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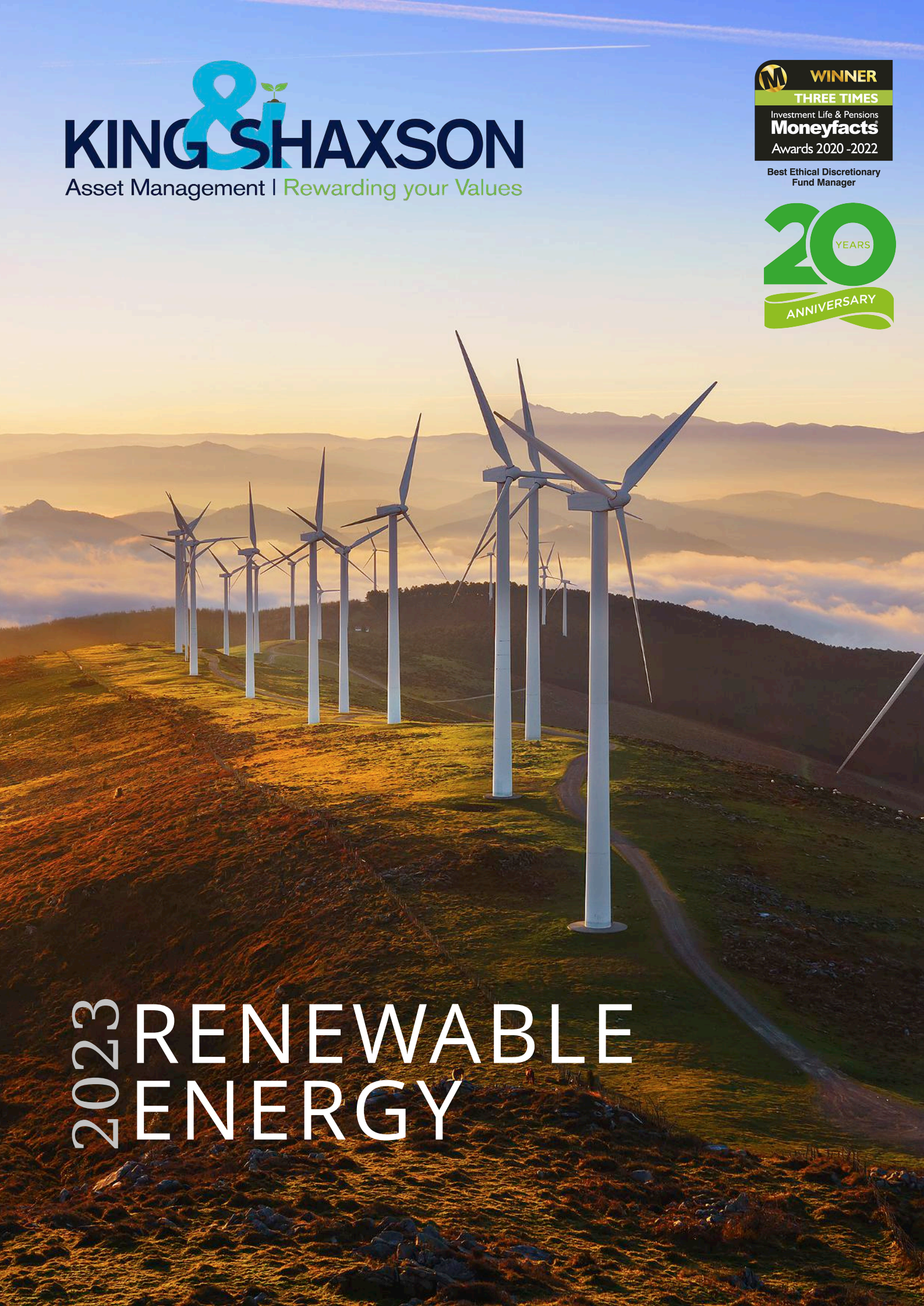

2023 RENEWABLE ENERGY

RENEWABLE ENERGY SECTOR

There is no doubt reliable energy has been, and remains, key to social and economic progress. It is a cornerstone of most developed economies and a significant part of the global investment universe.

In prehistoric times it was wood and animal waste which fuelled the early fires, whilst wind and water mills became prevalent around the time of the ancient empires, which developed in the modern era to power the early factories. It was the industrial revolution of the 18th and 19th century where the demand for coal exploded as a major source of fuel for steam power, but also later on for the first power stations.

From the start of the last century, oil and gas became major sources of fuel, with nuclear energy rising as a by-product of the Cold War era. Today, renewable energy has become a vital and growing percentage of the energy mix.

Whilst efficiency will moderate the growth rate, global energy demand is expected to grow by about 15% in the next quarter of a century as the global population expands and economies develop.[1]

Energy supply needs to grow for social and environmental reasons; clean water and sanitation, healthcare, sustainable agriculture, communication and education (as simple as enabling children to read and study after dark) all require energy. Where we stand out is our insistence that energy is clean (not just low carbon), affordable, and renewable so that it neither damages the environment or biodiversity.

Last year, Russia's military attempt to invade the Ukraine caused shock waves in the global energy market. It shook a complacent sector and increased the urgency for sources of energy that are less vulnerable to geopolitical risks and gyrations. This shock reminded global markets, businesses, politicians and households of the importance of reliable and cheap energy.

This point has not been lost on governments and policy makers around the world. The International Energy Agency (IEA), in their 2022 report, states that yearly global investments in renewable energy is expected to rise from $1.3trn in 2021 to $2.1trn in 2030.[2] A case further backed up by recent articles in the financial press, with The Economist highlighting global capital expenditure on wind and solar grew from $357bn in 2021 to $490bn last year.[3]

[1]IEA World Energy Outlook 2022
[2]IEA World Energy Outlook 2022
[3]The Economist, Feb 13th, "War and Subsidies have turbocharged the green transition"

Annual direct CO2 emissions avoided per 1GW of installed capacity

The key environmental impact of renewable energy is the displacement of damaging pollution from fossil fuel power stations. The IEA have quantified the tonnage of CO2 emissions displaced when using renewable sources versus traditional fossil fuels:

	Vs unabated Coal	Vs Natural Gas
Offshore Wind	3.5 million tonnes	1.6 million tonnes
Onshore Wind	2.8 million tonnes	1.3 million tonnes
Solar	1.4 million tonnes	0.7 million tonnes
Hydro	3.0 million tonnes	1.4 million tonnes

Source: The International Energy Agency

However, to us, **carbon emissions are only part of the story.** There are social and economic benefits of locally generated renewable energy.

According to the World Health Organisation, 12.6% of all deaths in 2019 were enabled by air pollution, the second highest cause after heart disease. Air pollution arising from combustion particulates, which largely come from human sources, is the most dangerous given they penetrate deep into the lungs. These air pollutants are more prevalent around humans, as people burn fuels to heat homes, whilst cities become increasingly dense. As a result, around 90% of air pollution deaths are from combustion particulates, with the remainder coming from gases.[4] Clean energy, like driving an electric car, doesn't just support the environment, it also saves lives.

Other significant social and economic benefits include easing the impact on poorer nations from importing fuels, the health costs from the mining and burning of these fuels and, in many cases, reliance on and nature of the regimes that benefit from exporting these fuels. Some years ago, we cited the "Resource Curse" as a key social impact factor to add to the positive impact of renewable energy.[5] Recent global events have sharpened the focus of these additional factors.

[4]No Miracles Needed. Mark Z Jacobson. Cambridge University Press, 2023.
[5] Blood Oil: Tyrants, Violence and the Rules that Run the World. Leif Wenar. Oxford University Press, 2016.

INVESTING IN CLEAN ENERGY

Renewable energy has been a staple of many impact portfolios, including ours, for years. Over time the range of investments in portfolios has increased. In the early years, the exposure to renewable energy was directly through the Original Equipment Manufacturers (OEMs), namely the developers and manufacturers of wind turbines and solar panels. It also came through the larger electricity utilities that had developed large renewable portfolios, such as Scottish Power or SSE. At the time, there were few pure play renewable energy producers (examples include Great Lakes Hydro – now Brookfield, or the unlisted Thrive Renewables) and attitudes to fossil fuels were less stringent as there were fewer alternatives.

In the last decade, this began to change, with a larger number of clean energy operating companies emerging. There are now a number of wind, solar, anaerobic digestion, hydro and mixed clean energy generation companies available for investment across a number of geographical regions. These investments are more yield based than the growth-based OEMs, offering an infrastructure-based alternative in portfolios with underlying cash flows based on long-term Power Purchase Agreements. More recently, these have been augmented by battery storage operators and other energy efficiency companies.

Over time, these early innovators have been joined by a number of “me too” offerings, with some attempting to differentiate their profile. Nonetheless, these investments enable access to operational renewable energy assets where the direct impact can be measured as clean energy generated. This is in line with the United Nations Sustainable Development Goal 7.2, which aims to substantially increase the share of renewable energy in the global energy mix.[6]

Many of the first OEMs and developers, such as Vestas Wind Systems, have moved from small innovative companies to large global ones. This evolution has enabled them to attract a larger investor base as they become more stable and attractive to large investment funds. Where they remain a pure play on clean energy, as well as a leader in their sector, enabling portfolio exposure to increase over time as their risk profiles have lowered.

[6]The United Nations: https://sdgs.un.org/goals/goal7

In addition to the early OEMs, other companies have re-purposed themselves. Orsted, formerly Danish Oil and Natural Gas (DONG Energy), aggressively began divesting their fossil fuels to become a leading developer of offshore windfarms. We fail to see this level of commitment from many of the oil & gas majors. Despite the windfall profits from the recent energy crisis, many continue to face investor backlash over the lack of speed and financial commitment to the energy transition. Our stance is avoidance of these companies until we begin to see real progress, not only on the environmental commitments, but also social issues (note the Niger Delta as a prime example).

In addition to the primary technology of wind and solar, other key components in the development of renewable energy infrastructure form part of our investment universe. One example is the ships that are required for building offshore wind farms. Eneti is a company that repurposed themselves from being a bulk commodity ship company to owning and operating a fleet of Wind Turbine Installation Vessels. These have improved significantly over the years to make the development of wind farms faster and cheaper whilst improving their environmental credentials.

Other key investments include offshore transmission assets which connect windfarms to the national grid, but also more localised grid connections, and increasingly, smart grids which empower smart energy management.

Nuclear energy

Given the recent energy crisis, the topic of nuclear energy has once again been thrust under the spotlight. Whilst on one hand, it is zero emission, there are other implications.

Nuclear plants take decades rather than years to build when factoring in the delays which have become common place. For example, Finland's Oikiluoto-3 nuclear plant was connected to the grid in 2022, marking Europe's first nuclear plant in fifteen years. However, it was originally scheduled to open in 2009. Meanwhile, the UK's Hinkley point continues to face delays, and construction costs are now expected to reach over £32 billion, double the original construction cost supplied in 2012.

Whilst the statistics are more favourable when lifetime extensions of current nuclear plants are factored in, the levelised cost of a new nuclear plant is anywhere up to 2 to 3 times more versus new onshore wind and solar projects.

Whilst rare earth minerals and metals form part of the supply chain of various renewable assets, mining for nuclear brings additional risks associated with radiological material which can lead to pollution and destruction of wildlife. In a similar vein, natural disasters and end of life waste pose major issues alongside the risk of nuclear weapon proliferation.Work continues on harnessing the power of nuclear fusion, a different process to nuclear fission which is currently used in nuclear power reactors. The sun and all the stars in the universe are powered by this form of nuclear power, which involves the fusing together of light atomic nuclei into heavier elements. In theory, nuclear fusion could supply all power on Earth indefinitely without long-lived radioactive waste.[7]

[7] No Miracles Needed. Mark Z Jacobson. Cambridge University Press, 2023

DEVELOPMENTS

Renewable energy has matured from being a subsidy dependent technology twenty years ago, to a major source of energy today. There are still strong growth opportunities for wind and solar in particular as their markets are far from satiated, and scale continues to moderate costs. The IEA reports mentioned earlier quantify some of this growth, but the geopolitical events in 2022 have accelerated the desire for the energy independence that renewable energy provides.

The principal drawback of wind and solar remains its intermittency. Solar does not work at night and varies with solar radiation, whilst wind is neither constant or controllable. Furthermore, other technologies such as hydro or tidal energy, whilst more predictable, can only be used in certain places. They are also more expensive and complex, with ramifications for the overall environmental fit as well as biodiversity.

The “holy grail” for many years has been energy storage, the ability to store the surplus energy generated on hot or windy days and then release it at times when these resources are not available. Storage solutions have arisen. There are already infrastructure investments available with battery parks in particular, which are able to charge when demand is low or generation is high, and discharge when demand is high or supply is low.

For now, the dominant technology in batteries, from small scale devices to electric vehicles and utility-scale energy storage is lithium-ion. Whilst there are other technologies advancing, such as solid-state batteries, they are not at the price point and commercial stage for wider use. Lithium-ion offers the energy density, lifetime and charging performance that is required, with new generation advancements expected to keep it as the leading technology. On top of this, companies are using cobalt-free lithium-ion batteries, reducing reliance on a resource that is largely found in the politically unstable Democratic Republic of Congo, where labour conditions are concerning.

More recently, green hydrogen has become increasingly viable. Hydrogen has a long history as a fuel and hydrogen fuel cell busses and vehicles have been running for over 20 years. Producing clean “green” hydrogen has become considerably cheaper and viable with the growth of renewable energy. As hydrogen is already understood as a gas, it is able to be used in a number of ways; making up a small part of the mix in gas networks, fuelling heavier vehicles, use in public transport (hydrogen trains are being trialled in some countries), industrial applications, and use in energy storage. Some high-risk investments in this technology have benefited from this trend and its application is firmly in the sights of most large industrial groups, such as Germany’s Linde.

CONCLUSION

Perspective is always important and since we started investing ethically for our clients over twenty years ago, we have seen a substantial change in the global energy mix. In fact, the only thing that has not changed is the importance of energy itself.

Wind and solar energy have moved from the fringes to become mature and key staples in the energy mix, and other solutions such as clean hydrogen are becoming increasingly prevalent. Maturity has lowered relative costs whilst the cost of fossil fuels has risen, not only in simple dollar terms, but also as the environmental and social costs are more easily quantified and added to the equation.

Demand for energy, geopolitical resource worries, real cost pricing, and regulation continue to drive the need for cleaner energy. We only need to look at the recent US Inflation Reduction Act to see the political desire behind this sector. At the same time, markets are far from satiated, even in Western Europe where so much is already established. The next twenty years appear to promise both the wider roll out of existing technologies as well as the development of new technologies.

This remains one of the most exciting spaces for impact investing.

Content by Wayne Bishop, CEO of King & Shaxson Asset Management.

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20 YEARS ANNIVERSARY

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