HSBC Asset Management

Navigating New Opportunities in the Energy Transition

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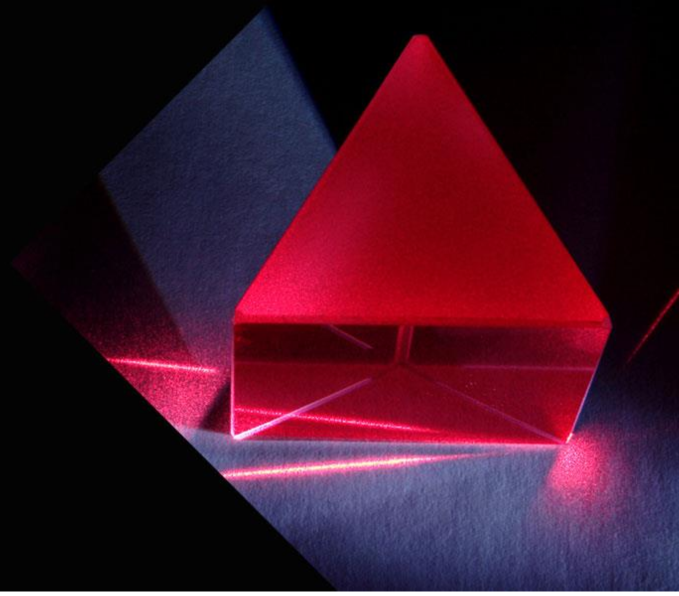


John Kerry, the U.S. Special Presidential Envoy on Climate, has described the energy transition as the greatest economic opportunity since the Industrial Revolution (Financial Times, 2023).

Introduction

The world seems to be moving in the right direction, but as we draw closer to 2030, much more needs to be done. COP28 has brought renewed attention to the urgency of the energy transition, bringing issues such as energy insecurity among emerging economies and energy affordability into the spotlight.

Despite these challenges, there are some positive trends in the reduction of carbon emissions. In 2022, global energy consumption increased at a slower rate than global GDP, rising by 2.1% and 3% respectively (Ener Data, 2023). More positively, global energy-related carbon dioxide emissions increased at an even slower rate of 0.9% (International Energy Agency, 2022). This seems to suggest that economic growth, which has traditionally amplified energy consumption and in turn fuelled CO_2 emissions (Journal of Cleaner Production, 2018), could be becoming less energy and carbon intensive.

This promising change in direction is attributable in part to the energy transition – the shift from fossil-based systems and networks to those based on renewable sources of energy. Globally, the transition is gathering momentum. Investment in the transition to low-carbon energy reached $1.1 trillion in 2022 (BloombergNEF, 2022), matching investment in fossil fuels for the first time.

While this level of investment is promising, the scale of the net-zero challenge is vast. If the world is to achieve net-zero targets, then a total of $194 trillion of investment is required to 2050 (Bloomberg, 2023). Such enormous investment is required both to decarbonise a substantially fossil-fuel dependent economy, with global emissions reaching a new high of more than 36.8 billion tonnes of CO_2 in 2022 (IEA, 2023), and to meet the ever-rising global energy demand, set to increase by 50%-100% by 2050 compared to 2020 (Reuters, 2023).

Apart from the amount of capital required, where investors and governments direct funding is equally important. Thus far, investment in the energy transition has been largely directed to conventional types of renewable energy generation like wind and solar power (EDHECinfra Research Note, 2022). As a result, two key problems have emerged. First, wind and solar power produce energy intermittently owing to varying environmental conditions. Second, wind and solar frequently generate energy when demand is not at its peak, creating an imbalance between energy supply and demand. So, while wind and solar energy show potential to generate substantial amounts of energy along the path to net-zero, investing in these sectors alone is not enough to satisfy energy demand which, at present, is becoming more intense and less consistent.

Any forecast, projection or target when provided is indicative only and is not guaranteed in any way.

As a result, the opportunities in energy transition are not solely in conventional solar and wind projects. To meet rising demand and net-zero commitments, increasing investment is required for conventional renewable energy generation projects and to find solutions to their inherent constraints, such as intermittency. This will continue to open up investment opportunities in related energy transition sectors such as energy storage, grid transmission and distribution, and other climate technologies.

The growing need for energy

The growing need for energy is being driven by a range of changes, such as faster than global average population and economic growth in developing economies, climate change and the shift to a data-centric economy.

Developing economies

Energy consumption is accelerating in developing economies, particularly those where population and economic growth both exceed the global average (ExxonMobil, 2022).
In India, for example, electricity demand is expected to grow by 70% overall over the next decade (Fitch Group/BMI, 2022), driven by population growth, increasing urbanisation and mounting demand from manufacturing, construction, transport and service sectors. This considerably exceeds electricity demand growth in the United States, which is expected to grow by 6% over the next decade. Rising living standards (illustrated by the growth of the middle class) and changing consumer preferences are exacerbating the growing demand for energy by increasing demand for appliances and other energy-intensive products.

Climate change-driven heating

Another factor driving demand for energy is climate change itself. Globally, 2022 was the fourth warmest year since records began in the mid-1850s. This amplifies electricity demand – for example, for every one degree increase in average daily temperature in India, there is a rise of around 2% in electricity demand (IEA, 2022). Rising temperatures also culminate in increased use of air conditioning for cooling, particularly in emerging and developing economies where extreme weather – in the form of more frequent, intense heatwaves – is becoming more common. Energy consumption for space cooling has more than tripled since 1990, to account for 10% of global electricity demand (IEA, 2022).

Digitalisation

While small overall, the digital economy accounts for a still relatively meaningful 2-3% of global electricity use. However, to be in line with net-zero, the IEA forecasts that emissions from digitalization will need to be cut in half by 2030 (IEA, 2022). The shift to a data-centric economy increases energy demand through the growing reliance on data centres (some of which are 100% renewable-energy-powered) for the storage, processing and management of vast amounts of information. The increasing use of cloud services, streaming platforms and data-intensive technologies, such as artificial intelligence (AI) is also compounding energy consumption.

Driving the energy transition

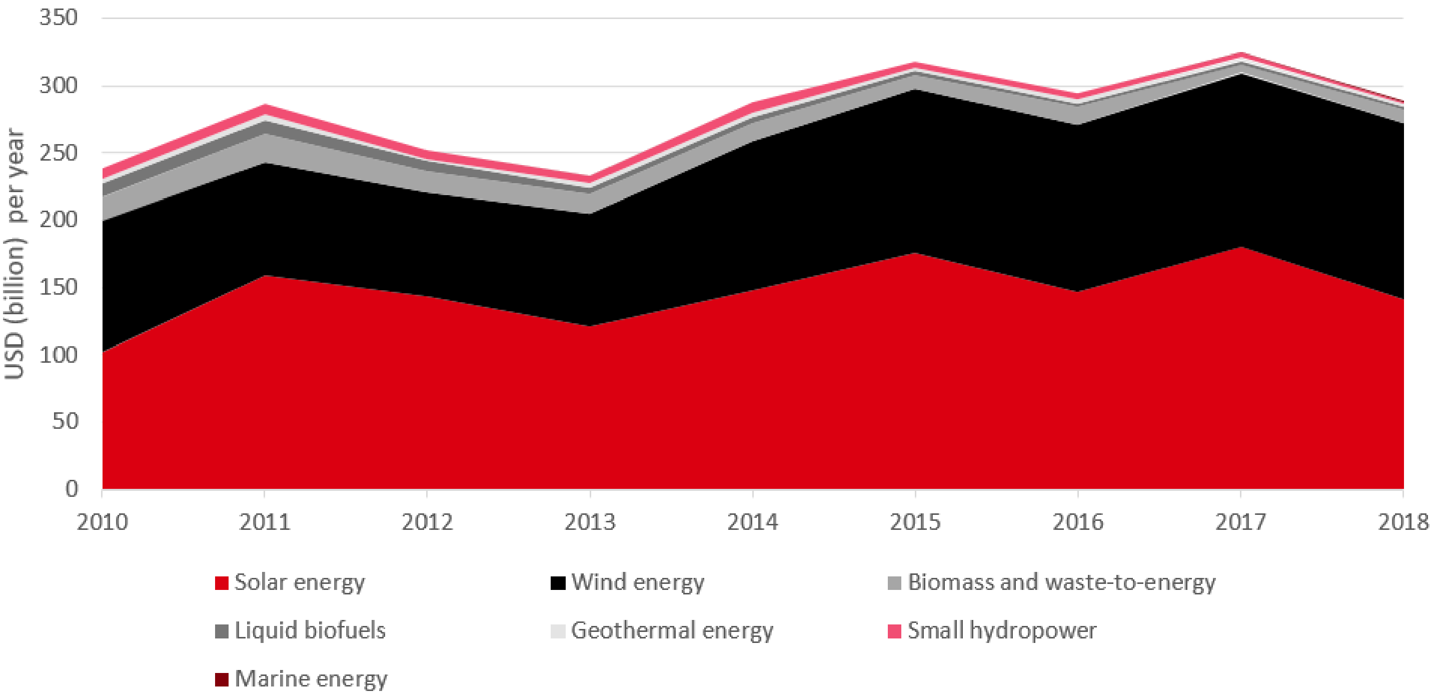
Some progress has been made in advancing alternative forms of energy. In 2022, 29.9% of electricity was generated from renewable sources (including hydropower, solar, wind, biomass, waste, geothermal and so forth), compared to 18.2% generated by renewable sources in 2002 (Our World in Data, 2022). In addition, sales of electric cars have increased nearly tenfold in the five years from 2018 to 2023 (IEA, 2023). However, the pace with which progress in renewable energy deployment is taking place differs according to geography, policy and industries – 95% of electric car sales, for example, occurred in China, the US and Europe (IEA, 2023).

For the world to meet net zero by 2050, faster progress is required. To drive the transition from fossil fuels to more sustainable alternatives, policymakers globally are taking a more targeted role in facilitating access to clean energy and new technologies. In the United States, the passing of the landmark Inflation Reduction Act, allocating approximately $370 billion to promoting investment in domestic energy production and clean energy (S&P Global, 2022). Meanwhile, in the EU, the European Green Deal initiative aims to make the European Union climate neutral by 2050. To finance this transformation, the EU Commission has earmarked a total of €1 trillion to be invested in the transition over the next decade.

Governments in Asia are also committing to support the transition. Japan for example, unveiled the Green Transformation Basic Policy which aims to unlock $1 trillion in investments in the green transformation of various industrial sectors. Indonesia and Thailand are continuing to direct investment to the manufacturing of EV parts, while India and South Korea have increased their EV subsidy budgets.

According to the IEA (IEA, 2021), the proportion of renewables in global energy generation capacity will have to increase to almost 90%, if the world is to meet net zero in 2050. Government support remains critically important in order to create conducive regulatory and legislative frameworks to accelerate investments in these technologies.

Investment in renewable energy by technology



Source: Our World in Data; UN Environment, BNEF

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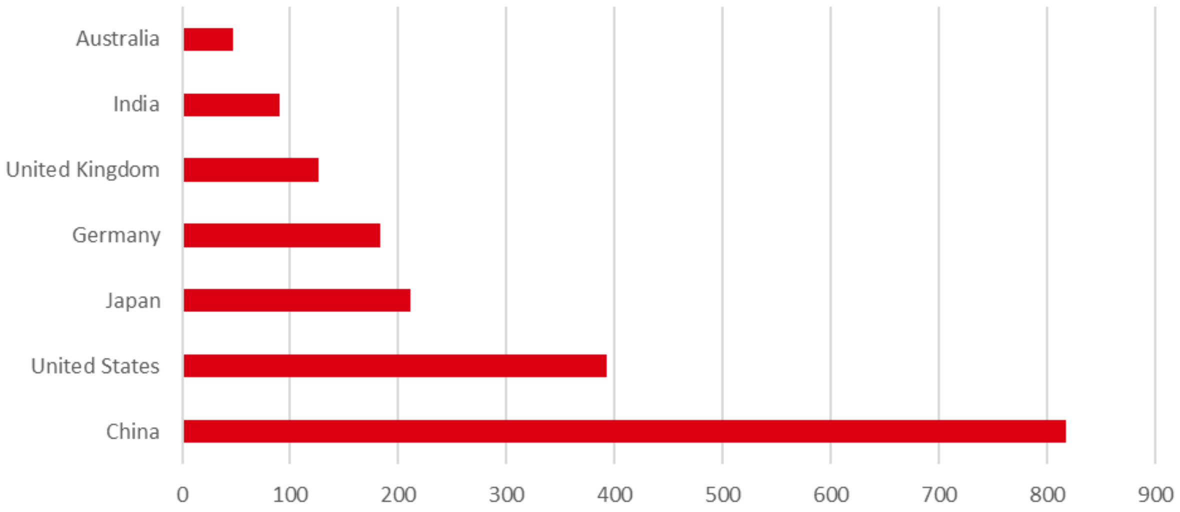
Challenges in the transition to renewable energy

The world's growing energy demand can be met via increased usage of fossil fuel-based sources and/or the development and usage of renewable energy sources. The negative impacts and consequences of fossil-fuel based sources of energy (such as coal, natural gas and oil) are well-documented. For instance, beyond the environmental impacts of more greenhouse gas emissions and habitat destruction, fossil fuels can adversely impact communities living near extraction and combustion sites through increased air pollution. Most renewable sources, on the other hand, emit little to no greenhouse gases or pollutants into the air while placing relatively less pressure on natural habitats.

However, the transition from fossil fuel-based energy sources to renewable sources of energy does not come without its challenges. The intermittent nature of wind and solar power could, for example, disrupt energy supply, reducing its efficiency. In order to promote a reliable and stable power supply, intermittent sources of energy must be complemented by other energy-related technologies, such as battery energy storage systems (BESS).

Lack of adequate funding and conducive regulatory regimes are also adding pressure to the decarbonisation movement. Without sufficient private capital backing alternative solutions to this intermittency or investing to secure the supply chain, the path to net-zero looks uncertain. The gap in infrastructure funding – expected to reach $94.8 trillion (ICE, 2022) for emerging markets by 2060 – underscores the need for greater private capital. To catalyse private capital into this space, it is critically important to develop the right legislative and regulatory frameworks. Currently, long permitting times along with the varying pace of battery technology advancement is impacting deployment, particularly for large-scale energy storage projects (IEA, 2023).

Renewable energy capacity investment from 2010 to 2019, $bn



Source: UNEP, Bloomberg NEF as of 2019

Furthermore, the global renewable energy technology supply chain is concentrated in Asia. China is the largest global manufacturer of solar panels, followed by Malaysia and Vietnam. China also dominates the batteries supply chain, with a 75% share of global battery production (BloombergNEF, 2022). Southeast Asia has a substantial proportion of natural resources, with critical minerals including bauxite, nickel and tin, all of which are used in EV battery production. The concentration of materials used in battery production renders the chain particularly susceptible to environmental and/or geopolitical disruption.

These challenges – the intermittency of renewable energy sources; the lagging deployment of energy storage systems; the concentration of the renewable energy supply chain, along with the capital and regulatory regimes required – have precipitated concerns about meeting net zero by 2050.

Solving the challenge

Of the various methods to store energy, pumped hydro-electric storage dominates the storage market at present (with 95% of the world's energy storage reflecting more the lack of storage rather than the scale of hydro-electric). Despite this dominance, it suffers from several pitfalls – hydro-electric storage can only be used in certain places, where the geography supports them (it is largely dependent on its proximity to a source of water and geology). Hydro-electric storage projects are typically difficult to implement, have long lead times (>10 years) and high initial capital expenditure ($3,200/kWh), compared to an average of $1,000/kWh – $2,000kWh for solar energy projects (Xiao, Junne, Haas and Klein, 2022). Beyond operational complexities, there are environmental and social concerns surrounding some hydro-electric storage using large dams.

However, while hydro-electric storage dominates the market now, other technologies – such as compressed air, stacked concrete blocks and battery storage – are also developing. Battery storage in particular is a key area gaining traction. Global investment in battery storage surpassed $20 billion in 2022 (IEA, 2022), and BESS projects have emerged as a promising solution in the face of the larger scale issue of intermittency.

What is battery storage?

At its most basic level, battery storage works by storing energy generated by renewable sources of energy, like solar and wind power, or energy taken from the electric grid. Software uses algorithms to discern and co-ordinate when the energy should be stored or released – typically in response to a spike in demand, when more power is required. This contributes to a more stable supply of electricity and keeps costs low.

Advancements in battery technology are helping to reduce the cost of battery modules, with figures from Bloomberg New Energy Finance suggesting the cost of lithium-ion batteries decreased by 85% between 2010 and 2018 (BloombergNEF, 2019) . This trend is set to continue, with a study by IRENA (IRENA, 2023) indicating that the total installed costs of battery storage may decrease by 50–60% by 2030, while battery cell costs may fall by an even greater amount. Lower production costs, along with greater capacity to generate electricity are driving demand for, and the deployment of, battery storage facilities. Consequently, improved manufacturing facilities, better battery performance and decreased costs are making battery storage projects more affordable.

Lithium-ion batteries are the most dominant battery chemistry in the market, with several benefits relative to other battery chemistries. These include significantly high energy density, relatively high voltage and low self-discharge, extending its life cycle (Berenberg, 2023). Global demand for lithium-ion batteries is expected to soar over the next decade – with the number of GWh needed to meet demand increasing from 700 GWh in 2022 to 4.7 TWh by 2030. Growing demand for passenger EVs, which typically use rechargeable lithium-ion batteries, is also amplifying demand. On the whole, global battery cell demand is expected to surpass 5,500 GWh by 2035, from just over 1,000 GWh currently.

The heightened demand for energy storage systems has led to increased investments being channelled into battery storage. In 2017, Tesla's installation of the 150MW Hornsdale Power Reserve, a large grid-scale energy storage facility, marked a ground-breaking venture in energy storage. But investment in battery storage must be upscaled significantly to align with net-zero goals. According to the IEA (IEA, 2022), grid-scale battery storage capacity must grow 44-fold between 2021 and 2030 to achieve net-zero by 2050.

Benefits (for the grid)

With solar and wind power generating varying levels of energy, storage offers several benefits for the grid. First, battery storage systems provide useful ancillary services to the grid, enhancing grid resilience and helping to balance the grid. Some of these services include peak shaving (managing spikes in energy demand) and regulating grid frequency by responding rapidly to fluctuations in electricity demand through providing short-run capacity. Finally, battery storage projects can shift load demand, or electricity consumption from peak hours to off-peak hours, maintaining overall electricity consumption at the same level. This helps provide back-up power and minimises the chance of power outages.

Battery storage projects also have the potential to be implemented alongside other renewable energy projects. These hybrid projects have the potential to increase generating capacity, improve the stability of electricity supply and boost efficiency. This co-location of renewable energy projects is already happening in Hawaii, where, despite strong solar resources, energy storage is needed to sustain a reliable supply.

Regulatory initiatives are helping to cement battery storage as an economically viable proposition by creating a conducive environment for its implementation. The US Inflation Reduction Act, as outlined earlier, supplies tax credits to companies and consumers for EV battery and raw materials that are sourced locally, which in turn is shifting manufacturers' organisation of their supply chain and supporting investments into the US.

Some other countries, such as India, are also seeking to decouple from dependence on a small number of countries for battery supply and source critical metals themselves to become self-sufficient. Geopolitical factors have also played a part – the Russia-Ukraine war, for example, has contributed to countries looking to diversify their energy supply and become independent.

Where are we in the cycle?

Despite the recent increase in investment, the battery storage market is still relatively underdeveloped. All elements of the battery supply chain must increase significantly to meet projected demand, including the mining and refining of raw materials (such as lithium, nickel and cobalt), and the manufacturing of individual battery components, such as cathodes and anodes.

Some of the new proposed technologies for battery storage, such as vanadium redox flow batteries, are in their early stages of evolution. But even some established technologies, such as lithium batteries, which are propelling the market, are new to some applications and require a substantial amount of investment to scale-up.

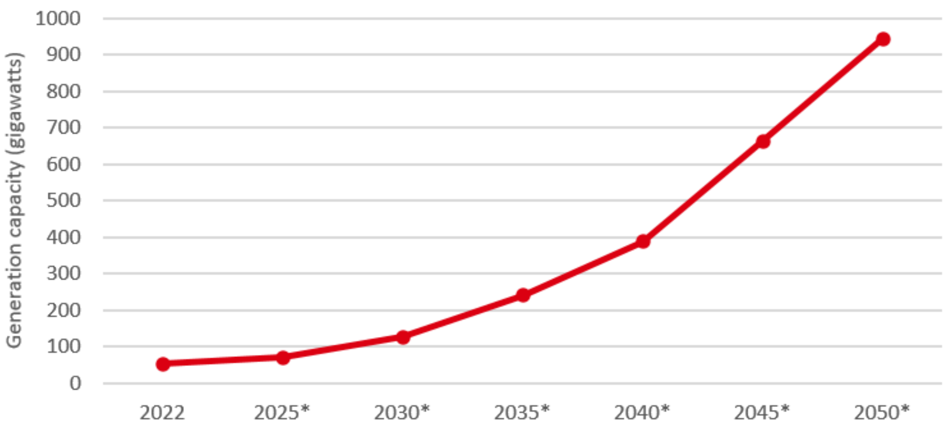
Globally, China leads investment in the battery storage market, accounting for 80% of all grid scale investments. Over 50GW of battery storage is currently undergoing construction – but this is just under half of the annual grid-scale battery storage needed to meet net-zero by 2050 (WEF, 2023). The US and Germany are also major players in battery storage development, with Germany and the UK being at the forefront of battery storage in Europe. Germany has recently approved tax credits to facilitate spending and increase the economic viability of battery storage projects, while in 2022, Europe's largest battery storage system began operating in the UK. Many markets in the Asia-Pacific region are also continuing to significantly expand their renewable energy capacity and concurrently the needed energy storage systems. In 2023, India announced $455m in incentives to companies establishing battery storage projects, following the country's announcement of plans to increase its renewable energy capacity to 500GW by 2030. More recently, Australia announced plans to expand their existing Capacity Investment Scheme for renewables, adding 32GW of renewable capacity in variable and dispatchable (i.e storage) forms.

The investment opportunity

Increasing demand, the intermittency of renewable energy sources, along with government incentives to support the growth of the energy storage sector have positioned storage solutions as a key component in achieving net-zero commitments and a promising investment opportunity. With the volatility of fossil fuel prices making renewable sources of energy one of the cheapest ways to generate energy (IRENA, 2022), demand for energy storage is expected to grow; through capturing excess supply cheaply and selling when supply outstrips demand.

With demand for storage increasing, the generation capacity from battery storage is also forecast to grow significantly over the next decades.

Installed electric generation capacity from battery storage globally in 2022, predicted to 2050



Source: Statista, 2023. As of end of November 2023.

Storage projects earn revenues in a similar way to other peak demand plants from a combination of revenue streams, forming a stacked revenue model. While these streams may differ by jurisdiction, these can include:

- Resource adequacy and the capacity market – through supplying a payment for reliable sources of capacity, the capacity market helps contribute to the security and stability of electricity supply.
- Ancillary services – battery storage projects can also earn revenue from selling ancillary services including voltage regulation, frequency regulation and products from the storage's contingency reserves to transmission owners or smaller-scale grid operators.
- Price arbitrage – referring to the revenue obtained from purchasing electricity when prices are low and selling power when prices are high.

The value-stacking of revenue streams offers upside to investors, while attractive investments provide returns based on committed stand-by power agreements covering both the cost and profits of projects for investors and offsetting the risk of regulatory and market shifts. Volatility in energy prices also acts as a potential source of profit for battery storage projects, although there remains a risk that volatility may decrease over time.

Within the storage space, small-scale projects are particularly attractive. These projects can potentially deploy capital faster than large-scale projects, which could face more approvals, potentially lengthier permitting processes and may have greater government involvement. Delays to construction, likelier in projects that are larger scale, can also culminate in increased costs because of inflation and fluctuations in commodity prices, affecting the overall commercial viability of projects. Through investing in small-scale projects, regulatory risk is potentially decreased, while investors can tap into the potential upside of storage projects.

Additionally, the supply chains on which small-scale projects are based may be more localised and simpler in nature, decreasing the project's exposure to global geopolitical tensions and subsequently bolstering supply chain resilience. A more localised supply chain can bring about several other benefits, including shortened delivery times and reduced transportation costs.

Due to the growing imbalances in supply created by intermittency, the market for balancing services is likely to keep providing value (LCP, 2021). Battery storage presents the current best opportunity for investment, with investment opportunities also existing to deal with issues such as battery disposal, through developing recycling facilities and associated infrastructure to support the battery storage industry.

However, despite the attractiveness of the standby power sector, the landscape remains marked by challenges. New technology is being developed utilizing different solutions for storage, but these still need to evolve. Batteries have also been linked to issues surrounding the impact of mining natural resources. This has precipitated ESG concerns, with mining having the potential to contribute to environmental pollution, economic inequality and the displacement of local communities.

To facilitate a just transition, these challenges need to be managed and risks mitigated through stringent regulation, illustrated by the EU proposing tougher requirements on sustainability, due diligence and recycling for Europe's batteries industry. Battery recycling is expected to become a significant opportunity after 2030. Navigating these complex markets and challenges is where experienced managers are essential in order to capture the upside of the energy transition.

How climate tech is helping the renewables industry

Climate technology – a dynamic and rapidly evolving sector –- is increasingly being recognised as a powerful tool for achieving ambitious climate policies. Globally, the climate tech market was valued at $20 billion in 2023 and is expected to expand to $183 billion by 2033, with a CAGR of 24.5% during the next ten years (between 2023 and 2033) (Future Market Insights, 2022).

One example of how climate tech is helping renewables is through smart grids. Smart grids help electricity networks enhance the efficiency and reliability of supply by using technology to match supply and demand while reducing costs and sustaining the overall stability of the grid. The advanced technology is gaining traction among several developed economies. In 2022, Japan announced USD $155 billion in funding promoting investments in smart grids, energy-efficient homes and carbon footprint reduction technologies, aiming to bolster grid resilience.

Additionally, carbon-capture, utilisation and storage (CCUS) technology, a set of technologies and processes designed to capture carbon dioxide emissions from large point sources (such as power generation and industrial facilities) is attracting attention in North America. The US leads CCUS globally, with more than 60% of global CO2 capture capacity (IEA, 2022).

Understanding these technologies alone, however, is not enough – these developing technologies with the potential for high returns require wider scaling up and significant investment to realise their potential in the journey to a low-carbon economy.

The role of private capital in the transition

The energy transition is capital-intensive. According to McKinsey, getting to net-zero by 2050 will require $9.2 trillion of investment per year, but only about $5.7 trillion per year is being invested today (McKinsey, 2022).

To meet the Paris climate targets, existing investments are likely to be insufficient. The gap between what is required and what is currently being invested has been growing in light of higher inflation and interest rates. Higher inflation rates have the effect of increasing the cost of materials and overall costs by extension, thus increasing the amount of capital required to finance a project (BCG, 2023). The cost of constructing wind turbines, for example, has increased by 30% since 2021, leading to some projects being cancelled or slowed down (Orsted, 2023).

Historically, government support – in the form of subsidies, incentives or other means – has been the catalyst for investments into clean sources of energy and other technologies to support the transition. This is necessary and will continue given recent announcements such as the Net Zero Industry Act, an EU initiative seeking to expand the EU's manufacturing capacity for renewable energy technologies and products. These incentives should subsequently contribute to increased demand for storage such as batteries.

While private capital has increased substantially, it needs to scale up more than what is currently being provided. To meet this need, figures from the IEA indicate that annual investment from both public and private sources in clean energy in emerging markets and developing economies (EMDEs) will have to more than triple – from $770 billion/year in 2022 to $2.2-2.8 trillion/year – by the early 2030s (IEA, 2023).

The widening gap between the capital currently being provided and the amount required to meet net zero, along with governments facing higher debts in the aftermath of the Covid-19 pandemic, means that private capital is set to play an increasingly crucial role in accelerating the energy transition. In addition to being contributors of capital, the private sector should also help to drive innovation and operational efficiencies while also promoting global best practices. According to the IEA Net Zero Emissions by 2050 Scenario (NZE), an estimated 70% of clean energy investment over the next decade will be carried out by private developers, consumers and financiers (IEA, 2021).

To incentivize private capital, governments will need to ensure supportive regulatory and legislative frameworks are in place to facilitate the rapid deployment of capital. Long approval and permitting times, especially for some large projects, could dampen investments. Some smaller projects where supply chains may be more localized, and regulatory and political involvement lower, could provide investors the opportunities to deploy capital rapidly, capturing the economic benefits of the transition, while allowing them to deliver on their net-zero commitments.

Spotlight: the importance of Asia

As an engine of economic growth and leader in the supply chain for the renewable energy industry, the success of the global transition to net zero hinges on a successful energy transition in Asia. Asia is estimated to control 45% of the renewables supply chain (McKinsey, 2022) with China alone accounting for 73% of global lithium battery manufacturing capacity, and is also the leader in solar panel capacity (BloombergNEF, 2022).

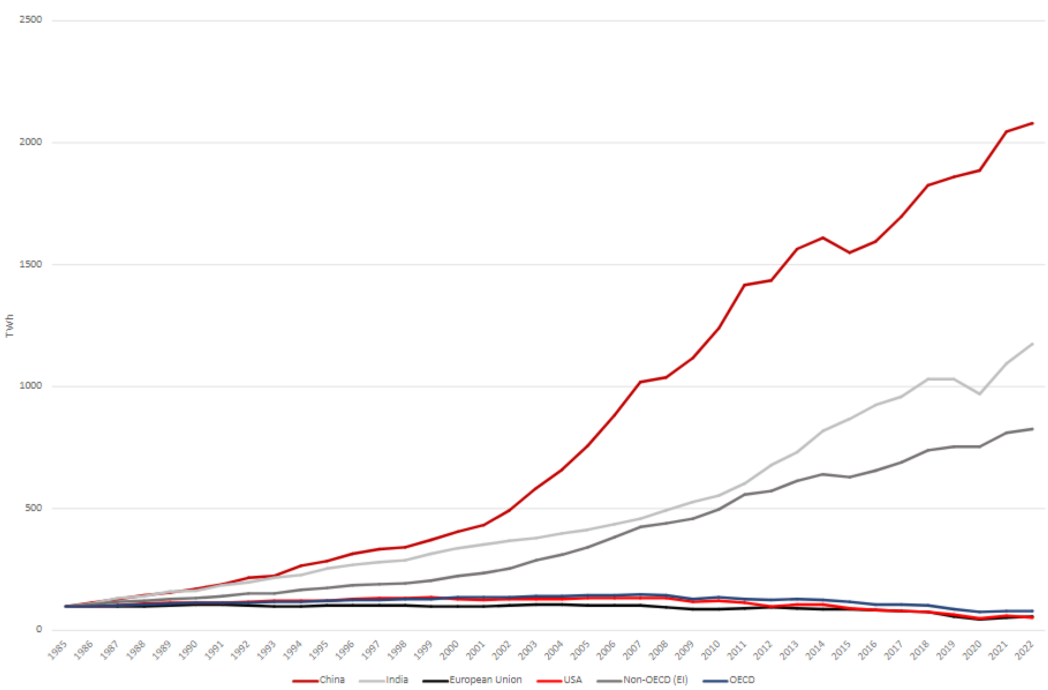
Currently, Asia's energy demand exceeds that of any other region: the International Energy Agency (IEA) forecasts that countries in Asia will likely use half of the electricity in the world by 2025 (IEA, 2022), compared to a quarter in 2000. This demand can be attributed to a multitude of factors, including fast-growing developing economies, Asia's position as a global manufacturing hub and its vast urbanising populations.

Robust economic growth is amplifying this demand. Last year, economic growth in the Asia-Pacific region reached 3.9% (IMF, 2022). This trend is set to continue, with India (estimated growth of 6.7%) and South Asia predicted to grow quicker than other regions in 2024 (Asian Development Bank, 2023).

Asia's economic ascent, driven in large part by its strong manufacturing industry, has long been propelled by a reliance on fossil fuels. Between 1985 and 2016, coal comprised 70% of China's energy consumption. China and India alone accounted for 67.2% of global coal consumption in 2022. Asia is still broadly increasing coal output, accounting for 80% of global coal use and 90% of young (<20 years) coal-fired power plants globally.

These high rates of fossil-fuel led economic growth, however, come at an environmental cost – in 2021, Asia generated more than half (55%) of the world's greenhouse gas emissions (Our World in Data, 2021).

Electricity generation from coal, 1985 – 2022



Source: Our World in Data; HSBC internal analysis as at a**s of 31 December 2022.**

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As such, one of the largest challenges Asia faces over the coming decades is that of decoupling carbon emissions from economic growth. To reduce the impact of this ostensible bond between energy use and economic development, some Asian countries are expanding their renewable energy capacity and improving energy efficiency. In China, the focus of policy has now shifted to the challenge of decoupling carbon emissions from growth. Crucially, however, Asia still has a long way to go in meeting net-zero targets (which differ by country) and achieving this decoupling will not be straightforward. This challenge is reflected in the prevalence of fossil fuel subsidies in the regions' economies. Research from the IMF (IMF, 2022) indicates that global fossil fuel subsidies and costs reached a record of $7 trillion in 2022 – with East Asia and the Pacific region accounting for nearly half of the total international subsidy.

Financing constraints add another layer of complexity to Asia's energy transition. Although sustainable infrastructure projects are increasing in quantity, the green financing ecosystem is relatively nascent in Asia, owing to evolving regulatory frameworks and standards for green financing, while international capital investment in the sector tends to favour the developed Asia countries at the expense of developing markets. Although the need for investments in renewable energy projects is evident, securing adequate funding remains challenging, with a PwC report published in 2020 (PwC, 2020) calling for more transition finance to be directed in emerging markets. Constraints on transition financing carry wider ramifications – not only globally, given the concentration of the global renewables supply chain in Asia – but also locally, where for example, a lack of financing can feed into the underdevelopment of the power grid for renewable energy integration, as is the case in Vietnam.

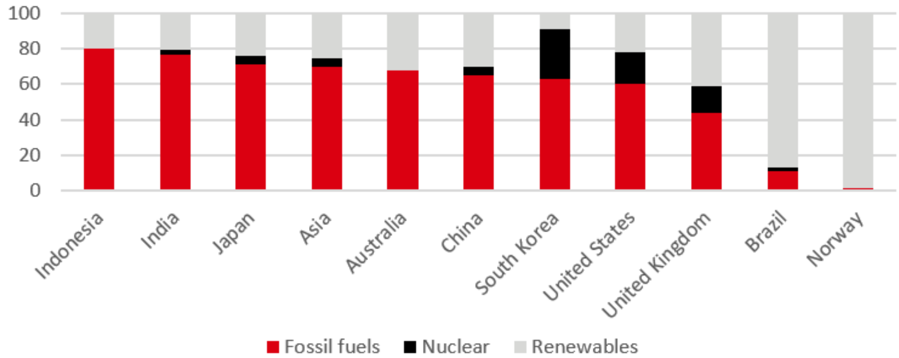
For Asian countries to meet their climate targets, there are substantial opportunities for investments into clean energy technologies across the region. Of the region's 409GW renewable energy potential, estimates indicate only 9.3GW or 2.3% of this potential is being used (East Asia Forum, 2023)

The dynamics in Asia

For the world to achieve the Paris climate ambitions, an accelerated energy transition in Asia is critical. Currently, Asia surpasses other regions in terms of the scale of investment needed for the energy transition and for climate adaptation and mitigation. According to the Network for Greening the Financial System's (NGFS) Net Zero 2050 scenario, $3.1 trillion of the $9.2 trillion to be allocated to physical assets for energy and land-use systems between 2020 and 2050, must be deployed in Asia.

However, with significant fossil fuel deposits and consumption across the region – particularly in China, India and Indonesia – the economic and social impacts of shifting away from coal, and fossil fuels are significant.

Electricity consumption from fossil fuels, nuclear and renewable energy sources, 2022



Source: Our World in Data; Ember's Yearly Electricity Data; Ember's European Electricity Review. As of 31 December 2022.

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On one hand, decreasing dependence on costly, volatile fossil fuels by investing in energy transition infrastructure – facilitated by the decreasing cost of clean energy – can provide opportunities for global exports, drive innovation and generate jobs. Solar photovoltaic technologies, for example, reached four million jobs globally in 2020 (IRENA research, 2020). On the other hand, the transition to sustainable energy sources has the potential to displace jobs in traditional energy industries and other fossil-fuel related sectors. In some countries, such as Indonesia, coal acts as a significant employer and generator of revenue for local communities. Meanwhile, in northwest China, a report by Global Energy Monitor indicated that jobs in coal mines in the Shanxi province could be reduced by 241,900 by 2050 (Global Energy Monitor, 2023). Additionally, more than half of the new jobs in the clean energy sector are highly skilled, with over a quarter medium-skilled (IEA, 2023).

Emerging countries also need to consider the cost of energy for their largely poorer populations, where increases in energy prices have a relatively larger impact. With circa 155 million people living in extreme poverty (defined by the World Bank as living on less than $2.15 a day) in 2022 (Asian Development Bank, 2023), and an estimated 75 million people being pushed into extreme poverty during the COVID pandemic, new energy sources need to be cost competitive. Moreover, the jobs created through renewable energy generation have to balance, if not exceed those lost through mining closures and so forth.

Furthermore, many of the poorest, marginalised communities in Asia reside in areas susceptible to extreme weather and climate risk, including coastal areas and low-lying islands. Extreme weather events and wider environmental shifts have the potential to directly impact these communities and their livelihoods - through damaging homes and infrastructure, or causing social or economic displacement. While extreme weather is becoming increasingly common globally, Asia is particularly prone to extreme weather, with temperatures in the region having increased twice as rapidly as the worldwide average in the past year (IMF, 2022). This has a particularly acute economic impact on Asia and beyond because of the region's centricity in the global supply chain and concentration of highly energy-intensive manufacturing industries in Asia.

Investment in sectors aiming to mitigate climate change, such as energy transition infrastructure, can help reduce this impact of extreme weather on poor communities, and carries the potential to make a significant, positive social impact. The phasing out of coal using clean energy technologies can help provide remote areas with access to electricity through the deployment of decentralised energy systems. Access to electricity has further positive effects on populations' quality of life through facilitating access to technology and information, enhancing educational outcomes.

In the landscape of global infrastructure opportunities, Asia stands out as a vital player in propelling the energy transition. Ultimately, we believe the energy transition globally is in jeopardy if Asia is unable to successfully transition from fossil fuels to low-carbon energy sources. To deliver the energy transition successfully, Asia must actively incorporate the heightened economic and social implications of the transition to ensure the process is equitable, sustainable and beneficial for all segments of society.

Portfolio Implications

Energy transition investments may be at the beginning of a decades-long investment cycle, representing a significant opportunity for investment and wealth creation. This opportunity is particularly evident in Asia, where there is immense potential for growth and innovation in the region's renewable energy sector. To reach net zero, while government support may kickstart the development of some energy transition infrastructure, private investment across the capital spectrum is crucial, particularly in emerging sectors like battery storage.

For private equity, many countries within Asia provide exceptional opportunities to make direct equity investments in businesses that develop, own and operate energy transition infrastructure assets. From our perspective, the most attractive risk-return proposition is in mid-market businesses that have a blended risk exposure across development, construction and operational assets. In the mid-market space, there is greater ability to negotiate bi-lateral deals and influence business plan implementation compared to larger deals. There is also considerable potential for investors to achieve additional returns through asset creation (through developing and building new assets) and platform building (through creating scale in mid-market businesses). The ability to add value in these situations is strengthened by our having on-the-ground investment expertise.

In the private debt markets, infrastructure investments within the renewable energy sector offer investors access to potentially stable cash flows and have inflation-protection characteristics by acting as a natural hedge against inflation. Increasingly these projects offer shorter duration, floating rate debt opportunities for investors characterized by stable cashflows and predictable returns. Investing in infrastructure debt opportunities are an attractive diversification from traditional private credit, with returns on a par with those strategies due to the scale of the investment opportunity (Preqin, 2023). The largest investment opportunity lies in infrastructure supporting the transmission, distribution and generation of energy. We believe the opportunities that will generate the most attractive returns are likely to be where the business models are still developing or the projects are smaller scale – found, for example, in storage and smaller scale electricity generation projects.

For investors with liquidity needs and/or not able to invest in private markets, investments in listed infrastructure may provide thematic exposure to renewables, offering broad diversification (by geography, industry and regulation) and liquidity. This asset-class provides diversification to global equities, due to predictable revenues that are often defined in contracts and linked to inflation

Conclusion

The energy transition is in full swing. While the energy sector continues to be the most significant contributor to global greenhouse gas (GHG) emissions (Intergovernmental Panel on Climate Change, 2022), new solutions are emerging to aid the transition to net zero, decarbonisation of the economy and counter concerns surrounding energy security and affordability for consumers.

The broader challenges facing the energy transition (including intermittency, supply chain concentration and a lack of funding), however, are not insurmountable. Instead, challenges such as intermittency have paved the way for greater innovation in renewable energy technologies, with technology continuing to develop.

Given the funding gap (McKinsey, 2022), private capital is set to be a powerful force driving the global energy transition towards more sustainable alternatives. Continued government support can help unlock the large flows of private capital required – particularly within developing economies where the potential to reduce emissions is high, but the investment environment is relatively nascent. Asia stands as a key player in the energy transition, requiring greater capital than other regions to meet its net-zero goals and support the global transition. Across Asia, we believe there is substantial opportunity to make direct value-added investments in the region's renewable energy sector. The region, which is projected to grow faster than the West with lower inflation, is positioned well to capitalise on emerging clean-energy technologies. This potential is strengthened by countries such as Japan, which have a strong legacy of technological innovation.

As the world continues to develop and deploy renewables, there remains several pockets of opportunities for investors in the global transition to a low-carbon economy with significant investment in energy storage required to meet the demand shifts and tackle the challenge presented by intermittency. Instead of investing in large-scale projects only, a greater opportunity can be found in investing in small-scale projects, in which it is quicker to deploy capital and where there is potential for less regulatory risk and delays.

In a macro environment characterised by the normalization of interest rates, affordability in the context of clean energy production becomes a challenge that requires manageable and controllable costs associated with the transition from fossil fuels to renewable energy sources. The success of clean technologies – and specifically batteries due to the evolving technology – hinges on cost efficiency, innovation, and widespread adoption. This approach is essential for fostering an energy transition that is not only sustainable for the planet but also economically viable for all.

Ultimately, we remain focused on supporting our clients in the global energy transition and helping clients find solutions to a rapidly changing landscape. In doing so, we aim to deliver positive financial returns for investors with investments that we believe may contribute to building a resilient, sustainable and equitable energy landscape in Asia and beyond.

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Risk considerations: there is no assurance that a portfolio will achieve its investment objective or will work under all market conditions. The value of investments may go down as well as up and you may not get back the amount originally invested. Portfolios may be subject to certain additional risks, which should be considered carefully along with their investment objectives and fees.

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- **Long-term horizon:** investors should expect to be locked-in for the full term of the investment.
- **Technological risk** exists when the technology, on the scale proposed for the project, will not perform according to specifications or will become prematurely obsolete. The risk of technical obsolescence following completion becomes particularly important when a project involves a state-of-the-art technology in an industry whose technology is rapidly evolving.
- **Economic conditions:** the economic cycle and prevailing interest rates will impact the attractiveness of the underlying investments. Economic activity and sentiment also impacts the performance of underlying companies and will have a direct bearing on the ability of companies to keep up with interest and principal repayments.
- **Valuation:** these investments may have no or a limited liquid market, and other investments including those in respect of loans and securities of private companies, may be based on estimates which cannot be marked to market until sale. The valuation of the underlying investments is therefore inherently opaque.
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