GREENTECH
VENTURES

EU CHINA GREENTECH

A whitepaper exploring a cross-continental open innovation ecosystem through the fostering of public and private partnerships

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Executive Summary

Global commitments to net zero are popularising sustainable development and green technology as a newfound focus of international collaboration.

The EU is a global leader in climate technology—a critically important sector for achieving net zero targets in the upcoming decades.

The rise of climate tech in the EU has been enabled by an ambitious rollout of climate-friendly policies and green technology funds.

China too, has put significant stake in the development of green technology. Forecasted to invest hundreds of trillions of yuan to achieve carbon neutrality, the formation of strong bilateral partnerships between China and the EU could accelerate the rise of promising green technologies and support scaleup for greentech entrepreneurs. Europe's foothold in green technology and its headway in environmental policy could serve as an inspiration for China.

Launched in 2021, the China and Europe Green Corridor seeks to increase EU–China collaborations on greentech, particularly in the form of public and private partnerships.

The China and Europe Green Corridor has been endorsed by the Shanghai Science and Technology Commission alongside partners in Europe.

The Corridor represents one of the first attempts to connect public and private sector players in the EU and China to accelerate innovation and investment in the green technology sector.

This whitepaper is a roadmap for decision-makers informing the future direction of the Corridor. We hope the contents of this report spur interest in best-leveraging the development of greentech in the EU and China moving forward.

Background and Context

2.1 Development of the Policy Environment and the Rapid Growth of Green Technology

The 2015 Paris Agreement on Climate Change represents our governments' collective goal to limit average global temperature increase "well below 2°C above preindustrial levels and to pursue efforts to limit the temperature increase to 1.5°C"—thereby averting the most catastrophic impacts of climate change.

In subsequent years, the EU and China have set several ambitious climate-related commitments, policies, regulations, and incentive programs. Policy leadership is increasingly leading investors to embed ESG into their investment mandates, which in turn fuels the growth of green technology.

The embracement of ESG in finance has been accelerated by international climate-finance standard organisations such as the United Nation's Principles for Responsible Investment (UNPRI) and the Financial Stability Board's Task Force on Climate-Related Financial Disclosures (TCFD). The TCFD disclosure framework exists to support climate disclosures at the company level that are comparable, consistent, reliable, and clear. Transparent and consistent company disclosures enable investors to allocate capital in a more informed way, ultimately avoiding the abrupt repricing of risks due to climate change, and resulting impacts on financial market stability. Particular emphasis is placed on climate change risk management, a testament to investors' commitment to ESG integration. Supported by more than 1,700 organizations worldwide, TCFD members include nearly 60% of the world's 100 largest companies, spanning 77 countries.

Globally, we are also seeing a rise in impact investing. According to Morningstar, ESG funds in Europe attracted inflows of EUR 233 billion (GBP 200 billion) in 2020 almost double that of 2019. The first quarter of 2021 saw a further inflow of EUR 120 billion, representing 51% of total European fund flow.

The challenges posed by the COVID–19 pandemic have accentuated the threat and need the adverse effects of climate change. This has been reflected in promises by politicians and investors of a green recovery.

Current conditions are favourable for the growth of green technology. As projected by the International Energy Agency (IEA), while existing technology will drive the majority of emissions reductions until 2030, after 2050, more than half of reductions will need to come from technology currently at beta stage.

2.2 Policy Development and Greentech in the EU and China

Public policy shapes the environment through commercial incentives and regulations for technology companies and investors. This section examines business incentive policies such as taxonomy, the carbon border tax, and the voluntary carbon market.

2.21 Taxonomy

Green taxonomy is a policy tool that identifies activities/investments that deliver on environmental objectives, and drive capital toward priority sustainability projects. To scale up the sustainable economy quickly, an accepted common set of internationally aligned standards for green finance, green technology and clean energy are required.

The EU Taxonomy is regarded as one of the most advanced sustainable finance standards currently available. This classification system for environmentally sustainable economic activities aims to clarify and regulate what can be considered a green economic activity. Developed as part of the wider EU Sustainable Finance Strategy, the EU Taxonomy is expected to define mandatory disclosure of sustainable investments and assets by investors, banks, and corporates in the EU and beyond.

China's taxonomy seeks to addresses climate change, environmental improvement, circular economy, waste recycling, and pollution prevention. The Green Bond Endorsed Project Catalogue, initially drawing international attention and debate following its launch in 2015 , due to misalignment with the international taxonomy, was amended on 21 April 2021 to have fossil fuel project removed from the list. This action, now signed into law, makes China's taxonomy consistent with international standards.

Continuing to improve the alignment of taxonomy between the EU and China would accelerate financial flows into low-carbon sectors as the world recovers from the Covid–19 pandemic.

The International Platform on Sustainable Finance (IPSF) is a knowledge-exchange platform aimed at aligning financial regulations and standards for a greener economy, launched by the EU and 14 countries, including China. The Working Group on Taxonomies within the IPSF, co-chaired by the EU and China, provides a good basis for aligning global green finance standards and taxonomies.

Even for the EU Taxonomy, experts recognise there is scope in need of further refinement. Some assert that the EU Taxonomy's ability to mobilise large volumes of capital for sustainable investment is limited scope of criteria considered inadequate. For example, assessment is focused on the status quo, and does not consider long-term sustainability strategies in place to achieve emission reductions goals for 2030 and 2050. Carbon-intensive companies, particularly those in hard-to-abate industries dependent on future technological innovations to reduce their

carbon emissions fail to be incentivised or rewarded for robust sustainability strategies to inform their transition over the upcoming decades.

Additionally, some experts have expressed concern that the extensive list of assessment criteria could overburden SMEs and significantly increase the cost and effort of reporting without streamlining existing standards.

Going forward, the EU would benefit from collaborating with China and other international partners such as the US to synthesise an internationally accepted set of taxonomy, which would provide clarity to investors and companies conducting ESG reporting or using green financial products, which particularly relevant to an ever-converging global financial market.

2.22 Carbon Border Tax

The Carbon Border Tax, also known as a Carbon Border Adjustment Mechanism (CBAM), is a tax imposed on the imports of certain emissions-intensive goods to avoid growing concerns over carbon leakage, or the transfer of high-emission production to countries with poor environmental regulations. The European Commission adopted the latest proposal of the CBAM in July 2021, and is encouraging international partners to take steps in the same direction. The European Parliament urged a direct link between the CBAM and the EU's emissions trading system (ETS), where producers in carbon intensive industries would have to buy and trade permits to emit greenhouse gases. Similar mechanisms are also being considered by the UK and the US.

Although Chinese policy makers were initially resistant towards the CBAM proposed by Europe, the country has recently become more supportive. Zhou Xiaochuan, former governor of the Bank of China, remarked in June that CBAM could be acceptable if tax income collected through this mechanism supports carbon reduction activities in developing countries, giving the example of a fund to buy carbon quotas in developing countries' carbon markets.

Zhou reasoned that if such border tax income (mainly collected by advanced economies, also likely to be importing countries) flows to developing countries (likely to be exporting countries) especially those with labour-intensive, energy-intensive, and emissions-intensive exports, this could contribute to total emissions reductions on a global scale.

A recent analysis by the non-profit thinktank Sandbag found that the CBAM's impact on Chinese imports into the EU is likely to be small. The four industries of Chinese imports affected by CBAM accounted for only 1.8% of all goods imported into the EU from China in 2019.

The consensus reached by EU and Chinese policy makers on CBAM is another means of the EU showing global leadership in using policy tools to avoid the risks of "carbon leakage".

2.23 Carbon Trading Market

A functional voluntary carbon market can incentivise carbon-intensive companies' to cut their emissions, whilst also encouraging investment into greentech to further the development of cutting-edge technology.

Today, more than 40 countries and 25 subnational governments have implemented a price on carbon. The EU and China are leaders in this market: the EU's trading scheme is one of the most established globally, while China's trading scheme has become the world's biggest since commencing operation in 2021.

The EU Scheme

The European Union's Emission Trading Scheme covers 45% of all EU emissions, operating in energy-intensive industries like electricity and gas, oil refineries, steel works, raw materials manufacturers, and commercial aviation. The EU Emissions Trading Schemes (ETS) works on a cap-and-trade principle, where a cap is placed on a company's carbon emissions and they are allowed to trade the excess. Through a gradual reduction of the number of carbon permits available each year, rising prices will place greater pressure on companies to reduce their emissions and adopt clean technology.

The EU ETS fits within the wider framework of the EU's Fit for 55 Package, a set of policies charting the path to reducing EU greenhouse gas emissions by 55% in 2030 (relative to 1990 levels), as required by the Union's recently-approved Climate Law. To achieve the goals set out by the Fit for 55 Package, the EU ETS will gradually reduce the emissions cap for the carbon trading scheme.

China's Scheme

For China, national carbon trading debuted in July 2021 in Shanghai, priced in the low 50s yuan per tonne. China's ETS has received significant global attention as the largest carbon trading market, which includes 2,225 coal and gas-fired power plants responsible for 4-4.5 billion tonnes of CO2 emissions annually in phase one alone—or 12% of global emissions.

Discussion about how to integrate a global trading scheme is underway with particular emphasis on the EU and China, representing the two largest ETS in the world. The low price for carbon in the China scheme is a major barrier to integration, an issue widely recognised by regulators, policy makers, and broader market participants in China.

Low carbon pricing in the Chinese carbon market fails to provide adequate incentive for polluters to reduce emissions as the environmental and social consequences of carbon-intensive operations are not reflected in the cost of carbon. Companies need to have a financial incentive to reduce emissions operationally first. Likewise, it prevents

companies operating in the Chinese ETS from developing and/or investing in carbon reduction technologies when profits from carbon credits—sold on the carbon market to polluters—remain poor.

China's emissions trading scheme cannot be a fully-functional carbon market with tangible climate impact without improved planning, data collection, measurement, and verification. Experts also believe China's carbon trading should have more financial characteristics, to improve the system's risk management function.

The first cohort of trading companies in China's ETS includes more than 2,000 utility corporations, with participation from China's carbon-intensive sectors set to increase. Motivated by the potential benefits of price rallies, the ETS market is being closely monitored by financial institutions and private investors.

Zhou Xiaochuan, former governor of the People's Bank of China said in 2021, "the most effective way of designing a carbon market would be to create one that places heavy emphasis on encouraging investment. In other words, carbon trading prices should serve as a catalyst to incentivise companies to invest in research and development, new equipment, and new technology, so that in the future China's overall capacity to cut emissions is significantly strengthened."

Since its introduction, Shanghai's national carbon trading market has seen little volatility and depressed overall trading volumes. According to Lai Xiaoming, director of Shanghai Carbon trading exchange, this stagnancy can be explained by the lack of sustainable strategy and environmental management in many corporations, a lack of oversight, and inadequate knowledge across-board. Xiaoming expects registries to continue to diversity, particularly to include a greater proportion of the financial sector.

The price of carbon in China is insufficient motivation for emitters across industries to adopt decarbonation, as affordable carbon credits render the cost of polluting negligible. A carbon Tax, on the other hand, helps to set out a baseline for emission costs. Chinese forecasters anticipate that China may well implement a carbon tax ahead of international peers.

CCER (Chinese Certified Emission Reduction), China's voluntary carbon market, counts on renewables and negative carbon to help fund the development and implementation of new technologies, such as carbon capture technology. However, CCER entries are for large corporations, SMEs and financial institutions are excluded. Since launched, CCER relies on physical trading that prohibits price discovery and adequate risk management has advocates urging policy makers to prioritise the introduction of derivatives. Going forward, structured derivatives are key components to accomplish the full functionality of an exchange

trading market. A dynamic, fully-functional carbon market can smooth pricing discovery, quantify carbon emission liability, calibrate for the cost of the energy transition, and stimulate the source of funding for the sector's innovation.

China is mindful of arbitrage activities, including the practice of selling to unqualified private investors.

EU and China Carbon Trading Scheme Collaboration Potential

The EU and China's carbon trading schemes are not only at different phases of development, but adhere to respective social, economic, and public policy considerations. Despite that the markets are unlikely to converge in the foreseeable future, the creation of an international standard would not only help to smooth potential border tax issues but to create a cross-continental collaborative culture at multiple fronts where businesses, investors, and citizens can work together.

As carbon trading schemes develop globally, both the EU and China will have significant opportunities to share their experiences and insights. If the world moves towards a uniform carbon trading scheme, the EU and China could play a significant role in shaping this global trading market.

2.3 State of Greentech Development in EU and in China, Breakdown by Sector

Green technology is developing rapidly, with both the EU and China being leaders in green technology.

Technological breakthroughs regularly occur in green technology. According to an analysis by the International Energy Agency, approximately 50% of the green technology needed to meet 2050 emissions targets are technologies currently in the prototyping stage.

Urging governments and the private sector to increase funding, the IEA has identified the following key categories critical to achieving IPCC 2050 targets: electrification, CCUS, hydrogen, and sustainable bioenergy. In addition, 15% of cumulative emissions reductions required between 2030 and 2050 will be driven by three technologies: advanced high-energy density batteries, hydrogen electrolysers, and direct air capture (DAC).

Key Categories of Green Technology as Identified by the IEA

- Renewables.
- Hydrogen.
- Battery storage.
- Green Mobility (e.g. electric vehicles) Carbon capture technology–CCUS/ DAC.
- SaaS–Energy efficiency software, supply chain carbon footprints management, etc.
- Circular economy and biological transformation.

Renewables

Europe has been a forerunner in the early-stage research and development of many renewable energy initiatives. China is deploying renewable technology at a scale that has reduced the cost of renewable energy, with sources such as wind and solar becoming increasingly affordable. The EU is projected to continue to increase the share of renewables in its energy grid.

China is a leader in the use of renewables, home to one-third of solar panels and wind turbines, half the world's electric passenger vehicles, 98% of electric buses. China is a mass producer of electric vehicle batteries and battery storage technology essential for increasing the capacity of renewable energy systems globally—a crucial event needed to transition away from fossil fuels. By 2025, China's battery facilities are forecast to grow to almost that of the rest of the world combined.

China's implementation of renewable energy is projected to grow, as climate modellers in China now call for the rapid replacement of fossil fuels with renewable energy sources.

Hydrogen

Green hydrogen, generated by renewable power and water, has emerged as a "silver bullet" technology with the potential to save carbon-intensive sectors such as aviation, where emissions reduction is particularly challenging. Currently green hydrogen is prohibitively expensive, but experts believe commercial rivalry between EU and China companies will soon drive the price down to affordable levels. Green hydrogen technology costs are already falling fast—a fall of 50% since 2015 and is expected to fall further. Furthermore, hydrogen is garnering attention from investors on the back of green policy proposals (including the announcement of the EU's hydrogen plan, targeting 40 GW of renewable hydrogen capacity by 2030).

European Commission Vice President and EU Climate Commissioner, Frans Timmermans, noted in 2020 that the European Union is capable of taking a global lead on hydrogen development, particularly because of Europe's technology leadership and the EU's ability to support hydrogen development through policy drivers.

Meanwhile, China has approved the biggest state-backed renewable mega project for green hydrogen led by Sinopec. The Chinese state-owned oil giant will launch its first green hydrogen project in the Inner Mongolia region in 2022.

Experts believe that whilst the EU can lead on hydrogen technology development, China can lead on costs and scale. China currently has no specific hydrogen targets, but experts believe if China set them, these could drive key changes in the sector.

Green Mobility and Electric Vehicles (EV)

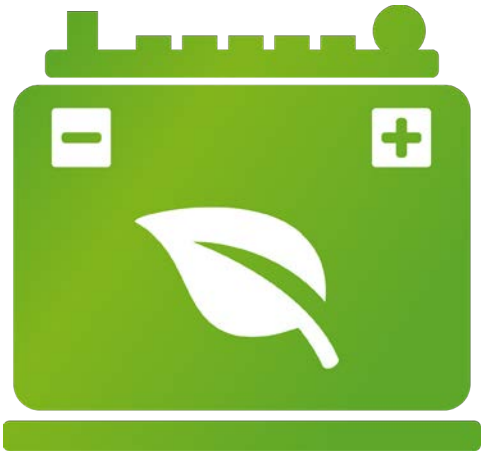
In 2020, Europe sold 1.3 million electric vehicles, surpassing China to become the world's largest EV market. Now in 2021, Europe looks set to maintain that lead. Electric vehicles are expected to achieve price parity by 2025 at the latest, EVs will have achieved price parity with fossil-fuel vehicles, not just in terms of total cost of operation but also in upfront cost. Furthermore, stricter regulations and higher taxes on fossil-fuel cars in Europe are other factors contributing to increasing speed of electrification in Europe.

Battery Storage

Lithium-ion batteries used in electric vehicles are manufactured in China. Large lithium-ion batteries are also used for large-scale energy storage. Improving the storage capacity of renewable energy would help even out supply fluctuations that can make renewables less desirable than fossil fuels in certain situations.

Europe's concern over its growing dependence on Chinese batteries for renewable energy storage has led European policy makers to

introduce incentives to encourage Europe battery manufacturing. For example, in 2018, the EU launched the Battery Action Plan, a concerted effort to realise this goal. The European Commission set a target of getting at least 30 million zero-emission cars on the road by 2030, with the ambition for European factories to cover over 90% of battery demand.



Carbon Capture, Utilisation and Storage (CCUS)/Direct Air Capture (DAC)

Scientists agree that to achieve the Paris Agreement targets, we no longer just require carbon neutral technologies, but carbon negative ones. Alongside preserving existing carbon sinks, such as those represented by forests and the ocean, the amount of carbon sequestration occurring on the planet can see a net increase through additional afforestation, the adoption of carbon-sequestering agricultural practices, biodiversity improvement, and the application of emerging technologies that can remove carbon from the atmosphere directly. Sequestered carbon stored on a long-term basis, or used for other purposes, such as biochar fertilisers, as long as it does not return to the atmosphere in the near-term.

Carbon Capture Utilisation and Storage (CCUS) can tackle emissions in sectors with limited technological solutions, such as the production of cement, iron, steel, chemicals, and synthetic fuels for the aviation industry. CCUS enables low-cost low-carbon hydrogen production. For companies in emissions-intensive industries, globally responsible for nearly one-third of the total emissions, CCUS and Direct Air Capture (DAC) is required to address large residual emissions (those remaining after economically and technically possible opportunities for emissions-reduction have been actioned) and achieve a state of carbon neutrality.

Today, there are more than 20 CCUS facilities around the world. The United States is home to approximately half of operational CCUS complexes. Since 2017, plans for over 30 integrated CCUS facilities have been announced, in the United States and Europe, but with some projects in Australia, China, and elsewhere.

Investment in carbon capture technology is low compared to other cleantech. Today's carbon capture technology is not commercially viable, relying on subsidies and incentivised by investments made based on the projected price of carbon. The former is driven by government policies intended to assist with and incentivise development despite the significant costs involved.

More recently, interest in CCUS/DAC has been reinvigorated, fuelled by net zero commitments arising across the major economies. According to the IEA, of the 16 countries that submitted an energy transition strategy by August 2020, nine referenced a role for CCUS: Canada, France, Germany, Japan, Mexico, Portugal, Singapore, the United Kingdom, and the United States.

The private sector has also announced several new CCUS investments. Notable mentions include the Oil and Gas Climate Initiative (OGCI)—a collaboration between a group of 13 international oil and gas companies, announcing investment in CCUS for a natural gas power plant in the United States; and Equinor, Shell and Total announcing plans to invest more than USD 700 million in the Northern Lights Offshore CO2 Storage Project, subject (critically) to government support. Investment on DAC soared, with Climeworks, one of the leading DAC technology developers raising CHF 100 million, representing the largest private investment for DAC technology. Breakthrough Energy and Xprize, sponsored by tech giants, have taken significant stakes in carbon capture technology.

A Carbon Capture whitepaper, published in 2021 by China's Ministry of Ecology and Environment, has clearly recognised the role of carbon capture technology in achieving the net zero roadmap. The whitepaper also reiterated the absolute urgency for China to develop carbon capture technology to assist emissions-intensive industries as technology and/or the renewable energy transition catches up. They note that unlike several other industrialised nations, China did not embedded carbon capture into its national energy transition benchmark, and there is an urgent need for China to erect a dedicated policy framework. Nevertheless, the carbon price in China remains too low for the carbon market to function as a funding mechanism and effectively support innovation. To close the gap, the paper concluded that China would have to import more advanced foreign technologies. Carbon capture requires decades of research, development, and industrialisation; falling behind here will only exacerbate the present gap. According to Asia Development Bank's 2015 report, the Chinese government has only subsidised CNY 3 billion in carbon capture projects, a tiny fraction compared to other nations.

Carbon capture technology will need to take a significant part of China's trillion-dollar investment to reach carbon neutral for decades to come.

Software as a Service (SaaS)

Software as a service (SaaS), or digitalization, is a key amplifier of transformation undergoing the energy and transportation sectors. Crucially, digitalization can optimize manufacturing processes, which tend to be impactful in reducing the carbon footprint of a business or a nation. Changes in terms of a) the connectivity of manufacturing equipment, b) the use of industrial software, and c) data analysis in the manufacturing process, would all accelerate the development of more sustainable manufacturing processes. The deployment of SaaS technology might include energy efficiency software or software for managing the carbon footprint of supply chains. Furthermore, digital technologies will be essential for the management of carbon capture and storage, as well as the electrifying and automating transportation currently reliant on fossil fuels.

China's technology giants are powerful figures in sustainable development. For example, Ant Financial, a sister organization of Chinese e-commerce firm Alibaba, is a founding partner of the Green Digital Finance Alliance, a group formed to drive the use of digital technology for the advancement of green finance.

Ant Financial has encouraged more than 200 million users to use Ant Forest, an app that gamifies real carbon footprint tracking. By the end of January 2017, Ant Forest has led to a reduction of 150,000 tonnes of CO2. This is one example of the massive potential of Fintech in supporting sustainable development.

Circular Economy and Biological Transformation

Circular economy systems provide a conceptual framework for new technological solutions and business model innovations to close resource loops.

Since adopting the Circular Economy Promotion Law in 2008, Chinese companies have pioneered transformations in areas like battery recycling. The EU updated its Circular Economy Action Plan in March 2020 as one of the main building blocks of the European Green Deal. This is an opportunity-rich and innovative area, particularly as the two parties signed an agreement on circular economy cooperation in 2018. Experts believe the sharing of best practices could lead to significant advancements in this area.

Biological transformation supports resource-efficient manufacturing techniques and processes over the product life cycle, from design to product end-of-life. Biological transformations, which deploy integrated strategies to tackle climate change, is consistent with China's ambition to become an "ecological civilization". China has made some progress towards this goal through integrated land-use planning, including ecological conservation and agricultural "redlines", and payment for ecological services schemes. Furthermore, China has also implemented significant reforestation programmes.

The EU has struggled to implement biological transformation technologies despite recognising its significance. This is partly due to difficulties reforming farm subsidies in the Common Agricultural Policy.

Current Collaboration Initiatives between Europe and China

Several collaboration schemes exist between the EU and China which aim to drive emissions reduction through effective incentive systems. This section illustrates case studies of collaboration initiatives between the EU, UK, and China, including discussion of The Belt and Road (BRI) as a potential arena for fostering international collaborations. Finally, an introduction to the China and Europe Green Corridor will be given a private initiative seeking to establish a cross-continental open-innovation ecosystem through public and private partnerships.

3.1 G20 Sustainable Finance Working Group

The G20 Green Finance Study Group was first established in 2016 under China's G20 presidency, which China continues to co-chair. Known for accelerating a global consensus on the need to scale up green finance, most recently, under the Italian G20 Presidency in 2021, it was elevated to working group status.

Between 2016–18, the group engaged with 10 major research projects, commissioned 24 input papers from over 20 knowledge partners, and served as an incubator for international sustainable finance initiatives. Ma Jun, Chairman of China Green Finance Committee, commented that new working group status, "will enhance the group's ability and effectiveness to address medium and longer-term sustainable finance issues that require global coordination."

3.2 Collaboration Between the City of London Corporations Green Finance Initiative and China's Green Finance Committee

The UK–China Green Finance Centre was formed from the longstanding partnership existing between the City Corporation's Green Finance Initiative (active 2016-19) and the China Society for Finance and Banking's Green Finance Committee (GFC).

The City of London Corporations Green Finance Initiative and China's Green Finance Committee founded the UK-China Green Finance Centre, supported by the UK Government's Partnering for Accelerated Climate Transitions (PACT) programme. Since its establishment, PACT has dedicated itself to the following initiatives:

- UK-China Climate and Environmental Disclosure Pilot: Bringing together major UK and Chinese banks and investors, the pilot focused on practical issues institutions face when implementing the

TCFD framework. The pilot supported the first TCFD disclosures from several Chinese institutions.

- Green Investment Principles for the Belt and Road (GIP): A set of 7 principles for investors to factor environmental risk and climate resilience into infrastructure projects along the Belt and Road. The GIP is focused on mobilising financial flows into green projects along the Belt and Road and supporting institutions to improve management of ESG risks.

3.3 Green the Belt and Road (BRI), an Opportunity to Foster EU and China Collaboration in the Green Space

First proposed by China in 2013, the Belt and Road Initiative (BRI) is an endeavour to improve connectivity and cooperation on a transcontinental scale. According to the World Bank, the Belt and Road initiative has projected potential to reduce travel times along the economic corridors by 12%, increase trade between 2.7% and 9.7%, income by up to 3.4% and lift 7.6 million people from extreme poverty.

The BRI is endorsed by more than 150 states and international organisations, including more than half the EU's present 27 nations. 126 countries were involved in the BRI, accounting for two-thirds of the world's population, 23% of the world's GDP and 28% of global carbon emissions. These countries are also home to 75% of the world's known fossil fuel reserves. Ensuring that the BRI initiative is aligned with the green agenda would produce profound impact on sustainable growth for generations to come.

Coordinated EU–China collaboration has the potential to fast track the transmission of pioneering green technology to third-world countries using a "plug and play" model. This deployment is particularly applicable to countries along the Belt and Road. The application of Chinese and EU technology in third-world countries would help accelerate climate technology in these countries across a broad set of applications.

Europe has a long-lasting legacy of interest in the economic development of BRI regions, outlining plans to deploy EUR tens of billions to leverage investment to tighten the relationship between Europe and Asia.

The social and economic benefits that will result from renewable energy transition can lead to a significant increase in the number of jobs in BRI countries. A study by the University of Massachusetts quoted by SSEE found that every USD 1 million in public investment generates 7.49 full-time jobs in renewable infrastructure industry, 7.72 in energy efficiency, and a mere 2.65 in fossil fuels. It is estimated that the overseas economic and trade cooperation zones, built by Chinese enterprises in the BRI countries, has already created about 300,000 jobs.

It is exciting to think that greening the BRI could become a key opportunity to support

the development of green infrastructure alongside green standards and digitalization in many emerging economies. The ultimate goal is to ensure that investments made under the Belt and Road Initiative contribute to the achievement of the 2030 Global Agenda for Sustainable Development.

To sustain a mutually beneficial and productive relationship in the transport sector, the European Commission and the National Development and Reform Commission of China established a Connectivity Platform in 2015. The objective of the platform is to enhance synergies between the EU approach and China's BRI. In April 2019, during the 4th Chair's meeting, both parties agreed on the Joint Study on Sustainable Railway-Based Transport Corridors between Europe and China.

A green BRI has the potential to yield immense impact, as the political entities involved account for two-thirds of the global emissions. To facilitate and enhance international policy dialogue occurring between all stakeholder groups, relating to the sustainable development of the Belt and Road initiative, the UN Environment has convened The International Coalition for Green Development on the Belt and Road (the Coalition), jointly initiated by China and the UN Environment, and led by UN Environment and China's Ministry of Environmental Protection. The Coalition serves as a platform to ensure that Belt and Road investments conform to international norms and good practices. The Belt and Road Initiative is an opportunity for UN Environment to deliver on its mandate: the approved Programme of Work, Medium-Term Strategy, and the 2030 Agenda for Sustainable Development.

3.4 China and Europe Green Corridor—a New Privately-Driven Collaboration initiative

The China and Europe Green Corridor is the first endeavour of its kind to bring together public and private sector players to mobilize capital investment into the latest cutting-edge green technology.

The China and Europe Green Corridor was co-developed between BGTA Accelerator, a UK-headquartered accelerator with stakeholder backing in both Europe and China, and the Green Technology Bank. A purpose-driven investment programme, it aims to address the challenges arising from cross-continental investment between Europe and China, public funding, and private capital. The Corridor sheds light on Europe's continued leadership in green technology and China's eagerness to engage with European partners.

The Corridor is endorsed by the Shanghai Science and Technology Commission, an official government agency supporting the development of China's technology and innovation. The Green Technology Bank follows the guidelines of a Green Financial System, issued by the People's Bank of China. This stresses that the purpose of a green financial system is to incentivize greater social and/or private capital to invest in green technology.

As such, the China and Europe Green Corridor is an investment-driven initiative for systematically incubating, scaling up, and investing in greentech companies. The structured programme is purposely built to harness cross-continental collaboration in innovation and investment through the facilitation of knowledge-sharing between green technology firms in Europe and partners in China.

The platform also brings together public and private sectors, from policy makers to the largest state-owned energy corporations, as well as sovereign funds, and industrial development vehicles. The corridor champions the values of inclusiveness and openness, engaging with a broad range of stakeholders across Europe and China, and offering hands-on support on local resources, best-practice, industrial networks, and investment.

Under the Green Corridor initiative, a physical accelerator programme supported by key stakeholders in Shanghai government will be located in the Baoshan district, the most polluted district of Shanghai, and home to some of the region's biggest carbon emitters. The accelerator is managed by the local team and informed by international experts to bring together the ecosystem across Europe and China and harness an all-inclusive open-innovation environment to facilitate the formation of greentech-driven public and private partnerships.

The Corridor has its own cross-border fund set up to invest into promising green technologies. This fund will draw capital towards cutting edge technology and facilitate its growth. This is powerful response to the two-dimensional challenge of financial dimension and industrial dimension (to be discussed below). The Green Corridor provides practical solutions and support to addressing these challenges.

Focus: Public and Private Funding to Support Innovation and Technology Development in the Green Space

In this chapter, we will focus on the public and private partnership model, by examining its component structure, advantages, and by comparing practices between China and the EU. We will contemplate how China's public sector should be engaging with private sector to mobilise capital, resources, fill the funding gap, and most importantly, harness a culture of openness, transparency, and innovation.

4.1 Overview of Public and Private Partnerships, Comparing the EU and China

A top-down approach to public private collaboration, led by government policy and regulation, is essential to truly work towards achieving the global decarbonization target. Policies such as the carbon trading market and carbon border tax can work collectively to drive private sector incentives, and mobilize private sector players. But the question of how to engage private capital to play a part in growing green technology remains a crucial question for policy makers, regulators and other stakeholders to further discuss and investigate.

One reason as to why public sector players are so crucial in growing green technology is that private sector capital may not choose to invest in green technology if left to market forces alone. Emerging green technology is often in early stages of development and poses a risky investment, with financial benefits often occurring over longer time scales. Taking carbon capture technologies as an example, significant capital investment is required over a long-time horizon to make DOC profitable and deployable at scale. For this reason, while carbon capture technology preceded the Paris Agreement, the sector remains underinvested due to the aforementioned challenges. Despite the widespread recognition of the importance of carbon capture technology, incentive lacks to engage with their development unless imposed by regulation, motivated by financial upside gains, or both.

Heavy industries such as steel and cement, which currently account for 22% of the global carbon emissions, could truly benefit from carbon capture technologies to ensure the net zero target is met. This has particular relevancy for China, which produces approximately half of the global supply of cement and steel.

How to effectively mobilise and support private investment and innovation in cutting edge technologies remains an international

pivot topic. And this question is a critical one, testing the ability of governments, institutions, and enterprises to design and implement overarching policies that effectively incentivise public and private co-investment.

So far, we have seen several attempts to establish such structure for public-private collaboration in Europe. In Sweden, the state is working with companies and researchers in the so-called Hybrit (Hydrogen Breakthrough Ironmaking Technology Project) to develop and implement a novel process for fossil-fuel-free steel production. A ground-breaking technology, Hybrit is a joint venture created in 2016 by three large Swedish companies: steel manufacturer SSAB, Europe's largest iron ore miner LKAB, and power utility Vattenfall. The project aims to reduce Sweden's CO2 emissions by 10% and Finland's by 7% through replacing coal with hydrogen in the steelmaking process. The Swedish Energy Agency is co-funding the research project in collaboration with Lund University. The Hybrit project sets out a classic example of collaboration between players across academia, industry, policy makers, and civil society. Once accomplished, it could provide a near-zero-emission solution for steel production in Sweden, and a model for heavy industry transitions elsewhere in the world.

Another example is BP, Iberdrola, and Enagás's joint effort to build the largest green hydrogen facility in the region of Valencia, Spain. The project would bring the installation of a 20 megawatt electrolyser and reach a capacity of 115 megawatts for the production of green hydrogen, anticipated to reduce CO2 emissions by up to 24,000 tonnes per year. With an estimated investment of EUR 90 million, the project is anticipated to incentivise further investment of around EUR 70 million, contributing significantly to economic growth, job creation, and decarbonation. This project has received the support of institutions at local, regional, national, and international levels. It is aligned with the Green Hydrogen Strategy of the Valencian Community, as well as with the Hydrogen Roadmap of Spain's Ministry for Ecological Transition and the Demographic Challenge.

In the start-up sector, the Energy Entrepreneurs Fund (EEF), set up by the UK government, is a breakthrough initiative supporting British entrepreneurs who make an impact on decarbonization. The EEE's GBP 11 million fund will support between 15-20 start-up projects, with each successful bidder receiving up to GBP 1 million. Since 2012, the government's Energy Entrepreneurs Fund has awarded GBP 72 million worth of grants, supported 156 projects, and mobilized more than GBP 500 million in private investment.

Carbon neutral objectives in the private sector are gaining momentum. Breakthrough Energy, a venture fund backed by Microsoft, specialises in supporting disruptive technologies that

help to achieve emission reduction goals. It has already launched the second venture fund of USD 1 billion. Established in 2015 by Bill Gates and a coalition of private investors, including more than two-dozen ultra-wealthy tech and business leaders around the globe, Breakthrough Energy has joined forces with EU programs such as Horizon Europe and the Innovation Fund to finance the partnership. Breakthrough Energy will be run by the European Investment Bank and other financial institutions under the Invest EU program. Funding is to be focused on four sectors: green hydrogen; sustainable aviation fuels; direct air capture, and long duration energy storage.

Meanwhile, many other tech giants are joining the climate mission, including Amazon's USD 2 billion Climate Pledge Fund, a venture capital program directed at sustainable technologies with the potential to help Amazon to fulfil its commitment to carbon neutrality by 2040. Similarly, Xprize, funded by entrepreneur Elon Musk for the development of carbon removal technologies, has pledged USD 100 million to carbon removal prototypes capable of removing at least 1 tonne of carbon per day from the atmosphere.

In China, major tech giants such as Tencent and Alibaba have announced net zero commitments. To meet this goal, Tencent will convert its data centres, which consume huge amounts of energy, to renewable electricity. According to Tencent's figures, China's data centres used 160.9 billion kilowatt-hours or 2% of the country's total energy in 2018. If Tencent were not to undergo an energy transition, Chinese data centres will generate 163 million tonnes of carbon in 2023; without operational changes, to claim carbon neutrality, Tencent would need to plant the equivalent of 10 billion trees annually. As with all major corporations, Chinese tech giants are influential in the world economy, and can choose to promote carbon neutrality, which will filter through their supply chains. The calibre to which Chinese tech giants implement and succeed in achieving their carbon reduction goals will be a key determinant of whether China is able to meet its goals.

The Chinese government has used a public-funding focused approach to help Chinese technology companies to grow in the past. Substantial funding resources are focused on subsidising research and development, a large amount of funding has been invested into state-owned enterprises. So much Chinese funding has gone into supporting state-owned enterprises' green energy activities along the Belt and Road, that smaller-scale private sector players find it difficult to engage in those projects. In a recent example, six Chinese state-owned enterprises issued green bonds that totalled CNY 6.4 billion, where proceeds were directed into the financing of four wind turbines, four hydropower dams, two solar farms, and a green building. Whilst these activities are a win for renewable energy, ownership is dominated by state-owned enterprises, potentially pointing to an imbalance in the engagement between public and private sector players.

In a new era defined by the dual existence of globalisation and a decoupling of China and the West, for China, there is a need to be more self-sufficient in research and development, particularly in cutting edge new technologies. This would require a paradigm shift in China's economic and commercial environment. Namely, private capital would need to play a greater role in China's green transition and private investment needs to greater align with sustainability goals and emissions targets. This requires policy makers and financial institutions to lead a fresh model of collaboration, taking account of long-term strategic values and mutual goals.

In a joint report between the Beijing green Finance Institute and Hillhouse Capital, a leading Chinese private equity, PE and VC funds were urged to fill financing gaps in high risk high return technologies critical to achieving China's carbon neutral roadmap. The report identifies the current concentration of public funding in bank lending and highlights the vacuum for equity-based investment into emerging technologies, which can be filled by private sector activities. Without the participation of PEs and VCs, China's industrial ecosystem is incomplete, as China cannot just count on large infrastructure projects. For all these reasons, an exponential growth of public-private investment model in China is anticipated in future years.

China has high ambitions on tackling climate change, and that can be seen by the growth of Chinese investment in this direction. The momentum of this trend suggests that significant returns are projected for investors who act early in this industry. Hillhouse Capital is one such having invested early in the solar giant Longi. Hillhouse capital has also invested in energy storage and electric vehicles, with equity stakes in Weilai Car, Ideal Car, Xiaopeng Motors, all Chinese rivals to Tesla.

Although the top-down approach to mobilising investment is more common in China, a bottom-up approach is also important within the context of tackling climate change as the average citizen's awareness and daily actions towards carbon reduction goals is critical. If China's 1.4 billion citizens can adapt a new climate friendly lifestyle, that would significantly contribute to China's energy transition.

For example, in China, tree planting campaigns are gaining momentum, thanks to Chinese millennials, who are eco-conscious, adaptive to new technologies, and believe in the net zero vision. Alipay is capitalising on this by launching its campaign—"Ant cloud tree planting festival". A study has showed that 40% of Chinese people have been using tree planting apps. There are 25 million university and college students are using Alipay tree planting app, and 4 million active tree advocate groups on China's social media, according to data compiled by Alipay.

Another example of private sector's participation in China's green campaign is Tencent's innovative digital investment app, which allows individual citizens to invest into multimillion green bonds through REITs vehicles.

These bonds fund green infrastructure projects across China and abroad. So far 9 REITs have launched via Tencent app, with total securities valued at CNY 30 billion.

In response to policy driven initiatives such as carbon border tax and carbon trading schemes, many thought leaders in China are advocating for an approach whereby the revenue from these schemes is returned to green technology financing. Financial market linkage networks, such as the link between Shanghai and London, or between Shanghai and the EU, can be structured to facilitate the development of a globally connected carbon market. More forward-looking policies could be introduced and implemented to connect policy, regulation, trade, and investment across China and the EU.

4.2 China's State-Owned Enterprises (SoEs) Play an Important role in Driving Private and Public Partnerships in China

According to estimates by China's National Centre for Climate Change Strategy and International Cooperation (NCSC), China has an annual funding gap of CNY 1.6 trillion yuan if it is to reach its climate target set for 2030. This figure is based on the calculation that CNY 56 trillion is needed to meet its climate targets by 2030.

The funding gap for China's net zero transition brings significant new opportunity for private sector players, due to the reliance of high-risk high-return technologies on venture capital.

According to Climate Policy Initiative, public financing accounted for more than 51% of China's green finance activities, and almost 95% are attributable to State-Owned Enterprises (SoEs) and State-Owned Financial Institutions. Public and private partnership financing counted for less than one-fifth, with the vast majority of funding coming from government subsidies.

SoEs dominate in China's energy, industrial, and utilities sectors. SoEs are currently responsible for more than half of the country's energy sector emissions. Nevertheless, SoEs are key actors for successful decarbonation, given their greater resources, networks and financial capabilities.

Achieving the climate goal requires considerable inputs from SoEs. Financial incentives are less relevant to SoEs than regulatory action on emissions. How the government prioritises the climate agenda will be the key drivers of SoEs behaviour.

As SoEs exist under different mandates to the private sector, motivating them toward climate action requires a distinct approach. Effective incentive structure should be one that creates a bespoke model which accounts for the social, economic, and political agendas of SoEs.

China's SoEs tend to participate in large infrastructure projects. For example, following China's approval of the biggest state-backed renewable energy mega-project for green hydrogen-Sinopec, a Chinese state-owned

oil giant announced launch its first green hydrogen project in the Inner Mongolia region in 2022. For Sinopec, this new approach is one that embraces higher risk and higher reward.

Chinese SoEs remain far from embracing innovation, especially in situations where collaboration with external stakeholders is required. For example, compared to China's internet sector, China's energy sector significantly lacks industry-knowledge and experience collaborating with start-ups. Tencent, the Chinese tech giant, has an estimated USD 259 billion invested in Chinese and overseas start-ups, placing the company as a global investment powerhouse, able to engage partnering start-ups to enrich its own internal expertise. However, start-up collaboration of this scale is beyond the capacity of many Chinese SoEs in the energy sector.

Conventional incentives like subsidies are less influential over the emerging generation of climate technology research and development projects in China. Therefore, while the subsidy model enabled China to become a leader in deploying renewables, it would be less effective in incentivising China to invest in the emerging green technologies required for the renewable energy transition.

Instead, to prioritize new technology in its policy may be the way forward. For example, in the case of carbon capture, the Chinese Ministry of Ecology and Environment clearly put the technology high on its agenda by publishing the 2021 Carbon Capture whitepaper. This whitepaper has facilitated the recommendation of a national development strategy and extended invitation for international collaboration. The Whitepaper went through extensive studies of the technology, its advantages, drawbacks, controversies, and made comparisons between the US, EU, China, and Japan. The insights resonate with the Asia Development Bank's 2015 carbon capture report, which reiterated the absolute urgency for China to develop carbon capture technology, has the potential to function as an enabler for the decarbonisation of heavy industries. The paper concludes that due to the fact that the carbon price in China is too low for the carbon market to exist as a funding mechanism for innovation, China needs to bring in advanced foreign technology to close the existing technology gap. Further looking into the carbon capture example, it seems clear that public and private partnership is needed to ensure effective development of carbon capture technology in China. As carbon capture is inherently a high risk high return venture, it is incompatible with the funding model of Chinese SoEs. Instead, it is more suited to the participation of venture funds like Bill Gates-backed Breakthrough Energy or Elon Musk-backed XPrize, both of which are largely exposed to carbon capture technology.

Motivating venture capital investment in China's green sector is a complex challenge as China's financial system is dominated by state-owned financial institutions with a tendency to support

SoEs. As such, Chinese SMEs often struggle to obtain capital. SoEs also have the advantage of being more resilient to failures of more risky investments, Compounding the disadvantage faced by SMEs in the Chinese financial system. In some cases where private capital is struggling financially, this can delay subsidy payments for renewables. The disadvantages faced by private sector players has stunted their growth, pushing industry capacity towards SoEs.

Public and private partnerships in China bear two dimensions. On the financial level, China's roadmap for energy transition relies heavily on public funding will need to reform its policy and regulatory frameworks to attract more private finance. On the industrial level, Chinese SoEs have been given the unprecedented mission to build partnerships with venture partners and use their competitive resources to incubate and scale-up green tech startups for mutual gains. It is clear that a value creation mechanism for large-scale infrastructure projects which builds partnerships that create bilateral wins between developers, investors, governments, and public financial institutions is the way forward.

The China and Europe Green Corridor responds to the two-dimensional challenge faced by China by encouraging SoEs partnerships with the private sector. The cross-continental ecosystem being forged by the Green Corridor exerts pressure on China's public sectors, including various actors in the public institutions and government agencies, as well as energy corporations and their investment vehicles, while mobilising the private sector to join and actively engage. The Green Corridor weights SoEs as its critical allies, where demands for leading edge technology are originated and further amplified across the line ups of the corridor to create a project driven collaborative environment. Such an environment would effectively support a full circle project lifespan. For example, piloting of a leading-edge technology from Europe, backed by an integrated mutual value creation mechanism, and performed by SoEs along with venture investors. Such an environment unleashes commercial, development and channels for exit, hence largely incentivise venture funding, satisfying both the mandates of public interests alongside returns on investment for the private sectors.

Another unique value proposition of the Green Corridor is that the Green Corridor's combined fund and accelerator model exists to advance its deal sourcing ability and accuracy, and muscle in its financial resources, underpinning public and private partnerships in China and with the EU. A physical accelerator located in Shanghai has the propensity of identifying strategic demands, and the local knowledge and networks can ensure a hand in hand assistance pledged to inbound foreign companies for taking the full advantages of such a low-cost offshore launchpad. Such a system would effectively de-risk investment and maximise returns, a model desired by venture investors.

Forging the public and private partnerships in China is a dynamic process, where the alignment of public and private interests is regarded as the fundamental enabler. The China and Europe Green Corridor embarking on unprecedented mission that will inevitably bear its learning curves, however the encouraging part is that the all-inclusive and open innovation ecosystem articulated will constantly engage, optimise, prioritise and self-accomplish the corridor's capability in delivering its core values, and become a frontier foothold to support international collaborations in the green space for the years to come.

Discussion and Recommendations— How Can the China and Europe Green Corridor Foster Collaboration and Contribute to the Global Climate Goal?

The China and Europe Green Corridor is a pioneering initiative. It is in early days of development and it is an open and inclusive initiative, welcoming various players from public and private sectors to contribute and drive it forward.

As such, the recommendations and conclusions in this whitepaper are by no means definitive. Instead, we highlight two key questions, that the China and Europe Green Corridor can hope to answer as it continues to evolve, and as more leading participants join the initiative.

Focus question 1: What are the critical intersections of policy and technology needed to drive forward the net zero pathway, and what are the best ways for policy makers and Greentech companies to collaborate?

As we have seen, new technology is costly to develop and commercialise. Without adequate financial incentives, it would be hard for companies to innovate by investing heavily into developing new technology. But the right policy incentives will become fundamental drivers, creating the right incentives for companies to innovate, because they can see a commercial case for such behaviour. Finding the right intersections between policy and technology requires ongoing discussion, a role that the China and Europe Green Corridor can uniquely facilitate.

Focus question 2: What are critical lessons to be learnt from existing cases of public private collaboration to mobilize capital and knowledge exchange that contribute to the development of green technology? How can these critical lessons be applied to China in a way that is suitable for China's unique context?

Public and private collaboration is seen as a critical way to accelerate towards net zero. As we have seen in the section of the public and private partnership, Europe has many successful examples of schemes that are producing concrete benefits for green technology companies.

China, with significant policy and substantial capacity is capable to mobilise private sector players through public private initiatives. The critical question is, how can we take existing lessons from successful schemes in Europe and apply them to China in a way that takes proper consideration of China's unique context and circumstances. Discussions in an attempt to answer this question is again able to be facilitated by the China and Europe Green Corridor.

Appendix 1.

Case study: Oxfordshire Greentech—a Public and Private Partnership to Foster the Net Zero Transition

Oxfordshire Greentech is a good UK-example of public and private sector collaboration to ensure that regional carbon reduction goals are met while maintaining thriving economic activity. As a leading example of public and private partnership towards a zero-carbon future, it provides inspiration for policy makers in China and globally.

History and Background

Oxfordshire Greentech was launched in February 2019 as part of the OxFutures programme, funded by the European Regional Development Fund, to help grow the low-carbon economy in Oxfordshire. By 2020, Oxfordshire Greentech was operating without funding, financed through membership fees and contracted dissemination and research projects. Oxford Greentech's founding partners are the sustainability charity Bioregional, Cherwell District Council, and Cambridge Cleantech.

Achievements

In 2 short years, Oxfordshire Greentech has grown its membership to nearly 100 organisations, including 3 district councils and the county council. Its members have confirmed benefitting in concrete ways, including networking opportunities, market intelligence insights, support in accessing finance, attending webinars and training events, and feeling the support of being part of a wider movement. Within its membership companies are some notable names, including Seacourt Printing (world's highest scoring B Corp printing company), OxWash (the world's first truly sustainable laundry company), and Greencore Construction (a developer of a globally leading zero-carbon development in Oxfordshire). The support that Oxfordshire Greentech is able to bring to member companies is significant. For instance, the networking and information-based events can help them find resources and inspiration to strengthen their technology as well as raise their profile, all of which enables them to further develop and scale up as critical green tech companies.

Key Achievements in Numbers

- Approaching 100 member organisations, including 3 district councils and the county council.
- 46 events on low-carbon topics since 2019 launch.

Additional Highlights

- Oxfordshire Greentech has done amazingly well considering we were only operating for one year when Covid hit. Oxfordshire Greentech decided not to shut down and furlough staff but that we needed to stick around to help companies at a really difficult time. Oxfordshire Greentech quickly pivoted to providing on-line events, training and networking opportunities.
- Oxfordshire Greentech had very good attendance at online events and the team hopes to continue this approach, (quick and easy to access, no travelling required, Oxford folk can attend Cambridge events easily and vice versa) and mix online events with its in person events when people can really network.
- The top 3 reasons companies have joined Oxfordshire Greentech are:
    - Networking and opportunities to collaborate.
    - Supporting the low carbon economy in Oxfordshire.
    - Accessing talks and workshops.

Knowledge and Insights Sharing

Oxfordshire Greentech runs knowledge-transfer events on several low-carbon topics including circular economy, low-carbon mobility, built environment, and access to green finance; this is often in collaboration with Cambridge Cleantech, its sister network. The network also releases a monthly newsletter and quarterly grant funding round-up, as well as regularly disseminating other business support opportunities, often in collaboration with Oxfordshire Local Enterprise Partnership (OxLEP), local authorities, and Cambridge Cleantech.

Variety of Methods for Engaging with Stakeholders

Oxfordshire Greentech has also partnered with OxLEP to create a new innovation competition called Energy Pathfinders: 2050, which aims to find and showcase low-carbon solutions in the built environment, transport, and energy sectors, as a way of helping the LEP achieve the vision set out in its Oxfordshire Energy Strategy.

Helping Partner Organisations through Information-Sharing and Support

Oxfordshire Greentech also supports Cambridge Cleantech in their annual Cleantech Venture Day, one of the UK's biggest cleantech pitching events. Sponsored by KPMG, Cleantech Venture Day is a high-calibre event with some of the biggest investors in the Greentech sector and some of the most innovative greentech SMEs in the country.

Academic Collaboration:

Oxfordshire Greentech also collaborates closely with world-class academic researchers from the University of Oxford's Environmental Change Institute to publish pioneering research. A new report, titled Pathway to Zero Carbon Oxfordshire, will be launching on 29 June 2021, documenting Oxfordshire's different potential routes to net-zero.

The analysis is conducted by taking into account a variety of factors, including technological innovation, macro-economic trends following COVID-19, public support, changing social norms and behaviours, and policy decisions taken at the local, national, and international levels. The report will acknowledge that while some factors are outside of Oxfordshire's local control, businesses, policy makers, and residents in Oxfordshire have a crucial role to play in innovating, investing, strategizing and implementing the changes needed for net-zero.

This type of research is critical in helping a variety of stakeholders in Oxfordshire to assess the amount of progress to creating a low carbon economy that Oxfordshire has so far achieved, and reflect on actions needed to meet the net zero goal going forward, both for the Oxfordshire community as a whole, and for themselves.

Appendix 2.

An Investor's Viewpoint: Green Technologies—a Smart Investment?

Jerome Chifflet

Why Invest in Green Tech?

Over the past ten years or so, we have seen the emergence of two new levers for investors, CSR (Corporate Social Responsibility) and Green Technologies. The former has occurred as large companies have had to integrate Human Resources criteria into their Techno-economic strategy. The latter has taken place to tackle the biggest issue we have to face today: climate change.

This is not the first time this trend has surfaced. The first green revolution occurred following the internet bubble in the mid-2000s, and had a similar story. I will come back to this later.

The question is, why is green technology and other deep technologies today a better investment than it was then?

The Good Reasons

I see at least three reasons: policies, which have given favourable regulations; economics, with new management of resources, particularly energy and societal; and a new approach to innovation.

First, the regulatory issues. Today, there are many European Union Commission rules which encourage investment into green technologies. A case in point is the Energy Plus Building Regulation, which, since January 2021 (TR 2020), requires buildings to produce more energy from renewable energy sources than it imports from external sources within the space of a year. Regulations such as these have boosted growth in several areas like low-consumption energy buildings, passive solar building design, new insulation materials, etc.

Second, Energy consumption is still a major problem. Solutions revolve around trade-offs between energy production and storage and establishing a true carbon balance between them. For example, in the case of electric cars versus lithium battery production or wind energy versus pylon construction and hence visual pollution. We have seen the rebirth of interesting deep technologies like Harvesting with Nikola lab or Greener Wave with the time reversal model utilization. Such companies as

French Startup Z#bre are using AI and cloud computing for intelligent workspace management and resource optimization.

Thirdly, a new trend is an innovation process called frugal innovation, "Frugal innovation or frugal engineering is the process of reducing the complexity and cost of a good and its production."

After low environmental constraints (minimization of regulatory frictions) and low energy consumption, frugal innovation represents the low-cost part in terms of resources.

The Pitfalls

There are at least two good reasons not to invest in a greentech company. First: "The fad". Even if there are many reasons to invest in this area you must really understand the business of the company you want to invest in and especially the expected benefits of its technology. This point brings us to the second pitfall.

As I mentioned in my introduction, the current wave is not the first time that investors have dealt with green technology companies. In the mid-2000s, U 76 billion was invested in what we called CleanTech companies. And it was one of the biggest flops. There are many reasons for this, but the first was that the expected and perceived benefits of the "CleanTech" technologies over the traditional technologies available at the time did not materialise and did not scale. Studies have now shown that less than 10% greater efficiency was achieved by using the "CleanTech" technologies—not enough to change the upwards disastrous trends in climate change and the environment or produce large enough efficiencies to warrant further investments.

Are there New Investment Criteria?

Definitely no! In the last two decades, we experienced the "Internet Bubble" and the "CleanTech" meltdown. I remember reading books that explained the rules of what they called the new economy! But we all know that it is only in physics that there are two worlds, Newton's for classical physics and Einstein's for quantum space. In economics the model is simpler and the rules decreed by Louis C Guerken about the venture capital industry's important role in enhancing economic growth and employment are still relevant today. Investments in green tech are no exception to these rules.

Conclusion

Today, investment in green technologies benefits from a large number of specific funds. For Europe alone, a USD 1 billion fund has been dedicated to Greentech and associations such as EIT Climate or EIT InnoEnergy, for example, are focusing on this area. In Sweden, the accelerator STING created a specific program named Sustaintech. Germany has the GreenTech festival, and the EU has initiated the "Startups Green Tech" program. But one of the key success factors is how startups will be able to "Scaleup" both from an investment

perspective as well as a procurement program by government and large corporations. The China and Europe Green Corridor initiative is a perfect platform which gives startups with great greentech the opportunity to implement their technology in a large market and meet their commercial goals while obtaining economies of scale.

For large companies: Open innovation is definitely the key but they must go beyond marketing and communication issues and really cooperate with and invest in greentech startups. David must dance with Goliath.

For Startups: They need to change their mindset about large companies, be less paranoid and realize that their competitors are also potential partners, and rethink their growth model to attract investors.

Authors and Contributors

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CEO of BGTA Accelerator

Helen is a business angel, investor, and serial entrepreneur. She is Founder and CEO of BGTA Accelerator, a London-headquartered cross-continental accelerator supporting the development of a global greentech and investment ecosystem. Helen serves as a Committee Member and International Advisor at SJTU (Shanghai Jiaotong University)—UNIDO Joint Institute of Inclusive and Sustainable Industrial Development. SJTU is the product of a partnership between the United Nations Industrial Development Organization (UNIDO) and Shanghai Jiao Tong University, a first-class platform of research, thinktank and coordinator for global cooperation.

Helen directs several government-funded exchange platforms, leads the China and Europe Green Corridor Initiative. The Corridor programme is backed by Shanghai Science and Technology Commission, an official government agency pivotal to develop greentech in Shanghai. Helen's networks extended to major tech hubs in China, including in Hangzhou, Beijing and Shenzhen, and span from government-backed investment vehicles to institutional funds and private investment.

Cecily Liu

Cecily has nine years of experiences across journalism, communications, public policy and the non-profit sectors combined.

Cecily is an MBA from INSEAD, an MA in Creative Writing from City University, and a BA in English Literature from UCL.

Commencing her career as a London-based finance journalist for China Daily international, she then worked as a Senior Research Advisor for the City of London Corporation, where she led financial services projects and gave expert advice and support to teams with a focus on public policy, trade and investment, and innovation in financial services.

Cecily has led key research projects that have contributed to the City of London's Green Finance Initiative, and has a keen interest in green finance. She is also the Managing Director of Visionary Education, a project which has empowered tens of thousands of children in rural China since its founding in 2008.

Jerome Chifflet

Jerome Chifflet PhD in Mathematics is a researcher and manager, and former entrepreneur. Up until 2015, Jerome was Head of Access to Finance Activity for Europe in the European Institute of Innovation and Technology Digital (EIT). His research background is extensive, including over 20 years in various positions that range from Research Laboratory Manager Deputy Research Director. Jerome is a seasoned entrepreneur, having founded and chaired Waidan, as CEO, from 2000-2004. At EIT Digital, Jerome was the Business Development Director for France prior to being appointed as Head Access to Finance Europe. He is a member of several Investment committees (PACA Investments, Sophia Business Angels) and startup incubators (PACA–EST; Telecom Paris Tech incubators). Jerome is member of the Telecom Paris Research Council and former longstanding member of the Telecom System Editorial Board International ICT Review. He is now Head of Scientific and Technical Disciplines for Orange Labs Research.

GREENTECH
VENTURES

A whitepaper exploring a cross-continental open innovation ecosystem through the fostering of public and private partnerships