPACT ALIGNMENT

HISTORY OF IMPACT

Impact investing traces its roots back to Socially Responsible Investing, the practice of avoiding “sin” stocks through screening out companies based on the impact of a company’s products. In the 1960s, the Ford Foundation created program-related investing (PRIs), shifting away from using grants and towards making low-interest loans to finance programs like urban redevelopment or affordable housing. PRI established the practice of positively screening for investments based on the perceived societal impact of a company’s products, whilst delivering a return of capital. In 2007, the Rockefeller foundation coined the term “impact investing”, defining it as an activity which seeks to generate social and/or environmental benefits while delivering a financial return. They stated that two key elements should be present, intentionality and measurement. To date, impact investment has typically involved private market-based project financing. As it has matured, it has started to migrate into public markets, accessing deeper pockets of capital.

IMPACT INVESTING IN PUBLIC MARKETS

The discussion of whether a public equities strategy can be designated as impactful is fraught with controversy, often centring on the concept of additionality: the extent to which desired outcomes would have occurred without the investor’s intervention. Opponents say that ‘true’ impact investing can only occur in primary markets, where the measured positive externality would not have occurred without the new and additive financial resource. Proponents say that ownership matters: additionality can be achieved through engaging with companies and policy makers to raise standards.

We have sympathy for both views. The investor’s contribution towards the impact may be less intense in secondary markets and delivered primarily through engagement rather than through new capital. But just because the form of additionality is different, does not necessarily mean it should be dismissed. As a fractional owner of a company, it is nearly impossible to draw a causal link between engaging with a company and behavioural change. However, if a mindful investor contributes to a broader trend or group engagement for positive change, it becomes far harder for management, industries and policymakers to ignore.

IMPACT ALIGNMENT

The Guinness Sustainable Energy strategy intentionally screens for companies selling the products and services which will help to deliver the transition towards a low-carbon economy. When companies and consumers purchase and use these solutions (heat pumps, electric vehicles, renewable energy) over incumbent technologies (gas boilers, internal combustion engines, fossil fuel generation) they contribute towards the global effort to reduce greenhouse gas emissions and combat climate change.

By investing in the companies that produce these products and services, we believe that the strategy’s success is closely aligned with this positive environmental impact. This alignment flows through our universe construction, where we deliberately target companies delivering climate solutions; through our reporting, where we measure and report on the carbon avoided and carbon cost of our portfolio; and through our engagement, where the overwhelming focus is on climate action.

APPENDIX 2: SDG MAPPING METHODOLOGY

Where companies have positive exposure to more than one target or goal, we assign the company's revenues first to the goal which we believe is most relevant to them. We describe this as the company's "primary impact", which on our schematic is represented in a green colour. We grade the level of primary impact by the proportion that the relevant activity comprises of the company's overall business activity. We then record other, or 'secondary' areas of positive impact, represented by a light blue colour.

CASE STUDY: VESTAS

Primary impact

We believe that Vestas' wind turbines help to deliver SDG target 7.2: "By 2030, increase substantially the share of renewable energy in the global energy mix". In 2022, 78% of its revenues came from wind turbine manufacturing, so we assign 78% of business activity to SDG 7. We believe that this goal and target are most relevant to the division's activity, so it is designated as a primary impact.

Secondary impact

We believe that products and services which upgrade and decarbonise energy infrastructure also align with SDG target 9.4: "By 2030, upgrade infrastructure and retrofit industries to make them sustainable...". We consider this to be secondary in relevance to SDG 7, so it is designated as a secondary impact for Vestas.

SDG 13: CLIMATE ACTION

Our mapping work produces the outcome of no primary exposure to SDG 13, 'Climate Action', which appears out of place for a sustainable energy strategy. This is because we map business activity to the underlying targets, and the targets for SDG 13 appear to be more aimed at governments, rather than private sector companies. As we believe that all the companies in our universe will contribute "to limit[ing] global temperature rise to well below 2 degrees centigrade", we recognise their contribution as a secondary impact only.

APPENDIX 3: BUSINESS ACTIVITY MAPPING

SDG	TARGET	RELEVANT BUSINESS ACTIVITIES	COMPANIES
3. GOOD HEALTH & WELL-BEING	3.4. By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being.	Manufacturing diabetes drugs, generic active ingredients (e.g. for opioid addiction therapy)	LG Chem, Johnson Matthey
	3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents.	Manufacturing systems and components which contribute towards autonomous mobility and advanced safety, such as driver assist, sensors, semiconductors, electronics and software.	Aptiv, Onsemi, Infineon, Sensata
	3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.	Companies playing an active role in the supply chain for cleaner transport (EVs, e-bikes, e-buses, FCEVs) including: batteries and cathode material, thermal management, components for hybrids (e.g. 12V, 48V) and fuel cells, auto-catalysts, electronics for EVs, lightweight materials for e-buses.	Johnson Matthey, LG Chem, Samsung SDI, Aptiv, Gentherm, Onsemi, Infineon, Sensata, Eaton, SolarEdge, TPI Composites, Tianneng Power
7. AFFORDABLE & CLEAN ENERGY	7.1 By 2030, ensure universal access to affordable, reliable and modern energy services	Involved in the construction, installation, operation and maintenance of hydro, wind, solar, geothermal and biomass energy, including supply chain contributors, companies which provide grid connection equipment, electricity distribution, smart meters and ESS.	Ameresco, Hubbell, Johnson Matthey, LG Chem, Samsung SDI, Infineon, Itron, Schneider, Eaton, Canadian Solar, Enphase, First Solar, SolarEdge, Xinyi, Vestas, Iberdrola, Ormat, TPI Composites, Tianneng Power
	7.2 By 2030, increase substantially the share of renewable energy in the global energy mix	Companies involved in hydro, wind, solar, geothermal, biomass generation, ESS, energy networks, or other renewable energy technology and their respective supply chains.	Ameresco, Hubbell, Nibe, LG Chem, Samsung SDI, Infineon, Itron, Schneider, Eaton, Canadian Solar, Enphase, First Solar, SolarEdge, Xinyi, TPI Composites, Vestas, China Longyuan, China Suntien, Iberdrola, NextEra, Ormat, Sunnova, Johnson Matthey
	7.3 By 2030, double the global rate of improvement in energy efficiency	Companies involved in selling energy efficiency products and services such as insulation, LEDs, heat pumps, ESS, smart meters or energy management.	Ameresco, Hubbell, Nibe, LG Chem, Samsung SDI, Johnson Matthey, Infineon, Itron, Schneider, Eaton, Enphase, SolarEdge, Ormat, Trane Technologies, Onsemi
	7.B By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support	Businesses with significant business activity outside of developed markets (North America, W. Europe, Australia, Japan, S. Korea), or businesses with a significant presence on island territories which deliver hydro, wind, solar, geothermal and biomass energy, including supply chain contributors, smart grid services, and grid storage	Xinyi, China Longyuan, China Suntien, Ormat

SDG	TARGET	RELEVANT BUSINESS ACTIVITIES	COMPANIES
8. DECENT WORK & ECONOMIC GROWTH	8.4 Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-year framework of programmes on sustainable consumption and production, with developed countries taking the lead	Licensing technology / processes to industry which enable greater resource efficiency, lower emissions and less waste, energy efficiency projects and equipment, resource measurement and management (meters), recycling, repair and maintenance, projects to improve energy and resource efficiency of industry.	Ameresco, Hubbell, Nibe, Johnson Matthey, Itron, Schneider, Eaton, Trane Technologies, Infineon, Tianneng Power
9. INDUSTRY, INNOVATION & INFRASTRUCTURE	9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities	Upgrading, maintaining, and operating the grid to enable greater uptake of renewable energy, energy efficiency projects and equipment, resource measurement and measurement, recycling, manufacturing clean energy infrastructure such as wind turbines and solar farms along with their respective supply chains.	Ameresco, Hubbell, Nibe, Johnson Matthey, Itron, Schneider, Eaton, Canadian Solar, Enphase, First Solar, SolarEdge, Xinyi, TPI Composites, Vestas, China Longyuan, China Suntien, Iberdrola, Nextera, Ormat, Trane Technologies, Tianneng Power, Infineon, Sunnova
11. SUSTAINABLE CITIES & COMMUNITIES	11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons	Electric transportation / batteries for electrified transport and their supply chains, electrical systems and semiconductors which support electrification of transport, battery thermal management, hybrid systems, light weight composite materials for electric buses	Johnson Matthey, LG Chem, Samsung SDI, Aptiv, Gentherm, Onsemi, Infineon, Sensata, Eaton, SolarEdge, TPI Composites, Tianneng Power
	11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management	Sales of energy efficiency products which can make homes and offices more aware of consumption (meters) or resource efficient such as insulation, LEDs, heat pumps, etc and companies which deliver such projects. Products which help improve air quality including EVs, e-bikes, E-buses, batteries, auto catalysts.	Ameresco, Hubbell, Nibe, Johnson Matthey, LG Chem, Samsung SDI, Itron, TPI Composites, Trane Technologies, Infineon, Tianneng Power
12. RESPONSIBLE CONSUMPTION & PRODUCTION	12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	Manufacture of products using less energy / fewer raw materials, water and gas metering, battery recycling, waste to energy (bagasse biomass). Repair and maintenance services which avoid scrappage of higher value items.	Hubbell, Johnson Matthey, Itron, Tianneng Power, Eaton
13. CLIMATE ACTION	13.2 Integrate climate change measures into national policies, strategies and planning.	Displacement Reducing energy consumption via energy efficiency and alternative fuels	Ameresco, Hubbell, Nibe, Trane Technologies
		Electrification Reducing transport emissions by transitioning towards battery electric vehicles	Johnson Matthey, LG Chem, Samsung SDI, Aptiv, Gentherm, Onsemi, Infineon, Sensata, Tianneng Power
		Installation Manufacturing and installing the equipment and infrastructure required to enable low carbon energy generation	Itron, Schneider, Eaton, Canadian Solar, Enphase, First Solar, SolarEdge, Xinyi, TPI Composites, Vestas
		Generation Increasing the percentage of energy generated from renewable and alternative sources.	China Longyuan, China Suntien, Iberdrola, Nextera, Ormat, Sunnova

Portfolio holdings as of 31st December 2022.

APPENDIX 4: DISCUSSION POINTS AROUND IMPACT METHODOLOGY

1. IMPACT REPORTING IS SUBJECTIVE

This document outlines how the Sustainable Energy team thinks about impact investment. By the nature of the topic, these views can be highly subjective. We debate our own impact methodology internally and with others in the impact community and expect our methodology to evolve as more data becomes available, and as industry standards emerge.

2. DOES A COMPANY NEED TO HAVE GOOD ESG TO BE AN IMPACT INVESTMENT?

We believe that impact is about the “what”, whereas ESG is more about the “how”. That said, we take ESG into account in our investment process. We take a holistic view of our investments, assessing strategy, financials, valuation, ESG and impact. If a company has a compelling strategy, is attractively valued, and has a product with a strong positive impact, we are willing to tolerate some ESG issues and use these as a catalyst for engagement. We would then track the company’s ESG behaviour, looking for improvement over time.

3. HOW DO YOU ACCOUNT FOR THE IMPACT OF THE STRATEGY CHANGING OVER TIME?

The impact of our strategy is likely to change over time as a result of changing allocations across our four subsectors (efficiency, electrification, installation, generation), depending on where we think the most attractive returns are available. Changes in company market capitalisations will also have an effect on the impact relative to a specific amount of portfolio assets. Over time, we are more focused on the impact trajectories of the individual investee companies than the overall portfolio outcome. A material change in strategy at an investee company, leading to a de-emphasis on the division(s) which generate positive impact, would cause us to re-visit our investment thesis and engage with the company to understand the shift.

IMPORTANT INFORMATION

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

The Guinness Sustainable Energy Funds are managed for capital growth and invests in companies involved in the generation, storage, efficiency and consumption of sustainable energy sources (such as solar, wind, hydro, geothermal, biofuels and biomass). The Funds are actively managed and use the MSCI World Index as a comparator benchmark only.

The Guinness Sustainable Energy Fund and the TB Guinness Sustainable Energy Fund 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. Further details on the risk factors are included in the Funds' documentation, available on our website.

This document is provided for information only and all the information contained in it is believed to be reliable but may be inaccurate or incomplete; any opinions stated are honestly held at the time of writing but are not guaranteed. The contents of the document should not therefore be relied upon. It should not be taken as a recommendation to make an investment in the Funds or to buy or sell individual securities, nor does it constitute an offer for sale.

GUINNESS SUSTAINABLE ENERGY FUND 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 or free of charge from the Manager: Link Fund Manager Solutions (Ireland) Ltd (LFMSI), 2 Grand Canal Square, Grand Canal Harbour, Dublin 2, Ireland; or the Promoter and Investment Manager: Guinness Asset Management Ltd, 18 Smith Square, London SW1P 3HZ. LFMSI, as UCITS Man Co, has the right to terminate the arrangements made for the marketing of funds in accordance with the UCITS Directive.

Investor Rights

A summary of investor rights in English is available here:

<https://www.linkgroup.eu/policy-statements/irish-management-company>

Residency

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

Structure & regulation

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

Switzerland

This is an advertising document. The prospectus and KID for Switzerland, the articles of association, and the annual and semi-annual reports can be obtained free of charge from the representative in Switzerland, Carnegie Fund Services S.A., 11, rue du Général-Dufour, 1204 Geneva, Switzerland, Tel. +41 22 705 11 77, www.carnegie-fund-services.ch. The paying agent is Banque Cantonale de Genève, 17 Quai de l'Île, 1204 Geneva, Switzerland.

Singapore

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

TB 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.tbaileyfs.co.uk or free of charge from T. Bailey Fund Services Limited ("TBFS"), 64 St James's Street, Nottingham, NG1 6FJ.
General enquiries: 0115 988 8200.
Dealing Line: 0115 988 8285.
E-Mail: clientservices@tbailey.co.uk

T. Bailey Fund Services Limited is authorised and regulated by the Financial Conduct Authority.

Residency

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

Structure & regulation

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

Telephone calls will be recorded and monitored.



Guinness Global Investors is a trading name of Guinness Asset Management Ltd., which is authorised and regulated by the Financial Conduct Authority (223077).