

Green, Growing and Global

A decarbonising capital for a competitive UK

Report Summary

Two challenges are defining the business environment today: recovering from COVID-19 and climate change. One demands economic growth, the other stems from our economic past. Yet there is a growing understanding of environmental economics which shows that the two sets of solutions need not conflict. A decarbonised future can be one of environmental benefits and economic prosperity. The average green investment can create almost three times as many jobs per pound as fossil fuel investments¹.

Spending now on green investments can reduce the lock-in of fossil fuels for years to come.

Many of the world's governments have committed to a green recovery from COVID-19 by launching once-in-a-generation plans that prioritise green development, like the UK's Build Back Better. These may be accelerated by ambitions stated since, such as the UK setting one of the world's most ambitious targets to reduce emissions by 78% by 2035 vs. 1990. The war in Ukraine, and its impacts on world energy markets, are increasing the pressure to act now to create resilient, affordable energy systems.

Addressing the city's carbon emissions is well underway. As a C40 city, the capital's emissions have fallen 40% between 2000 and 2017². The Mayor's targets aim to accelerate this, with London becoming a net-zero carbon city by 2030. Early action has been taken towards this end. For example, the Ultra Low Emission Zone (ULEZ) introduced in April 2019 reduced CO2 emissions by 4% and NO2 emissions by 36% in the first six months³, and the Mayor is currently consulting on extending the zone to cover the whole of Greater London. At the same time, the new London Plan requires full carbon impact to be considered from construction to end of life and has already influenced whether projects get built.

Yet London still represents approximately 10% of the UK's emissions, so there is more to be done. London First's Business Manifesto for Delivering Net Zero Carbon, published in 2020, sets out actions for the Mayor and businesses to accelerate the transition to net zero. Since then, the Mayor has published an updated pathway to 2030 which sets out the need for 210,000 homes and 28,500 non-domestic buildings to be retrofitted each year between now and 2030, as well as a 27% reduction in travel using petrol and diesel cars between now and 2030⁴.

² Greater London Authority, *London Energy and Greenhouse Gas Inventory (LEGGI) 2018, 2021*, www.data.london.gov

³ Transport for London, *Central London Ultra Low Emission Zone – Six Month Report, October 2019*, www.london.gov.uk

⁴ Element Energy, *Analysis of a Net Zero Target for Greater London, January 2022*, London.gov.uk

¹ Heidi Garrett-Peltier, "Green versus brown: Comparing the employment impacts of energy efficiency, renewable energy and fossil fuels using an input-output model," *Economic modelling*, pp 439-47, 2017"

The UK aims to reduce emissions by

78%

by 2035 vs 1990



London's emissions have fallen

40%

between 2000 and 2017²

Capturing the green growth opportunity on this journey is front and centre, with a commitment to double the size of London's green economy to £100bn by 2030.

Delivering net zero is everyone's business. Reducing emissions is a challenge that defines London's future prosperity and its citizens' jobs. To retain its status as a global business hub, London will need to think about how to push forward to become one of the world's most prosperous green cities. Its economy has distinctive strengths to support this drive, spanning financial and professional service clusters, the world's largest aviation hub⁵, a vast and diverse built environment, among many others. Seizing the green growth opportunity could not only provide high quality jobs and prosperity to London, but also support growth in the rest of the country by harnessing the UK's green economy and accelerating the country's response to mitigating the effects of climate change.

This paper with input from McKinsey and Company, our sustainability knowledge partners, is London First's opening contribution to the green growth debate. It starts



to set out what business could do to seize the initiative on green growth opportunities in sectors critical to the London economy. It is intended to spark discussion and move the conversation forward: it is not intended as a roadmap to net zero, rather it explores how London businesses can harness the capital's competitive advantages to seize the opportunities offered by a decarbonising world and drive climate impacts. It proposes seven provocative ideas drawing on member suggestions. Each idea has

impact from three perspectives: Green House Gas reductions beyond those in current pathways⁶, job creation or other economic benefits, and wider contributions to national prosperity. These major opportunities span four key sectors: buildings, aviation, financial services, and professional services. Each has been crafted through a series of workshops and discussions with business leaders and substantiated with a credible fact base. Whilst not currently London First policy, the ideas in this work are intended to encourage debate on the role of business in green growth.

Most importantly, each provocative idea shows how the capital could chart a tangible path to a stronger, cleaner UK.

London's economy is inextricably linked with regional economies across the country: illustratively, London First previously estimated that 35% of jobs created in London from the construction of new offices are spread across the UK⁷. Similarly, these provocative ideas, if taken forward, could help spread benefits in multiple ways across all regions. This could be through pilots run in London that could be replicated elsewhere, demand for new products like green building materials that kickstarts a supply chain across the UK, or services and capital that help found and grow other new industries across the country.

These provocative ideas are not intended as an exhaustive plan for addressing climate change in, or by, the capital. London First recognise that not all sectors are covered, for example the necessary mobility transition. Nor are cross-cutting enablers examined such as the challenge of ensuring appropriate skills to match the demand for green jobs (and the role of London's schools, colleges and universities in this regard). These are, though, part of London First's wider programme, for example via Skills London, the UK's largest careers event, which returns to the capital in November 2022, and will include an array of green job opportunities. Many other promising ideas were fielded, both in these sectors and others, and we encourage both challenge of our provocations, and new provocations entirely.

⁵ Busiest airports by number of passengers, includes: London City Airport, Gatwick Airport, Heathrow Airport, London Luton Airport, London Stansted Airport and London Southend Airport and the source: ACI, Annual World Airport Traffic Dataset, 2018, July 2019, <https://aci.aero/>

⁶ Namely those of the Climate Change Committee's Sixth Carbon Budget, scaled for London

⁷ London First, London 2036: An Agenda For Jobs and Growth, January 2015, <https://www.londonfirst.co.uk/sites/default/files/documents/2018-04/London-2036-web.pdf>

The provocations in more detail

In buildings

London's housing stock is larger than all other European capitals and is predicted to grow by a million more homes over the next 30 years⁸. These buildings are responsible for more than 50% of the capital's emissions⁹. On average, approximately 75% of a building's lifecycle emissions occur in their operation and around 20% are 'embodied emissions', mostly from producing the materials they are made from. Embodied emissions are becoming more important as buildings become more efficient (as they produce relatively fewer operational emissions) and taller (as they use relatively more materials) and so it is crucial London uses the scale and diversity of its built environment to explore ways to address both.



What if London targeted large buildings with high operational emissions to kick-start a retrofitting revolution?

Decarbonisation of buildings is far behind targets and London has some of the lowest uptakes of national incentives. Seventy-four per cent of London's housing stock runs on mains gas that needs to be replaced. At current

rates of retrofitting, 60% of houses will still be below EPC C by 2030. As a part of a wider portfolio of interventions, London could join other global cities, such as New York and Tokyo, and tip the scales on the costs of low carbon retrofits for buildings with the highest emissions through a large buildings emissions trading scheme (ETS). A buildings ETS would set a cap on the amount of CO₂ that can be emitted per square foot of floor space. Buildings that exceed the limit will be able to purchase credits from those that are below the limit. Careful implementation would be critical, tailored carefully to building type and ownership model. But implementation could also help social issues. People in fuel poverty (an issue that is worsening in London) could be exempted from the scheme by policy makers, and actively supported by the initiative. By offering commercial buildings with high retrofit costs (e.g., heritage commercial properties) an option to pay for exceeding the ETS, a fund could be made to support retrofitting in social housing, contributing towards delivering a just transition to net zero that addresses urban inequality and benefits low-income communities. Estimates suggest that such a scheme could save 2Mt CO₂/year by 2030 and create 10,000 additional retrofitting jobs¹⁰. Supply chains across the UK could be kickstarted, which, for example, could potentially shift the UK from one of the biggest heat pump importers to an export contender.



74%
of London's
housing
stock runs
on mains gas

⁸ Presuming past 20-year CAGR of London's housing stock continues to 2050

⁹ Greater London Authority, London Energy and Greenhouse Gas Inventory (LEGGI) 2018, 2021, www.data.london.gov

¹⁰ Assumes large buildings occupy ~40% of the cities total floor area, calculated using (Building Heights in England, Emu Analytics) building heights data and making assumptions on building footprints. Using London's emissions data and comparing to New York's thresholds presume ~70% of these require envelope and low carbon heat retrofits to move below emissions thresholds.



What if London channelled accelerating interest in prime new builds into kick-starting the low carbon building materials industry?

The London Plan, the city's key regional planning document, has begun to target embodied emissions. For example, requiring developments referable to the Mayor to demonstrate reductions. Now the question is: what more could be done to make a critical mass for supply chains? London's prime residential market¹¹ is thriving, growing 10 percentage points a year faster than standard properties¹². Focusing on this market, where thriving activity suggests an ability to pay may be higher, could accelerate decarbonisation of the UK's construction industry. There is also potential in the capital's prime office stock: using green building materials would add approximately 7% to the price of a 45-storey London office block, similar to the premiums seen for other sustainability metrics on commercial properties like BREEAM. A target system (see page 18) on prime builds, for example, could start at 25% zero-carbon materials, which would be enough to support a clean cement plant from 2025 and be a top-10 user of a green steel plant by 2035.

This could help take an additional 1Mt of CO₂ off London's embodied emissions at its peak. As well as launching a domestic industry that lowers costs for all building types, export capabilities in green materials could be traded with the EU, where environmental policies, such as the EU's Carbon Border Adjustment Mechanism, will heighten demand for capabilities such as carbon capture use or storage (CCUS) on cement.

In aviation

London airports form the largest aviation hub in the world, with 180 million passengers annually, prior to the pandemic¹³. International travel is a vital part of London's economy. It is how London businesses trade across the globe, how tourists reach London's cultural and heritage attractions, and how international talent finds new jobs and educational opportunities. Despite per passenger emissions dropping as planes become more efficient, the growth in the number of people flying results in aviation remaining one of the few emitters in the capital that has continued to grow since 1990, nearly doubling to today. London drives 75% of the UK's aviation emissions and UK fliers now report feeling "flygskam" ("flight shame") as intently as Scandinavians where the word first originated. This is the moment for action. Our first two provocative ideas would help unlock two main solutions, sustainable aviation fuel (SAF) and carbon removals:



Domestically sourced SAF fuel could create

33,000 jobs

¹¹ Defined as private homes above £1,000psf

¹² Savills Research; Molior: "London Supply Update Q2 2021", August 2021, <https://pdf.savills.com/documents/London-Supply-Note-Q2-2021.PDF>

¹³ ACI, Annual World Airport Traffic Dataset, 2018, July 2019, <https://aci.aero/>



London represents approximately 10% of the UK's emissions



What if London as a city achieved a sustainable aviation fuel (SAF) target so ambitious it was comparable to the best EU countries?

The UK has targets for SAF, but London's airports have an ambition to go further: 15% by 2030 would be comparable to some of the top European countries, like the Netherlands. Government support to scale up production is undoubtedly the top priority in the short term, but more could be done through initiatives like a London SAF Buyers' Alliance. The city has a high concentration of corporates aspiring to decarbonise their scope three emissions. A SAF surcharge would add approximately 2% to the price of a transatlantic business class flight. Another route could be to take advantage of London's concentration of municipal solid waste (MSW). Shifting from burning MSW for energy to producing SAF could have a net impact of 0.5–1Mt CO₂e. This is equivalent to the impact of taking 3 million internal combustion engine cars off the road. Further, if fuel is sourced domestically, it could potentially kick-start an SAF economy across the UK of up to 33,000 jobs, where currently the UK lacks the capacity to meet even today's targets¹⁴.



What if London's airports sowed the seeds for high-quality carbon removals and pledged to become the first carbon-negative air hub in the world?

International standards on offsets for aviation have been described as falling short of what is needed, failing to ensure additionality and climate impact. London's airports could step in to lead the world with targets and standards for high-quality carbon removals – going so far as to pledge to neutralise all of London's historical aviation emissions. The UK is already a global leader in high-quality carbon removals; if London's aviation sector removes ~20-25Mt of CO₂ per year by 2050 (as suggested by the UK's Climate Change Committee¹⁵) and increases its removals by 2% a year from then on, it may eradicate all historical carbon impacts of its flights before 2100. Kick-starting a removals industry will help other sectors – the CCC's pathway requires almost five-fold growth in carbon removals in the UK between now and 2050. Globally these technologies need a fifty-fold scale-up – so there will be an exciting export market as well, given the UK is strong in particular in BECCS and DACS¹⁶. Removals would support a just transition (a carbon removals STEM professional has a 70–90% skill overlap with an Oil and Gas STEM professional), creating high quality jobs, often in historically deprived areas of the UK¹⁷.

¹⁵ Climate Change Committee, *The Sixth Carbon Budget*, December 2020, <http://www.theccc.org.uk/>

¹⁶ The Intergovernmental Panel on Climate Change (IPCC), *Special Report: Global Warming of 1.5 °C*, October 2018, <https://www.ipcc.ch/>

¹⁷ Coalition for Negative Emissions, *The Case for Negative Emissions*, June 2021, <https://coalitionfornegativeemissions.org/>

¹⁴ Calculated using job multipliers for SAF produced above the Sixth Carbon Budgets requirements, upper bound presuming all fuel is sourced domestically.

Financial services

London is a global leader in financial services – the UK has a trade surplus of £88 billion in this sector. Whilst the UK leads on conventional finance, in relative terms the industry lags on sustainable finance. Ten percent of sustainable funds domiciled in Luxembourg, the largest domicile in Europe, are managed in the UK. The UK manages double the percentage for conventional funds. Altogether, the UK's top financial institutions have around 800Mt of CO₂ on their books – more than twice what the UK emits each year.



What if London pushed forward the momentum in green financial services to fund the world's green CAPEX needs and transition to a green asset book?

The UK's finance industry has made progress in committing to a more sustainable future. Asset managers and banks with climate targets now represent \$16 trillion of underlying assets¹⁸. But more near-term action could be beneficial. This could also help solve a major challenge in wider society of connecting capital to decarbonisation investment needs. London's financial organisations could commit to stringent interim decarbonisation targets by 2025, such as through the Net Zero Asset Owners Alliance. London First could play a convening role, bringing together industries with needs and financiers to meet these targets. Despite top-ranking infrastructure,

¹⁸ Net Zero Finance Tracker, Climate Policy Initiative, [accessed 27/01/2022], <https://www.climatepolicyinitiative.org/netzerofinancetracker/>

London is not fulfilling its potential on sustainable finance. Sustainable funds are now outperforming conventional funds and capital is shifting – European sustainable flows accounted for 43% of all European inflows in Q2 2021¹⁹. As the global industry pivots, London losing its competitive advantage threatens to harm the UK economy. Yet London could still capitalise on the opportunity. If the UK's 10 largest asset managers and fifteen biggest banks achieved a 25% emissions reduction target for their portfolios by 2025, around 200Mt CO₂e per year may be saved and £1.5 trillion of additional funding provided to the net zero transition (broadly the amount the CCC estimates is needed for the UK). At the same time, this would safeguard the 70–80% of jobs that could be at stake long term if the transition continues and London's sustainable finance market share does not increase.



What if London became a leading centre for voluntary carbon trading?

While the priority for corporates must be to reduce their own emissions, voluntary carbon markets today can support abatement through funding for additional projects that, for example, engage in nature restoration, develop climate technology, and deliver energy efficiency improvements. In the future they could support carbon removals from the atmosphere, which the IPCC says the world may need up to 10Gt of by 2050 to address

¹⁹ Sunniva Kolstyak, "European Sustainable Fund Flows Slow in Q2", Morningstar, July 2021, [morninstar.co.uk](https://www.morningstar.co.uk)



The voluntary carbon credit market has been growing at an annual average rate of around

30-45%
since 2017

residual emissions and manage overshoots of the carbon budget. The voluntary carbon credit market has been growing at an annual average rate of around 30-45% since 2017. London's financial industry could commit to developing the infrastructure required to establish London as Europe's carbon trading hub. London is uniquely positioned because of its significant capabilities in fintech, the presence of trading hubs, and a legal system that shares similarities with those of many of the countries supplying credits today. If London establishes itself as a leading voluntary carbon trading hub, it could trade approximately \$1–3 billion in carbon credits in 2030, encompassing the UK's domestic demand as well as a further share of Europe's carbon credit demand. The UK's professional service industry has grown 55% over the past 10 years and, along with financial services, employs 806,000 people in London, many of them drawn from the top global talent attracted to the city. Professional service firms have their own emissions, but these are dwarfed by those of their clients. For example, in 2020, PwC; Deloitte; KPMG and EY all served more than 20 of the FTSE 100 each; nearly one third of the FTSE 100 emit carbon dioxide at a rate consistent with global temperature increases of 2.7C or more by 2050²⁰. Meanwhile, the economic case for actively addressing environmental, social and governance (ESG) issues in corporations continues to grow. As just one example, the cost of capital for better ESG performers is two percentage points lower than for poor performers²¹.



What if London's professional service firms collectively grew their proposition for ESG talent as a city?

Employees are attracted to firms that deliver on ESG promises; for example 84% say they are more loyal to a company that helps them contribute to environmental issues²². And in professional services, talent is a key value driver, with executives attributing 76% of their value to their employees²³. London's firms could form a coalition that builds the infrastructure required for London to become a leader in ESG professional services. Measuring the carbon impact firms have on clients and training whole organisations is a mammoth challenge. A coalition could allow professional service firms to drive initiatives such as standardised approaches to measuring climate impact with their clients or to agree collective commitments to flexible working norms, which may create employment opportunities in the city for talent beyond Greater London. With the right focus, this could collectively orchestrate an improved experience for ESG talent. Establishing London as an ESG hub would attract new talent, offsetting some of the dips in attraction seen since Brexit²⁴, whilst improving the performance of the sector's clients. Improving the FTSE 250's ESG score could save £700 million simply through lower cost of capital alone and is likely to benefit from many other effects on profitability, revenue and stranded assets at risk.

The business community is already playing a significant role in responding to the climate challenge and London can be a leader in net zero transformation. Across sectors, business is looking at its own carbon footprint, investing in new technologies and services to help reduce emissions and adapting business models, for example to transition to green fleets and zero carbon buildings. Business is also recognising that climate action has the potential to deliver social value through a 'just transition' that benefits the most vulnerable in society.

London First will continue to encourage and support members to put in place Climate Action Plans (CAP) that are transparent and standardised through participating in the UN Race to Zero, and other initiatives like the Glasgow Financial Alliance for Net Zero and the Mayor's call to action to adopt the UK Green Building Council's Net-Zero Framework for commercial buildings.

Many other global cities in our focus sectors are eyeing London's crown. Amsterdam is focused on green finance, Vancouver on low carbon buildings, and Helsinki on transport. These provocative ideas could help build on what's already being done and offer huge opportunity to contribute to the UK's decarbonisation goals, create jobs, and deliver growth.

²⁰ Arabesque S-Ray, "Analysing the Temperature Score", February 2020, arabesque.com

²¹ Ashish Lodh, ESG and the Cost of Capital, MSCI research, February 2020, <https://www.msci.com/www/blog-posts/esg-and-the-cost-of-capital/01726513589>

²² Edelman Trust Barometer 2020

²³ The Predictive Index, 2020 State of Talent Optimization Report, September 2020, predictiveindex.com

²⁴ Based on job searches on UK jobs on Indeed

We invite our members to work with us on developing this critical agenda. We'd welcome your feedback so please get in touch with

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Full report

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Context

COVID-19 has had an enormous impact on the world. The coronavirus pandemic has had tragic effects on health and lives but also taken an immense toll on economic livelihoods. In 2020 the UK's GDP fell by 9.7% whilst the number of universal credit claimants in London increased by approximately 140% between March 2020 and April 2021²⁵. While many local, national and global economies have now bounced back to pre-pandemic levels, the legacy of the pandemic is evident in sectoral and labour market shifts, uneven investment and productivity performance, and the now-looming cost of living crisis.

In addition, climate change remains a catastrophic threat to society. Coming out of COP26, combined pledges may limit the world's warming to 1.8C²⁶. Such pledges require significant action to be taken and funding to be committed, and even then, still exceed the Intergovernmental Panel on Climate Change's (IPCC) recommendation to keep warming below 1.5C to avoid catastrophic and potentially run-away climate change. The world is facing two challenges: one caused by its economic past, another by a need to shape a positive economic future. Important as it is to repair the economic damage of COVID-19, a swift return to business as usual could be environmentally harmful. A lesson can be taken from the 2007–08 financial crisis. The ensuing economic slowdown sharply reduced

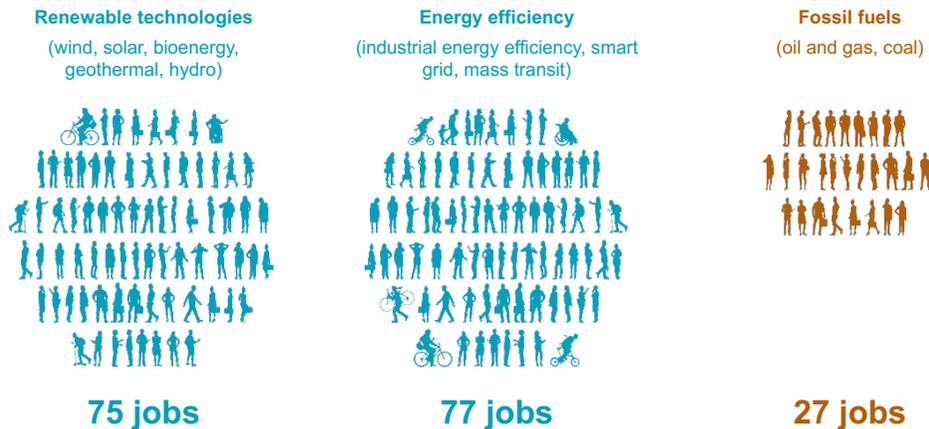
global greenhouse-gas emissions in 2009. But by 2010, emissions had reached a record high, in part because of measures implemented to stimulate economies, with limited focus on the environmental consequences.

Yet a growing understanding of environmental economics shows that the two sets of solutions need not conflict. Countries – and cities – do not have to choose: a decarbonised future can be one of environmental benefits

and economic prosperity. The average green investment can create around three times as many jobs per pound as fossil fuel investments²⁷, as illustrated in the figure below. Spending now on green investments can help to avoid the lock-in of fossil fuels for years to come. Green investments are driven in particular in COVID-19 recovery packages, by promoting once-in-a-generation investments to drive a green recovery. The European Union, for example, has set up a €750 billion recovery fund.

Government spending on renewable energy and energy efficiency has been shown to create 2-3x more jobs than spending on fossil fuels

Jobs created, directly and indirectly¹, per \$10 million in spending



1. Excludes induced jobs
Source: Heidi Garrett-Peltier, "Green versus brown: Comparing the employment impacts of energy efficiency, renewable energy, and fossil fuels using an input-output model," Economic Modelling, pp. 439-47, 2017

25 City Intelligence Unit, GLA, Socio-economic impact of Covid-19, July 2021, data.london.gov.uk

26 Dr Fatih Birol, "COP26 climate pledged could help limit global warming to 1.8 °C, but implementing them will be the key", The International Energy Agency, November 2021, iea.org

27 Heidi Garrett-Peltier, "Green versus brown: Comparing the employment impacts of energy efficiency, renewable energy and fossil fuels using an input-output model," Economic modelling, pp 439-47, 2017"

London's work in addressing the city's carbon emissions is underway. As a C40 city, belonging to the global network of mayors taking urgent action to confront the climate crisis, the capital's emissions have fallen by 40% between 2000 and 2017²⁸. The Mayor's targets aim for London to become a zero-carbon city by 2030. The city has already achieved some of its goals: The Ultra Low Emission Zone (ULEZ) introduced in April 2019 reduced CO2 emissions by 4% and NO2 emissions by 36% in the first six months²⁹ and the Mayor is currently consulting on extending the zone to cover the whole of Greater London. At the same time, the London Plan requires developments referable to the Mayor to reduce their embodied emissions; and an expansion of cycle lanes has led to a 22% increase in the number of journeys taken by bike in outer London³⁰. Yet as our Business Manifesto for Delivering Net Zero Carbon shows, London must go further to set out a clear pathway to achieving net zero.

London could drive green economic growth, for the city and the UK, by capitalising on the opportunity in areas where the city has an advantage. There are multiple ways to drive economic growth through 'green' – for example, creating demand for and transitioning workers to higher

value green professions, or improving the productivity of the economy through capital investment and efficiency savings. A particularly important element is becoming competitive in green export markets. This is often most achievable in areas where a city already leads, and London has many distinctive competitive advantages in sectors which could have significant climate impact. The city is also inextricably connected to regional supply chains across the UK, so action in the capital could support growth agenda beyond its boundaries. For example, 35% of jobs created in London from the construction of new offices are spread across the UK³¹. London cannot risk being complacent. Other cities are beginning to place a stake in the ground in areas of their own decarbonisation competitiveness and so London needs to move fast. Amsterdam is strong on green finance, launching two funds to support the city's decarbonisation 2025 goal. The Amsterdam Climate & Energy Fund (AKEF) offers primarily subordinated loans ranging from EUR 500,000 to 5 million, while the Sustainability Fund supports smaller, local projects up to EUR 500,000³². Vancouver is taking steps to decarbonise its buildings³³ with its Greenest City 2020 Action Plan³⁴.

Delivering on a vision of a decarbonised London will require action to prioritise opportunities and will need to be delivered in partnership with London businesses which share strong green growth ambitions. London First believes there is a strong appetite among businesses to shape green growth. COP26 has increased the momentum in both the public and private sector; globally, through the Glasgow Financial Alliance for Net Zero, 450 financial institutions have committed to net zero by 2050, accounting for \$130 trillion in assets³⁵. Corporate climate commitments are continuing a dynamic rise, doubling between 2019 and 2020³⁶. For London's businesses, now is the time to support bold moves. London First and its members have already begun to explore the city's net zero future with its 'Business Manifesto for Delivering Net Zero Carbon in London' and many members signing up to the UN Race to Zero initiative.

Now, London First aims to build on this work and inspire action by demonstrating the potential economic and environmental benefits of a handful of decarbonisation opportunities with near-term actions.

28 Greater London Authority, *London Energy and Greenhouse Gas Inventory (LEGGI) 2018, 2021*, www.data.london.gov

29 *Transport for London, Central London Ultra Low Emission Zone – Six Month Report, October 2019*, www.london.gov.uk

30 Mayor of London, "World's First Ultra Low Emissions Zone expands to cover inner London", October 2021, london.gov.uk; Mayor of London, *The London Plan 2020*, May 2021, london.gov.uk; Mayor of London, "Record breaking growth in London's cycle network continues", March 2021, london.gov.uk

31 London First, *London 2036: An Agenda for Jobs and Growth*, January 2015, www.londonfirst.co.uk

32 C40, "C40: Good Practice Guides: Amsterdam Sustainability Fund and Amsterdam Climate and Energy Fund", 2016, C40.com

33 *Invest in Holland*, "Amsterdam Tops World Ranking for Green Finance", May 2021, investinholland.com

34 *City of Vancouver, Greenest City 2020 Action Plan*, 2015

35 Tom Metcalf and Alex Morales, "Carney Unveils \$130 trillion in Climate Finance Commitments", Bloomberg, November 2021, Bloomberg.com

36 United Nations Climate Change, "Commitments to Net Zero Double in Less Than a Year", September 2020, unfccc.int

London First's approach to shaping these provocative ideas

Seven provocative ideas have been shaped in partnership with business leaders through a series of roundtables and individual discussions. These ideas are ambitious, yet practical ways businesses can contribute to initiatives that reduce carbon emissions and deliver jobs and growth. Each idea demonstrates the potential for businesses to drive the agenda beyond current path for the city and highlights the environmental and economic case for doing so.

The ideas span four sectors: buildings, aviation, financial services, and professional services. These sectors were chosen for their role in London's distinctiveness, with the aim of capitalising on and preserving London's competitive advantages, respectively: a dense built environment with a scale unlike most of Europe, the world's largest hub of aviation activity, a centre of professional service expertise, and a world leading financial hub. London holds many other competitive advantages which we have not explored further but that the city can draw on, such as a strong track record of mobility innovation.

The provocative ideas themselves were selected based on four factors. First, their material decarbonisation impact, measured as CO₂ impact above the UK's sixth carbon budget pathways. Secondly, the size of the

economic opportunity the provocation could deliver, whether job creation, job protection, increasing GVA, or creating new export markets. Thirdly, their positive knock-on effects on the whole of the UK. This contribution to growth across the UK might be delivered through pilots run in London that could be replicated elsewhere, new value chains that can be initiated in London but spawn benefits elsewhere, or services that enable other new industries beyond the capital. Finally, those with near-term implementation actions that London First members could drive. For example, business investments or local government frameworks that can be set without reliance on national level policy. All provocative ideas offer short-term actions that could be delivered in the next couple of years with benefits reaped by or before 2030.

This is not intended to be a roadmap decarbonisation for London. Further still, even within the overlap of green growth, neither the sectors of focus nor the ideas within them are intended to be exhaustive. The purpose of this paper is to illustrate the materiality and accessibility of decarbonisation opportunities that create abatement and economic opportunities, whilst detailing some options for where this could begin. We actively welcome challenge or additions to this list.

The provocative ideas presented in this initial contribution to the debate have all been underpinned by quantitative analysis and engagement with London's senior business leaders. McKinsey and Company, our sustainability knowledge partner, has developed a credible fact base to underpin these discussions. This contribution will go on to shape London First's approach to sustainability over coming years.



Building a decarbonised London

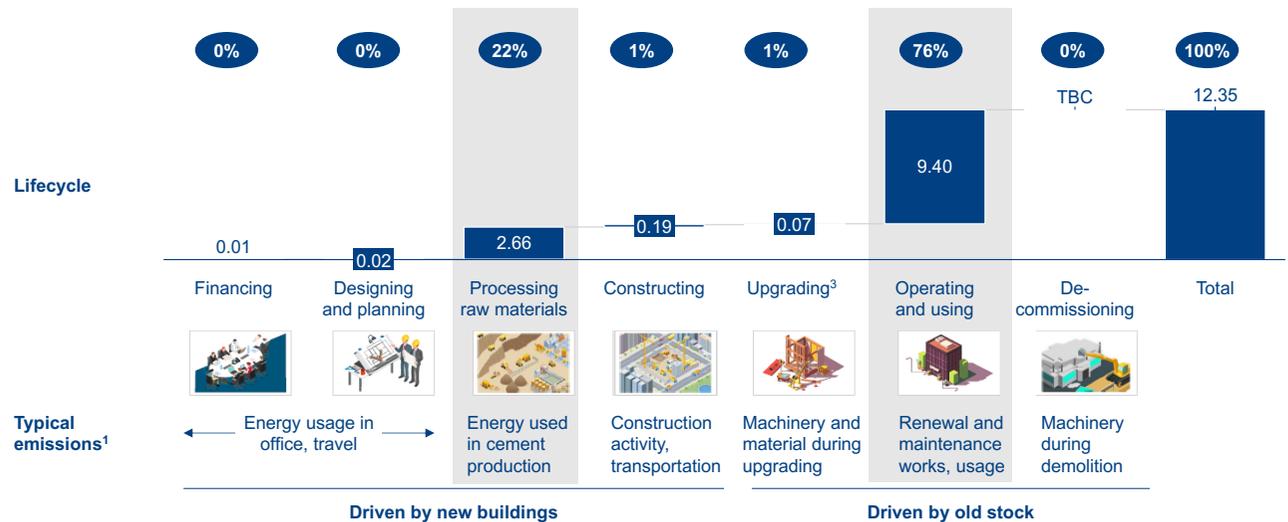
London has a uniquely large, diverse, and economically vibrant array of buildings. The capital already tops European rankings for number of dwellings³⁷, and it can expect an additional one million homes to be built by 2050³⁸. In a decarbonising world this scale represents both a challenge and an opportunity.

Buildings generate carbon emissions throughout their lifecycle, from first planning to final demolition. Those that occur before a building is in use are called “embodied emissions”. Analysis of the global building stock found that on average these represent around a fifth (~22%) of a building’s total lifetime emissions. Most are from the processing of raw materials into building materials (above all steel and concrete, which represent 60% of embodied emissions)³⁹. Almost all the rest (~76% of the lifetime total) are operational emissions, those produced once a building is in use - from lighting, heating, cooking, appliance use etc. Currently, operational emissions from buildings make up more than half of London’s total direct emissions⁴⁰.

Along the building value chain material processing and operation are the highest contributors to emissions

CO₂ emissions by asset type (GtCO₂e)^{1,2}

% of emissions



1. Modelled using Modeled global energy demand in detail till 2050; leveraged the International Energy Agency together with sector specific reports to build a comprehensive baseline of current energy use across sectors; refined based on bottom-up assessment of e.g. commercial building (materials), emissions from entire transportation network in US (transportation)
 2. Includes scope 1 (direct emissions from owned and controlled sources), scope 2 (indirect emissions from generation of purchased energy) and scope 3 (all other indirect emissions that occur in a company’s value chain)
 3. Emissions allocated to upgrading based on construction spend on renovation vs new. Data only available for real estate - same factor applied for infrastructure
 Source: IEA CO₂ Balance 2018, Steel Construction Encyclopedia, Press search, OECD

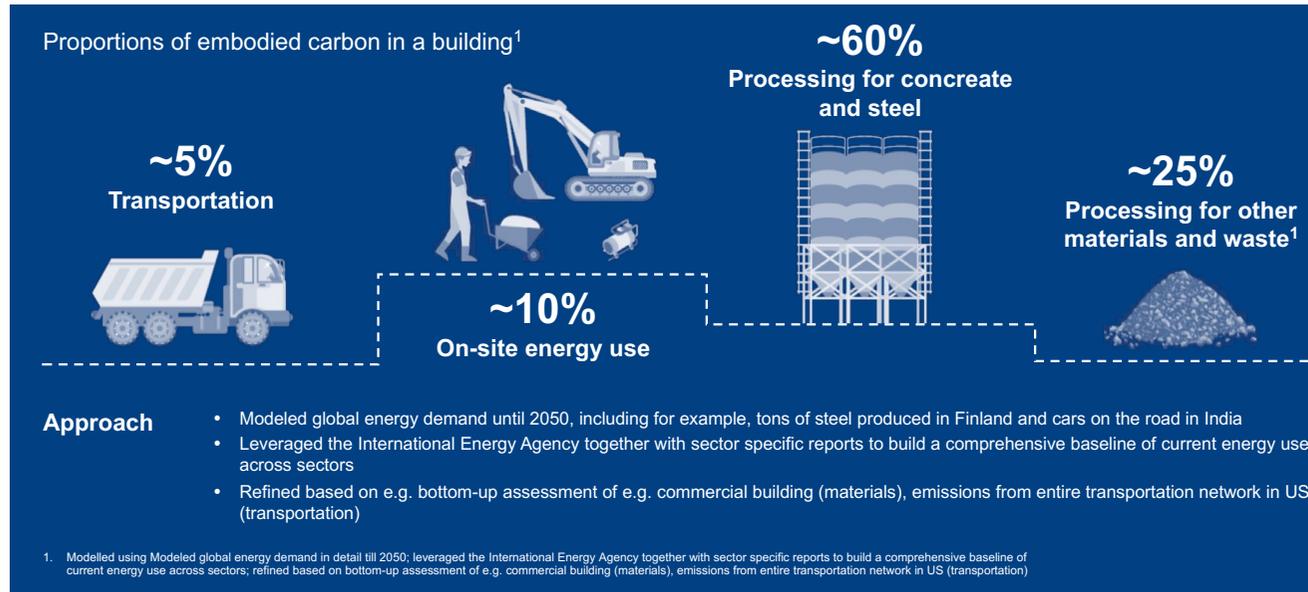
37 Eurostat, European Commission, <https://ec.europa.eu/eurostat/data/database> [last accessed 27/01/2022], excludes Moscow

38 Presuming past 20-year CAGR of London’s housing stock continues to 2050

39 Modelled using Modeled global energy demand in detail till 2050; leveraged the International Energy Agency together with sector specific reports to build a comprehensive baseline of current energy use across sectors; refined based on bottom-up assessment of e.g. commercial building (materials), emissions from entire transportation network in US (transportation)

40 Greater London Authority, London Energy and Greenhouse Gas Inventory (LEGGI) 2018, 2021, www.data.london.gov

The processing of concrete and steel represent the largest share of embodied carbon



The balance between embodied and operational emissions is changing. Newer buildings are significantly more efficient to run, so their operational emissions are lower. But because embodied emissions have not changed as much, these now make up a higher proportion of the total. Today, in the most efficient new builds, embodied emissions can account for almost half the total emissions⁴¹. At the same time, London has a scarcity of land with tight planning restrictions, including the greenbelt, and to deliver the scale of development that the city needs, particularly in relation

to its housing needs, building at higher density is a necessity, which in some instances means building tall.

Building tall reduces emissions elsewhere, for example, from transport owing to less urban sprawl, but it also means more embodied emissions per building area. The number of tall buildings going up in London has grown by 26% a year for the past five years, and these buildings embody more emissions because they require massive steel frames and use large quantities of concrete⁴². A 20-storey building can have up to ten

times the embodied emissions per square foot of a 2-storey building⁴³. More operationally efficient and taller buildings make it imperative that the embodied emissions of London's building stock are addressed in parallel with their operational emissions. Whilst the London Plan has already made progress going beyond national policy to reduce the emissions of the capital's building stock, more can be done.

⁴¹ Buildings Performance Institute Europe (BPIE), *Whole-Life Carbon Challenges and Solutions for Highly Efficient and Climate Neutral Buildings*, May 2021, www.bpie.eu

⁴² *New London Architecture, London's Tall Buildings Survey 2021*, April 2021, <https://nla.london/>

⁴³ Bohne, R, Kaspersen, B, Lyslo Skullestad, and Myklebust, E. *Embodied Energy Versus Building Height, The "Premium" of Building Tall*, Construction Industry Council Hong Kong, July 2017, <http://hdl.handle.net/11250/2483766>

Provocative idea 1

What if London targeted large buildings, with the highest operational emissions, to kick start a retrofitting revolution?

What does it involve?

Reducing building operational emissions is complex, particularly due to variations in building ownership. Multiple policy instruments could be used, be that incentives or mandates. The London Plan already goes beyond building regulations to reduce emissions, but existing buildings remain a challenge. One option to spur emission reductions could be an emissions trading scheme (ETS) to tip the scale on the financial incentive for decarbonisation for London's large buildings⁴⁴. An ETS would set a cap on the level of emissions buildings can emit per square foot of floor space. Buildings that emit less than the cap could sell their permits to those with emissions higher than the cap, as currently works with the EU ETS. Whilst such a scheme would have significant design and implementation challenges, other major cities like New York and Tokyo have already introduced similar schemes and lessons could be taken from their experiences. The scheme could be piloted with commercial buildings, where ownership models may make implementation

simpler and aim to be rolled out to all large buildings if deemed feasible after early pilots. If successful, this could in time be extended to cover residential properties, with appropriate exemptions. The scheme could create a financial incentive for landlords to decarbonise their properties. But most importantly the instrument could be designed to protect and support those in fuel poverty, through exemptions and an offsetting mechanism that channelled funds from commercial properties that don't meet targets towards decarbonising social housing.

What are the potential benefits?

Buildings are a challenging sector to decarbonise. Along with issues of substantial up-front costs, tenant-landlord dynamics, and the inconvenience of some interventions for property owners, in many cases today there is not a business case for most interventions⁴⁵. An ETS would start to overcome this challenge for landlords by improving the economics of retrofits.

An ETS would guarantee emission reductions by setting a cap and allowing landlords to choose the best path. In comparison, building policy today tends to focus on retrofitting and heat replacement separately. London Councils have committed to retrofit homes to an average of EPC B by 2030. Yet at current rates, 96% of homes will miss this target and the 74% of London's housing stock that runs on mains gas will still have this carbon-emitting heating source [figure]⁴⁶. An ETS would go further to help ensure that the outcome of carbon reduction is achieved. For example, achieving EPC C and a decarbonised heat system is likely to be a better outcome environmentally than EPC B with limited fuel switching. Policy aimed at incentivising private landlords to decarbonise heat has so far had a limited uptake in London. The Renewable Heat Incentive, which offered payments for renewable technologies, attracted 300 applications in London compared to 7,000 in the East of England⁴⁷.

⁴⁴ The definition of 'large' would need to be scoped out, but large buildings present a significant portion of London's building stock and in some instances have economies of scale

⁴⁵ Carbon Trust, Heat Pump Retrofit in London, August 2020, <https://www.carbontrust.com>

⁴⁶ Using past 5-year EPC data for London's housing stock, projected changes based on previous CAGR. Future required projections presume a linear growth and distribution of 25% of dwellings at EPC A, 50% at EPC B, and 25% at EPC C to achieve London Council's average EPC B target.

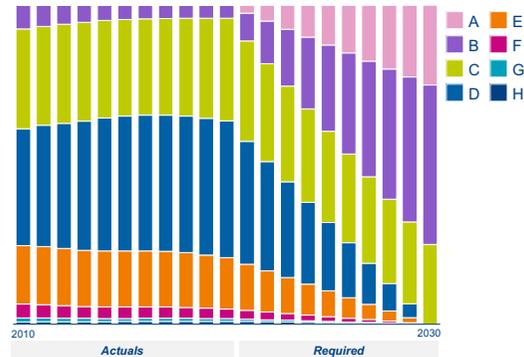
⁴⁷ Department for Business, Energy & Industrial Strategy, RHI Monthly Deployment Data, January 2021, www.gov.uk

At current rates of energy retrofits, London will be a long way off reaching targets

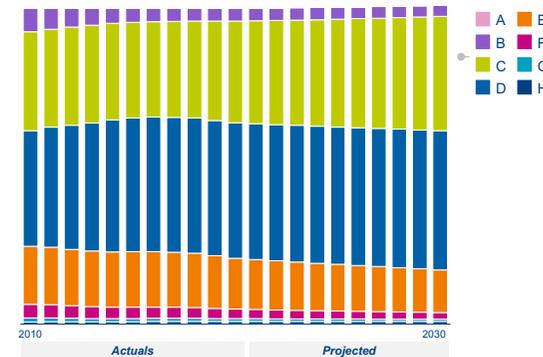
London needs to achieve an average standard of EPC B by 2030¹...

...but is not currently retrofitting fast enough; just 4% of homes will reach the target at current rates

Energy Efficiency Rating of Existing London Lodgments required under London Councils ambition 2010-2030, %



Energy Efficiency Rating of London Lodgments 2010-2030², %



Source: UK Gov: Live tables on Energy Performance of Buildings Certificates

1. Using past 5 year EPC data for London's housing stock, projected changes based on previous CAGR. Future required projections presume a linear growth and distribution of 25% of dwellings at EPC A, 50% at EPC B, and 25% at EPC C to achieve London Councils' average EPC B target.

2. Assumes 2019-2020 rate of change

An ETS could improve the economics of building decarbonisation by tackling the cost of electricity versus gas, one of the factors complicating retrofits. Mains gas is often cheaper for heating than electricity, even though it generates higher emissions. This is partly because environmental and social obligations costs are passed on differently in electricity and gas bills. According to Ofgem, these costs make up 2% of the average UK gas bill and 25% of the average UK electricity bill⁴⁸. The UK government, through the Heat and Buildings Strategy, has committed to rebalancing levies to change this and create

a business case for low-carbon heat, but this may not come for some time. By pricing building carbon emissions, an ETS could rebalance these costs, by effectively raising the price of gas to the point where electricity became the cheaper option. Inevitably costs would go up for subject parties in the short run, but in the long run these may be recouped through lower operating costs, particularly as the UK government rebalances heating costs. Nonetheless, support may be needed to access capital. For example, the city could explore financial instruments that support landlords, such as PACE loans.

Importantly, the scheme could be designed to protect and support those in fuel poverty and contribute towards delivering a just transition to net zero that tackles inequality and benefits low-income communities. On average over

the past 15 years, 10% of London households are in fuel poverty and the share is expected to rise sharply as a result of rising wholesale gas prices⁴⁹. This rise in London contrasts with a fall in the proportion of people in fuel poverty in England over the same period. If such a scheme is rolled out to residential buildings, it could be designed to exempt those in fuel poverty. But not only this, even when focused on commercial properties the policy could incorporate an offsetting mechanism for commercial landlords to achieve their obligations by paying an offset rate that funds decarbonising of households in fuel poverty. This would reduce costs for those with commercial properties that are extremely expensive to retrofit, such as heritage commercial properties, and stimulate financial flows for insulation and low carbon heat for households in fuel poverty.

New York and Tokyo are already driving comparable schemes. Tokyo was the first to implement an ETS for large commercial and industrial buildings. The scheme has reduced emissions in Tokyo by 6.9%⁵⁰. New York's Local Law 97 targets large buildings given the percentage of emissions these account for in the city, and uses an ETS mechanism because it provides flexibility. For example if a building is due to replace its equipment before it might need to meet the ETS carbon requirements, it can get recognition for this by selling its additional impacts to a third party who may save significant cost by waiting slightly longer to replace their equipment. The scheme targets

48 Ofgem, *Costs in Your Energy Bill*, [accessed 27/01/22], <https://www.ofgem.gov.uk/energy-advice-households/costs-your-energy-bill>

49 *Fuel Poverty Statistics*, Department of Business, Energy and Industrial Strategy, January 27, 2022, www.gov.uk

50 Arimura, T. and Abe, T., *The Impact of the Tokyo Emissions Trading Scheme on Office Buildings: What Factor Contributed to the Emission Reduction?*, Research Institute for Environmental Economics and Management, Discussion Paper Series No. 1908, November 2019, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3487245

large commercial and residential buildings, covering 60% of the city's built area and will come into force in 2024⁵¹.

Decarbonising commercial buildings could also allow companies to reduce the emissions from their offices. Around half of FTSE 100 companies have net zero targets and 47 of them have headquarters in London⁵². These targets suggest a willingness to pay for decarbonisation - a buildings ETS could help them do it.

A large buildings emissions trading scheme, if using the same limits as New York's Local Law 97, could help save 2Mt CO2/year. As well as potentially costing buildings owners less than a target system without the ability to trade requirements between parties, wider economic benefits would also be created.

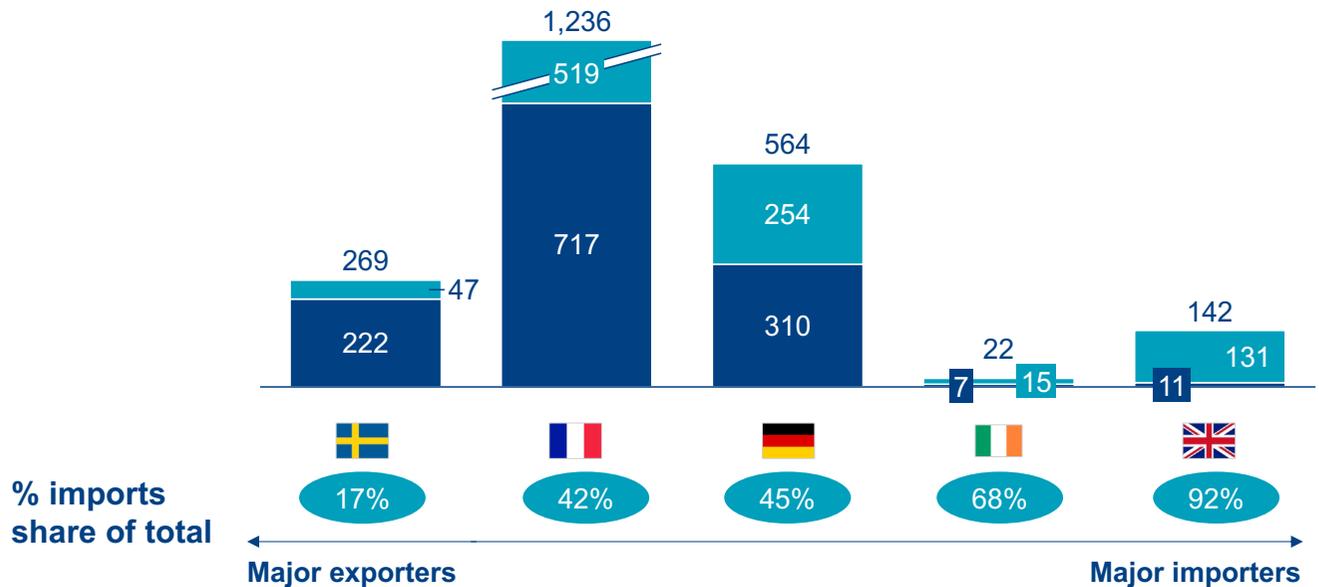
London will already need a substantial retrofitting workforce for existing plans but dialling up ambition could create an additional 10,000 or so direct jobs in retrofitting and low carbon heat. Critically, this may help make retrofitting more of a viable profession in the capital, as job demand would begin earlier and last longer than the Sixth Carbon Budget's job projections⁵³. This could also present new structural opportunities for UK industry. For example, today, 92% of heat pumps are imported, but a large-buildings ETS could create the critical demand to support the UK's future heat pump industry [figure]⁵⁴.

The UK is presently a net importer of heat pumps

Heat pump import and export volumes, by country in 2018¹

000s units

■ Imports ■ Exports



1. Estimate based on import value and heat pump ASP of 6000 USD
Source: Comtrade Database, United Nations, [accessed 27/01/2022], <https://comtrade.un.org/>

51 Guarini Center of Environmental, Energy & Land Use Law, Carbon trading for New York City's Building Sector; June 2021, <https://guarinicenter.org/>

52 Guy Faulconbridge, "Nearly half of FTSE 100 companies have no net-zero target", Reuters, October 2021, www.reuters.com

53 Assumes large buildings occupy ~40% of the cities total floor area, calculated using (Building Heights in England, Emu Analytics) building heights data and making assumptions on building footprints. Using London's emissions data and comparing to New York's thresholds presume ~70% of these require envelope and low carbon heat retrofits to move below emissions thresholds.

54 UN Comtrade Database, United Nations, [accessed 27/01/2022], <https://comtrade.un.org/>

Provocative idea 2

What if London reduced the embodied emissions of its prime new builds to kick-start the low carbon building materials industry?

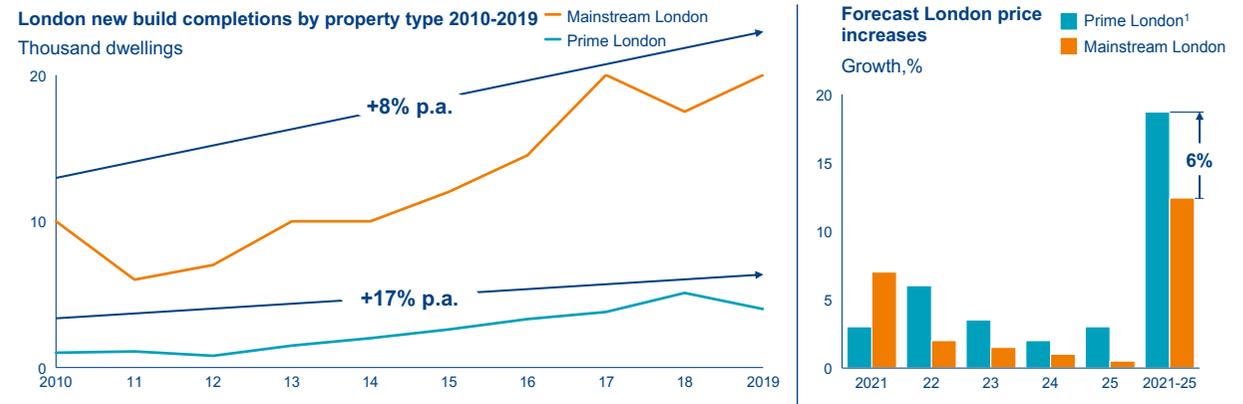
What does it involve?

As well as operational emissions, London will need to reduce the embodied carbon of its building. When new building capacity is required, renovating idle building stock is likely the easiest way to create low carbon buildings. Alongside this, there is a need to focus on using lower carbon construction materials. Several policies could be considered to support the shift towards low carbon construction, such as tax rebates for low carbon developments; public procurement of low carbon building materials; or life cycle carbon limits for new buildings. One potential possibility is if London set progressively more stringent requirements for embodied emission reductions in new prime residential development (the exact definition of which would need to be clearly defined). Targets could cover both building materials and on-site construction. Targets could tighten over time to allow construction companies to adjust and send a clear demand signal to cement, steel and other material producers to help de-risk investments. Ambition could ratchet up over time, starting with a 25% embodied emissions reduction from 2025–30, a 50% reduction from 2030–35, and a 100% reduction from 2035 onwards. This would be faster than the reduction called for in the current Sixth Carbon Budget⁵⁵.

What are the potential benefits?

The thriving prime residential property market may be most able to absorb the additional costs of using low carbon materials. The market⁵⁶ is growing at 10 percentage points a year faster than the market for standard properties⁵⁷ and prices are projected to increase by 6 p.p. more than those for standard properties⁵⁸.

London's prime property market is thriving



The growth rate of prime property in London over the past 10 years has been double that of the mainstream market. 20% of London's new builds today are prime properties, compared to 10% in 2010. Analysts further expect this demand to continue given higher price forecasts for these properties.

1. Prime Properties: Private homes above £1,000psf (on sites with more than 20 private homes); Mainstream properties: Private homes below £1,000psf (on sites with more than 20 private homes)
 Source: Savills Research, "Residential Property Forecasts", July 2021, savills.com; Savills Research; Molior, "London Supply Update Q2 2021", August 2021, savills.com

55 Climate Change Committee, *The Sixth Carbon Budget: Manufacturing and Construction*, December 2020, theccc.org

56 In the data this market is defined as private homes above £1000/ per square foot

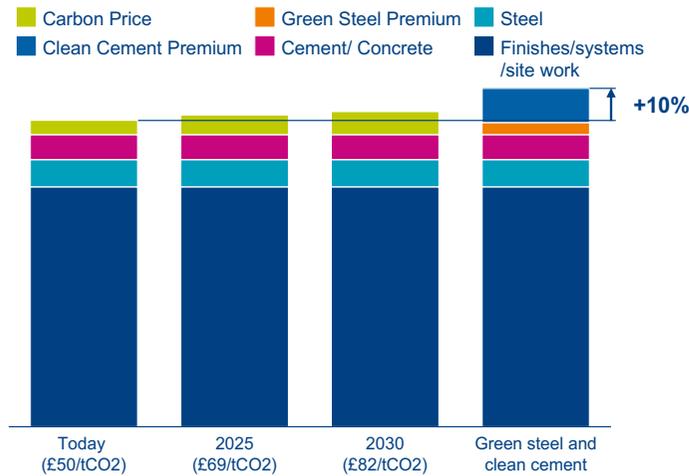
57 Savills Research; Molior: "London Supply Update Q2 2021", August 2021, savills.com

58 Savills Research, "Residential Property Forecasts", July 2021, savills.com

Costs of using decarbonised building materials in a 45-storey London office block

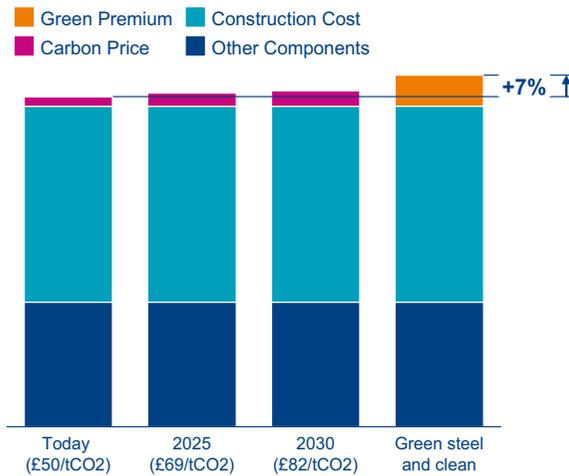
Change in construction costs of 45-storey London office block, at today's prices with carbon price and decarbonized building materials¹

Share of construction cost



Change in total end price of 45-storey office block, at today's prices, using decarbonized building materials

Share of house price



The costs in decarbonising embodied emissions are modest. The analysis found that in 2030, using only zero carbon building materials would increase the total costs of a 45-storey London office block by around 7% vs. today⁵⁹.

Commercial prime buildings could also absorb some of this cost in through a premium for lower embodied carbon. JLL estimates that central London outstanding

or excellent BREEAM rated Grade A transactions carry a rental premium of 10% and enjoy lower vacancy rates⁶⁰. EPC A and B properties have a 10% sales premium on EPC D properties⁶¹. Although unlikely to be of the same scale due to lower associated financial benefits (i.e. lower heating bills), a green premium for embodied emissions could substantially reduce the cost of decarbonisation.

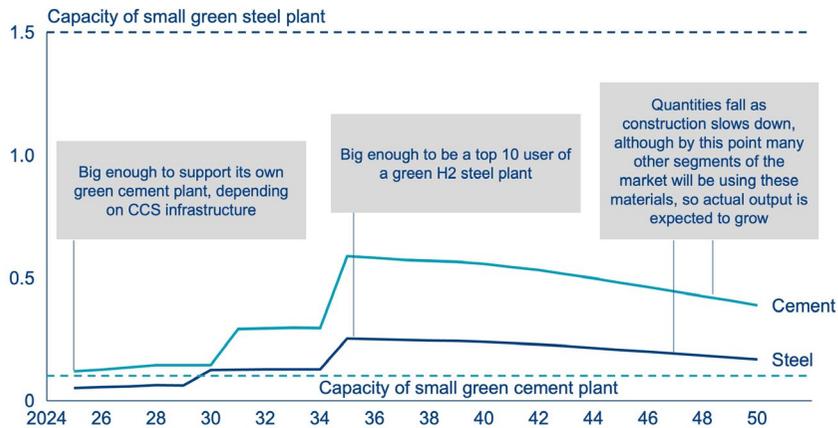
⁵⁹ Cost Breakdown taken from Building Magazine, "Cost Model for a 45-Storey Office Tower in Central London"; Carbon Price: Carbon Pulse – EU ETS analyst forecasts; Emission Factors: IPCC (steel EF: 1.46 tonnes/tCO2; Cement EF: 0.4985 tonnes/tCO2)

⁶⁰ JLL, *The Impact of Sustainability on Value in Central London*, May 2020, jll.co.uk

⁶¹ Claire Bailey, "Does Demand for green buildings lead to a premium", *Savills*, April 23, 2021, savills.com

Demand for building materials in London as a result of prime ‘net zero embodied emissions’ targets for premium buildings, Mt

Projected demand for building materials in London as a result of a prime ‘net zero embodied emissions’ target for premium buildings, Mt of raw materials¹



¹ Assumes same growth rates in building materials demand as today; presumes 20% of all building materials go to the prime sector, the same proportion as prime new buildings of total new builds.

Source: McKinsey Sustainability Practice, Expert Interviews

An important part of driving decarbonisation in the UK’s building materials supply chain is demonstrating material demand on a clear timeline. Interventions with the largest carbon reduction (e.g., carbon capture and storage on a full cement plant) require a critical mass of demand to be invested. Targeting residential and commercial prime properties could provide the critical mass required to get the UK’s low carbon construction industry off the ground with substantive step changes. Until then, plants are likely to invest in more incremental improvements (e.g., efficiencies) and so be less likely to be able to provide 100% green cement at scale to any customer.

Due to the size of the market, with a strong level of ambition a prime embodied emissions scheme could provide sufficient momentum. The illustrative targets could create enough demand for low carbon materials to support a clean cement plant from 2025 and be a top-10 user of a UK green steel plant from 2035⁶². Although only impacting a fraction of London’s overall construction, the scheme could kick-start the industry five to ten years earlier than assumed in the models of the UK’s Climate Change Committee. This would not only cause additional decarbonisation from properties in the scheme, but help reduce costs for other segments of the market (i.e., outside

of prime), thus making meeting the targets in the Sixth Carbon Budget, the UK’s emission thresholds, more likely.

Finally, stimulating the UK’s clean cement and green steel industry today would likely create goods and services which may soon be in greater demand by other markets. The EU is in the process of passing a carbon border adjustment mechanism (CBAM). This will put a price on the carbon content of imported steel from UK sites. Even on products not typically traded between countries, such as cement, capabilities on decarbonisation developed domestically can be exported abroad.

⁶² Assumes same growth rates in building materials demand as today; presumes 20% of all building materials go to the prime sector, the same proportion as prime new buildings of total new builds.

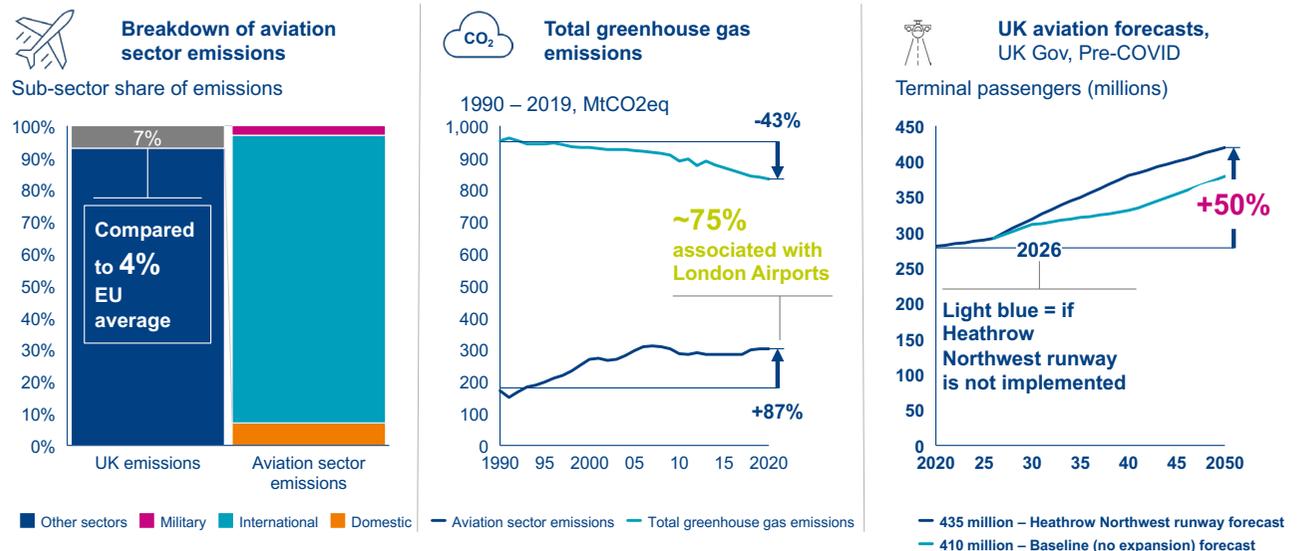
London as a centre of decarbonised aviation

Aviation is vital for both the UK and London's economy. Across the UK, the air transport sector provides 1.6 million jobs and contributes \$120 billion GVA annually⁶³. Greater London is home to the largest aviation hub in the world, with 180 million passengers annually, 22% more than the next biggest, New York⁶⁴. The UK's aviation sector can remain competitive whilst decarbonising and London holds a unique position to lead in this transition due to its scale.

Aviation contributes 2% of global emissions, but in the UK departing flights account for 7% of emissions⁶⁵, over three-quarters of which come from London⁶⁶. Aviation is one of the few industries that is continuing to emit more carbon each year. Since 1990, aviation emissions have increased by 87% whilst in the wider economy emissions fell by 43%, driven by a lower carbon power sector and a shift away from emission intensive industry⁶⁷. On the current trajectory, these emissions are expected to rise, driven by higher demand due to growing incomes. According to pre-COVID government forecasts, flights to and from the UK could increase by up to 50% by 2050⁶⁸.

Aviation's role in the UK economy and the industries emissions

Aviation accounts for 7% of UK emissions, ...and unlike almost every other sector, UK aviation emissions have grown since 1990... ... and more people will want to fly in the future



Source: Air Transport Action Group (ATAG); Aviation Benefits Beyond Borders Facts and Figures; September 2020, <https://aviationbenefits.org/>; Final UK Greenhouse Gas Emissions Database, Department for Business, Energy and Industrial Strategy, data.gov.uk [accessed 27/01/2022]; Department for Transport, UK Aviation Forecasts 2017, October 2017, gov.uk

Customers care about the environmental impact of flying. A transatlantic return flight consumes a third of an individual's carbon budget, the total emissions an individual can emit each year if we are to avoid catastrophic climate change⁶⁹.

In the UK, 30% of consumers say they plan to reduce air travel due to climate concerns. 'Flygskam', or 'Flight Shame' is as high in the UK as in Sweden where the word originated⁷⁰.

63 IATA, *The Importance of Air Transport to the United Kingdom*, 2018, <https://www.iata.org/>

64 ACI, *Annual World Airport Traffic Dataset*, 2018, July 2019, <https://aci.aero/>

65 *Final UK Greenhouse Gas Emissions Database*, Department for Business, Energy and Industrial Strategy, data.gov.uk [accessed 27/01/2022]

66 *Airport Tracker: Aviation emissions uncovered*, ODI, Transport and Environment (T&E) and International Council on Clean Transport (ICCT), <https://airporttracker.org/>, [accessed 27/01/2022]

67 *Final UK Greenhouse Gas Emissions Database*, Department for Business, Energy and Industrial Strategy, data.gov.uk [accessed 27/01/2022]

68 Department for Transport, *UK Aviation Forecasts 2017*, October 2018, www.gov.uk

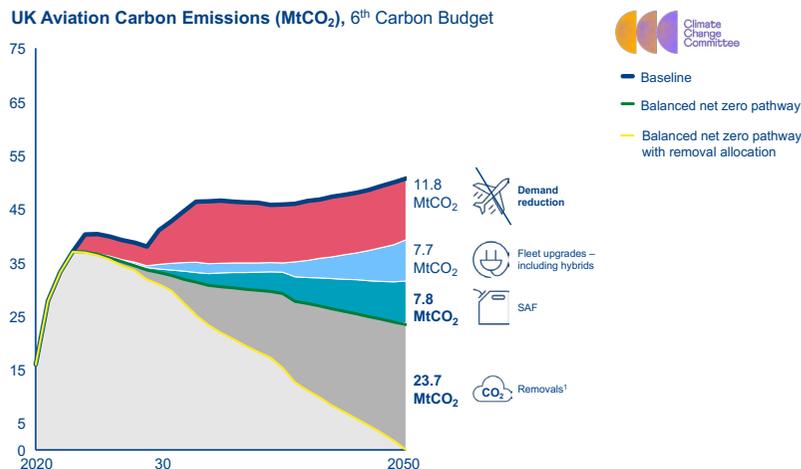
69 Presumes a CO₂ budget of 6800 kgCO₂eq: Federal Ministry of the Environment, Germany

70 McKinsey "CleanSky" survey, July 2021

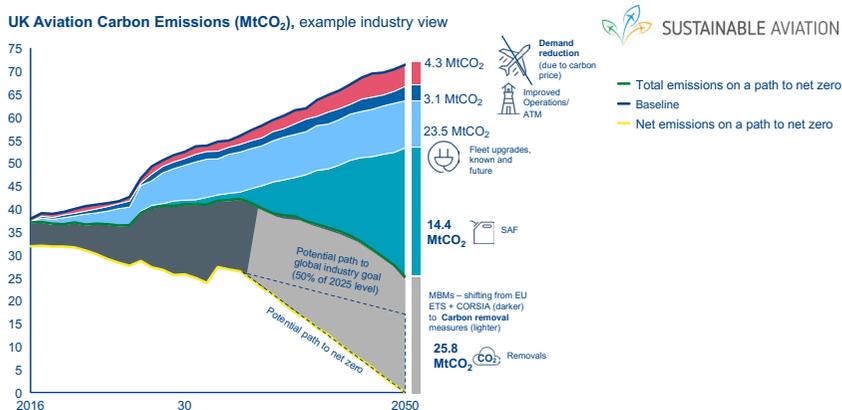
Reducing unnecessary flights is an essential part of a decarbonisation journey for global aviation. For those that remain, focus shifts to what can be done to decarbonise flights. Despite being expensive, low carbon technologies for aviation exist. To bring down costs they need to be scaled rapidly. Of most importance are Sustainable Aviation Fuel (SAF), a low carbon alternative fuel, and carbon removals, which permanently remove CO₂ from the atmosphere. These are currently the only viable options to fully decarbonise the CO₂ emissions of medium and long-haul aircraft, which account for two-thirds of aviation emissions⁷¹. The need for a step change in action is typified by the UK Climate Change Committee's Sixth Carbon Budget. On the assumption these technologies evolve as per their current trajectory, a significant amount of additional demand management would be needed in the aviation sector to fill the gap [figure]⁷². If these technologies are not scaled rapidly - something most likely to be achieved via an effective price support mechanism from government - demand management may have an impact on London's global connectivity and thus economic success.

The UK's aviation industry has already begun taking steps to achieve its sustainability ambitions. Sustainable Aviation was a coalition formed by UK airlines, airports, manufacturers, air navigation and key business partners in 2005 to create a long-term strategy for UK aviation. The coalition is driving ambitious commitment to net zero primarily via SAF and Removals. A more ambitious pathway suggests a path to net zero with only small amounts of demand management [figure]. But fast action is needed to realise this, and London has significant economic opportunity at stake.

Climate Change Committee's modelled pathways for UK aviation under the Sixth Carbon Budget



Sustainable Aviation, industry bodies' view on how net zero could be achieved if solutions were scaled



⁷¹ International Council for Clean Transport (ICCT), CO₂ Emissions From Commercial Aviation 2013, 2018 and 2019, October 2020, theicct.org

⁷² Climate Change Committee, The Sixth Carbon Budget: Aviation, December 2020, <http://www.theccc.org.uk/>

¹ Note CCC does not attach removals to particular sectors but we have applied the CCC ramp up rate for removals in general, arriving at an end value necessary to address residual aviation emissions

Source: Sustainable Aviation, Sustainable Aviation Fuels Roadmap, February 2020, [sustainableaviation.co.uk.](http://sustainableaviation.co.uk/); Climate Change Committee, The Sixth Carbon Budget: Aviation, December 2020, <http://www.theccc.org.uk/>

Provocative idea 3

What if London as a city achieved a sustainable aviation fuel (SAF) target comparable to the best performing EU countries?

What does it involve?

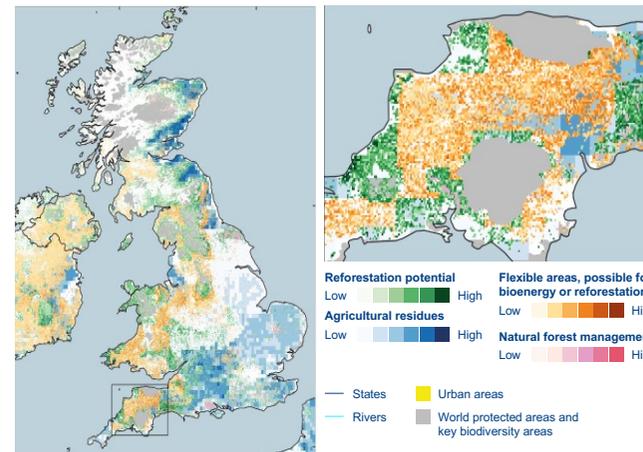
London could achieve an uptake of SAF of at least 15% by 2030. It would involve input from three main directions. First, London's airports could build on their current SAF commitments (e.g., Heathrow's 10% SAF target), and commit to a progressive SAF target that reaches 15% by 2030. This would put London significantly above the EU wide target of 5% by 2030 and on par with high performers like the Netherlands, though still behind leading Nordic nations. There are many ways this target could be met and London may have particular advantages in two in particular. Firstly, corporates outside the aviation world could collaborate in sponsoring flights to use SAF by forming a London SAF Buyers Alliance. Secondly, businesses could work with the Greater London Authority to review the economic and environmental case for adjusting waste policy to scale up the local production of SAF from waste.

What could be the potential benefits?

Boosting London's SAF consumption would help reduce the environmental impact of aviation, while growing a dynamic new UK industry. SAF today is primarily made from waste oils and used cooking oil. Biomass such as agriculture and wood residues, energy crops, and waste are all certified feedstocks that will be increasingly

Geospatial modelling of the UK's Sustainable Aviation Fuel feedstock potential

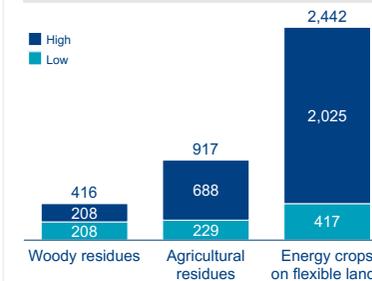
Geospatial modelling of available biomass sources



Source: Coalition for Negative Emissions, The Case for Negative Emissions, June 2021. <https://coalitionfornegativeemissions.org/>

Theoretical sustainable SAF production, Gallons, M

This analysis does not take into consideration density of biomass – where ~10-20% of residues are typically close enough for affordable collection. However, this demonstrates that enough residues exist to warrant further exploration.



If you look at wood, ag. and flexible energy crop zones, the UK has theoretically enough sustainable biomass for >3000MG of SAF, depending on collection

used in the coming years. Theoretical geospatial estimates indicate that the UK has enough sustainable biomass feedstocks to produce more than 3,000 Mg of SAF [figure]⁷³. Practical limitations may reduce this (Sustainable aviation estimates about half is economical

⁷³ Conducted using geospatial modelling of UK's reforestation potential, agricultural residues and natural forest management. Only includes wood, agriculture, and flexible energy crops. Waste is omitted.

to access), but today, the UK produces just 13 Mg. A current government initiative, the Green Fuels, Green Skies project, aims to expand this to between 200 and 300 Mg⁷⁴, but this is still well short of the 700 Mg or so of demand that a 15% SAF target would create.

⁷⁴ Calculated by analysing announced capacities of Green Fuel, Green Skies (GFGS) winners and creating proxies for those without announced capacity

In the future SAF could also be produced from renewable energy through power-to-liquid technologies (which do not need biomass), where the UK could be distinctive through North Sea wind, and a thriving CCS industry that might mean the UK has better access to clean CO2 through direct air capture or BECCS, a key ingredient to power to liquid fuels.

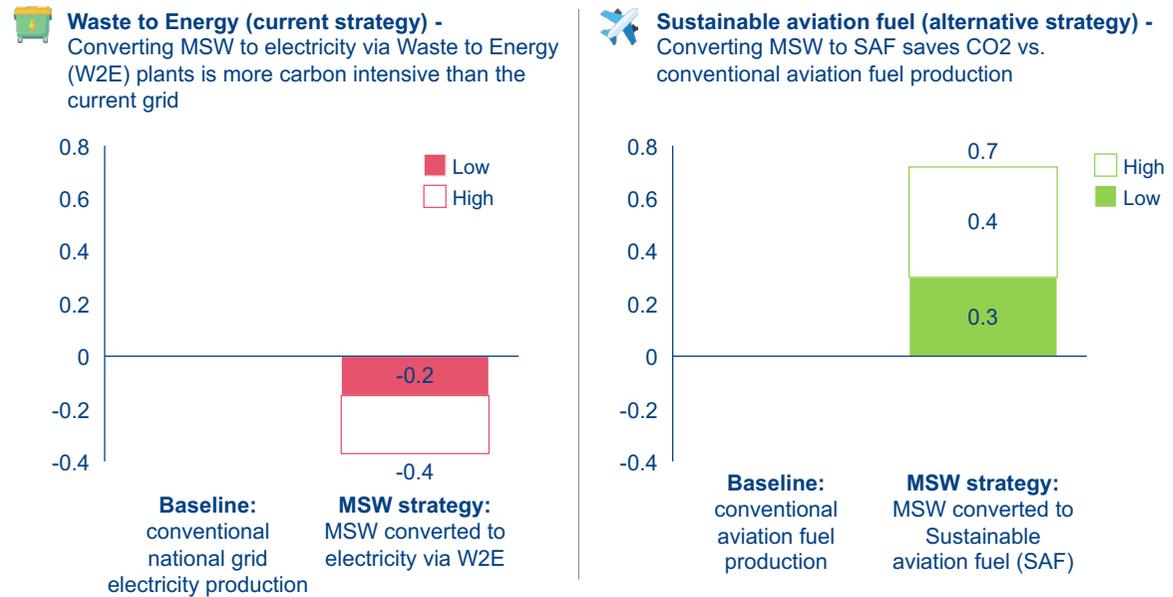
Building up the UK’s SAF capabilities early could create jobs, reduce emissions, and present an export opportunity. A 15% SAF target could create up to 33,000 direct, indirect, and induced⁷⁵ jobs in SAF production (this is an upper bound presuming all fuel is sourced domestically). In addition, it could reduce emissions from flying by 6 Mt of CO2, equivalent to taking 3 million cars off the road (more than there are registered in London today)⁷⁶. Furthermore, because the UK’s production potential is far beyond its domestic needs, there is an opportunity to export either fuel or the underlying engineering capabilities to other markets, where there is growing demand for SAF. For example, Air France’s €7 billion support package was set on the condition that it reduced CO2 per passenger-km by 50% by 2030. The EU’s ReFuelEU aviation proposal, a component of the Fit for 55 package, has a 2% 2025 and 5% 2030 blending mandate, i.e. the % of SAF that should be mixed with jet fuel. A handful of other countries have more ambitious targets. For example, Sweden, Finland, Denmark, and Norway all have 30% targets and are further ahead in developing their production, so the UK must move fast to develop its domestic industry if it is to compete.

⁷⁵ Defined as jobs generated by local spending on goods and services by employees

⁷⁶ Calculated using job multipliers for SAF produced above the Sixth Carbon Budgets requirements.

Emissions abated through shifting MSW from being used in waste to energy plants to be utilised to create SAF feedstock

Estimated CO2 per year for different MSW strategies, MtCO2eq/yr, focusing only on MSW that could be converted



Source: Calculated by comparing difference in emissions if electricity produced from waste to energy was replaced by electricity with UK grid emissions factor, and comparing if UK jet fuel was replaced by SAF produced from London municipal waste feedstock

In the near term, London could also use its own resources to bolster supply for SAF. Waste-to-energy (WtE) (burning waste to produce power) has grown rapidly in London, after tax regulation reduced the amount of waste sent to landfill in the capital by 92% over the past 20 years⁷⁷. However, burning waste produces CO₂, and the sector also will also need to look at how to decarbonise. Element Energy's recent analysis for the GLA proposed that WtE should be fitted with Carbon Capture and Storage, which is a viable path and could create negative emissions. However, it may be expensive and logistically challenging. Instead, much of London's municipal solid waste (MSW) could be redirected to SAF production. Early analysis suggests that this could save 0.5–1 Mt CO₂/year [figure], through reduced electricity and aviation emissions.

SAF may also be accelerated in London because consumers may want to reduce the environmental

impact of flying and be willing to pay the increased cost to do so⁷⁸. In particular, many companies are already making commitments to reduce their own flight emissions. Microsoft, for example, has committed to sustainable jet fuel for future travel. Shareholders and consumers increasingly expect corporates to behave in a climate responsible manner and for some aviation is a big portion of their emissions. A SAF surcharge would add just 2-6% to the price of a trans-Atlantic business class flight. A corporate buyers alliance could make commitments to supporting London's SAF industry, with slight cost increases, but significant contributions to emission reductions. Once corporate buyers have kick-started the market, the wider market may follow. Forty percent of respondents in McKinsey's CleanSkies report survey are willing to pay more than 2% of the ticket price more for zero carbon ticket⁷⁹.

⁷⁷ Department for Environment, Food and Rural Affairs, UK Statistics on Waste, July 2021. <https://www.gov.uk/government/statistics/uk-waste-data>

⁷⁸ McKinsey 'CleanSky' Survey, July 2021

⁷⁹ McKinsey 'CleanSky' Survey, July 2021

Provocative idea 4

What if London's airports sowed the seeds for high quality carbon removals by pledging to become the first carbon negative aviation hub?

What does it involve?

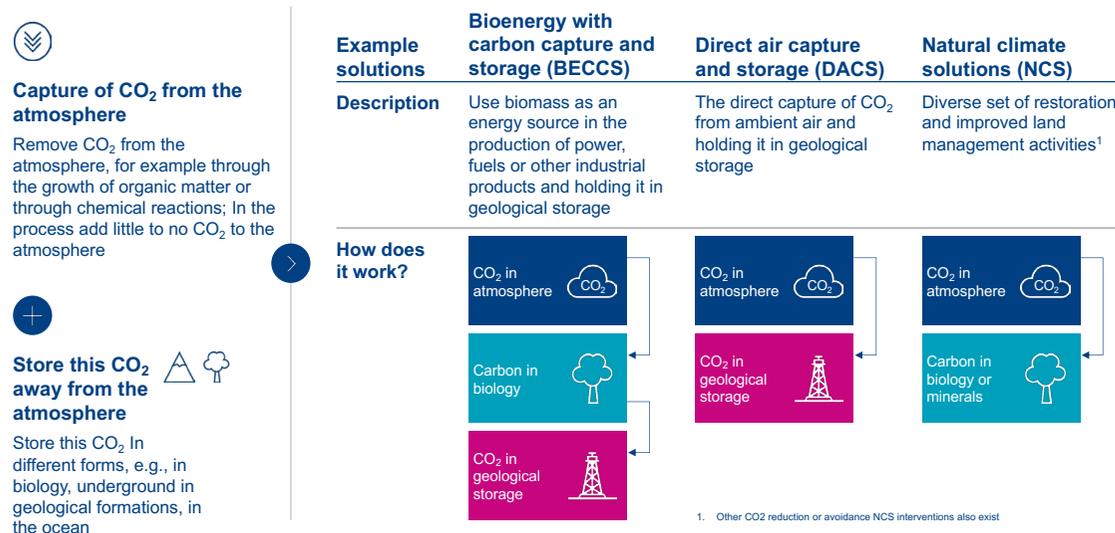
By driving a major strategy to remove carbon from the atmosphere, London airports could aim to be the first carbon negative aviation hub by 2100, whilst increasing the climate integrity of carbon offsets in the short-term, by setting targets and standards for carbon removal technologies. Carbon offsets can be carbon reduction/

avoidance or carbon removals. Avoidance only reduces emissions elsewhere in world (that need to eventually be reduced anyway on a 1.5C pathway), but carbon removals (or 'negative emissions') take carbon dioxide out from the atmosphere with full additionality. The climate integrity of carbon removals is thus more stringent than traditional reduction/avoidance credits. Three of the most studied types of removals are illustrated below.

What are potential benefits?

Mechanisms to ensure the additionality of carbon offsets are still being refined. Whilst international schemes, namely CORSIA, aim to drive up the use of carbon offsets in the aviation industry, it focuses on addressing new growth in aviation CO2 emissions and provides no incentives for high quality carbon removals as low-quality offsets are allowed.

Carbon removal solutions: BECCS; DACS and NCS



Carbon removals overcome many of the additionality debates that surround traditional carbon offsets and offer both a short- and long-term solution for decarbonising London's aviation. In the short-term removals would allow London's airports to contribute to its achievement of 1.5C pathway as SAF is scaled up. In the mid-term, removals can neutralise any residual emissions, for example if there are interruptions or limitations in SAF supply due to feedstock issues. In addition, they can go beyond standard CO2 impacts, for example vapour trails from flights can have a warming effect that may be as significant as the CO2 emissions they emit, and which may not be entirely removed by SAF⁸⁰.

80 Coalition for Negative Emissions, *The Case for Negative Emissions*, June 2021, <https://coalitionfornegativeemissions.org/>

In the long term, London's airports could use removals to go so far as to achieve the highest possible climate target – becoming a carbon negative air hub. In practice, this would mean removing all historical carbon emissions caused by London's aviation sector. London could first scale-up carbon removal to the CCC's suggestion of ~20-25mt by 2050 so as to achieve net zero emissions.

If however it continues growing its removals by ~2% pa. thereafter, it should become carbon negative before 2100. If ambition is even higher, this can be achieved sooner.

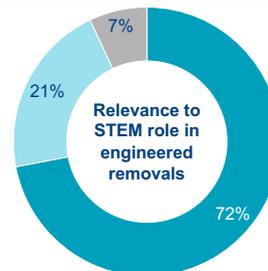
The exact form of implementation would need to be explored, for example whether the airports or airlines charge each originating flight for the cost of a quantity of carbon removal or cover it through other means. Similarly, the aviation industry would need to work with carbon removal providers to ensure that quality removals of the right volume were coming online over time (and that despite a long term target, short term action is carefully tracked), and within this there could be debates on the right mix of removal solutions over time (e.g., reforestation vs. engineered removals). Critically, regardless of the timeline, carbon removals must not be a substitute for action on other solutions like SAF, but a parallel pursuit. All that said, becoming carbon negative has been established as a credible high quality environmental target, championed by leaders such as Microsoft.

Economically, London's aviation industry could help stimulate demand to scale-up a technology where the UK has a competitive advantage, which will be critical in throughout the UK and globally. The CCC's pathway requires carbon removal technologies to scale up in the

Jobs in engineered removals support just transitions

Skills transfers

Demonstration of the skills overlap of an **O&G STEM professional** with an (estimated) BECCS/DACS STEM professional

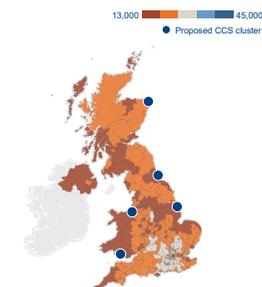


- Strong** – directly re-usable, e.g., process modelling
- Medium** – relevant, but with contextual differences, e.g., engineering design on CO2 storage vs. gas extraction
- Low** – Limited applicability, e.g., Operating specific O&G equipment

Location of job creation

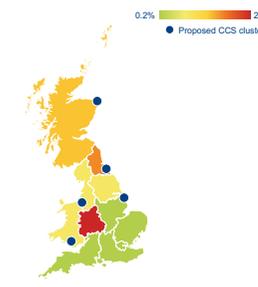
Engineered removals are likely to be created in historically deprived regions

Gross disposable household income by local authority, 2018, £



Engineered removals are likely to be created in regions facing job transitions

Estimated jobs at risk from a net-zero transition, % of workforce, 2020



UK by +~400% by 2050⁸¹. Whilst the IPCC estimates carbon removals will need to scale 50X by 2050⁸².

The UK has a competitive advantage in carbon removals with extensive geological storage for CO2, approximately 80Gt, and multiple carbon capture and storage hubs being piloted. The costs of these engineered removal technologies will come down as they scale, engineered removals are on the beginning of a learning curve. Costs for BECCS are expected to fall by 45-50% and DACs by 50-80%⁸³. Countries that drive down this learning curve first will be in a privileged position.

Ultimately, carbon removals present an opportunity to create jobs in parts of the UK that have suffered historic job losses as the UK's economy has evolved. A fully scaled up negative emissions industry (both nature based and engineered removals) could create 50,000-100,000 jobs⁸⁴ across direct, indirect and induced perspectives. Those in engineered removals, will have a significant overlap with declining industries. For example, a STEM professional in a Direct Air Capture plant could have a 70%-90% skill overlap with an equivalent professional in the Oil and Gas industry [see figure above]⁸⁵.

⁸¹ Climate Change Committee, *The Sixth Carbon Budget: Aviation*, December 2020, <http://www.theccc.org.uk/>

⁸² The Intergovernmental Panel on Climate Change (IPCC), *Special Report: Global Warming of 1.5 °C*, October 2018, <https://www.ipcc.ch/>

⁸³ Coalition for Negative Emissions, *The Case for Negative Emissions*, June 2021, <https://coalitionfornegativeemissions.org/>

⁸⁴ Coalition for Negative Emissions, *The Case for Negative Emissions*, June 2021, <https://coalitionfornegativeemissions.org/>

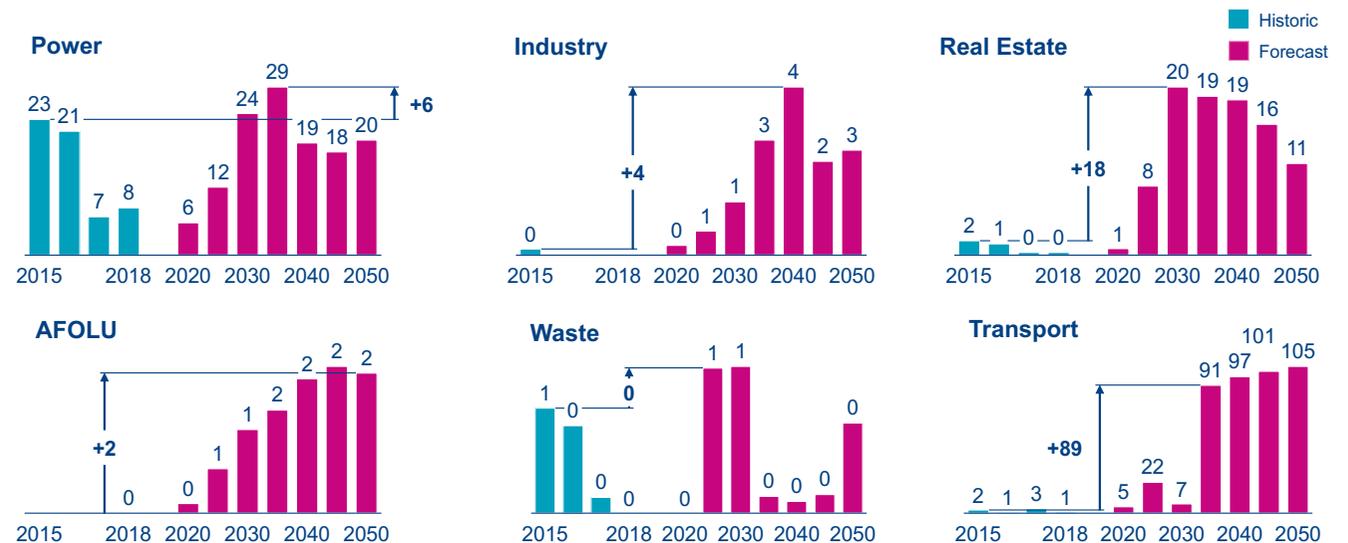
⁸⁵ Coalition for Negative Emissions, *The Case for Negative Emissions*, June 2021, <https://coalitionfornegativeemissions.org/>

London as the centre for green financial services

The UK is a global leader in financial services, with a £64 billion trade surplus⁸⁶. It holds £3.2 billion in international bonds, more than any other country. And London is the centre of this economic activity, home to 12.4% of the world's foreign-listed companies and a place that attracts top global talent. This leadership is underpinned by a thriving fintech sector, an international workforce, strong tax incentives, a favourable time zone, and the world-leading London Stock Exchange. Could the factors that make the UK a leader in conventional finance also position it to become a leader in green finance?

Green finance presents an unprecedented opportunity for the financial sector. In the UK alone, £50 billion will be required annually to meet emission reduction targets⁸⁷. In the EU, this figure rises to €470 billion and globally \$4,000 billion will be required^{88,89}. The financial system is still a long way from making this shift in most sectors, in the UK, this is particularly true in real estate and transport [see figure to the right].

Historic investment flows and investment required to reach net zero by sector in the UK USD billion



Source: Net Zero Finance Tracker, Climate Policy Initiative, [accessed 27/01/2022], <https://www.climatepolicyinitiative.org/netzerofinancetracker/>

⁸⁶ *The Global City, Facts and Figures: UK Financial Services Trade, 2020*, www.theglobalcity.uk

⁸⁷ *Climate Change Committee, Sixth Carbon Budget: The UK's path to Net Zero, December 2020*, www.ccc.org

⁸⁸ *Paolo d'Aprile, Hauke Engel, Stefan Helmcke, Solveigh Hieronimus, Tomas Naucler, Dickon Pinner, Godart van Gendt, Daan Walter, Maaïke Witteveen, Net Zero Europe, December 2020*, mckinsey.com

⁸⁹ *International Energy Agency (IEA), World Energy Investment 2021, June 2021*, www.iea.org

However, a green shift is coming, and if the UK does not act now to take the lead in sustainable finance then London as a city could risk a significant portion of its financial sector. For example, in 2020, 22% of funds domiciled in Luxembourg, Europe's top domicile, were managed in the UK. But for sustainable funds, the comparable figure was less than half that [see figure]⁹⁰. The picture is similar when examining debt. At the end of 2020, 0.4% of the UK's outstanding debt securities were sustainable, compared to 3.9% in the Netherlands. Equally, for loans, just 2.2% of the UK's outstanding loans were sustainable, compared with 6% in Sweden [figure]⁹¹. London risks losing its global leader position to Amsterdam, or another European capital, if it does not make a stand on sustainable finance soon.

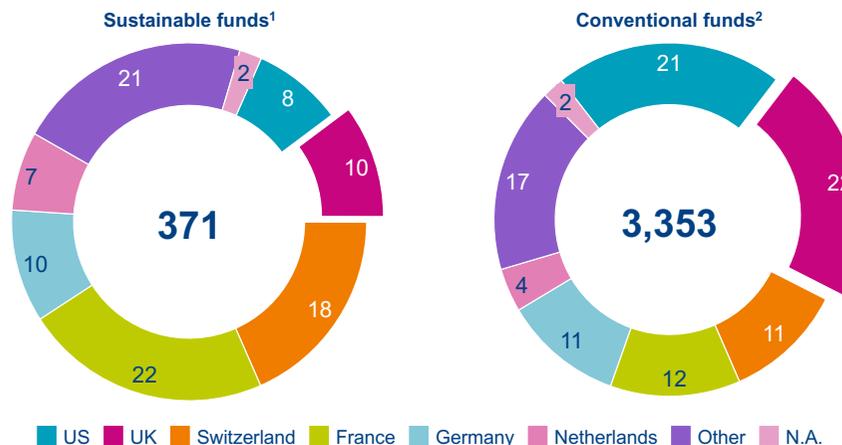
The UK will likely be deeply impacted by the rise of sustainable finance, given the potential influence of our financial sector – positively or negatively – in climate change. The investments of the UK's 10 largest asset managers and 15 biggest banks accounted for 805 Mt of CO2 in 2019, double the UK's total emissions⁹². If the UK does not shift to a more sustainable financial system, London's competitiveness as a financial hub may be eroded and the effort to reduce global carbon emissions could suffer.

90 Association of the Luxembourg Fund Industry (ALFI), European Sustainable Investment Funds Study 2021: Catalysts for a Greener Europe, July 2021, www.alfi.lu

91 Analysis conducted using data from the European Central Bank and Dealogic databases.

92 Greenpeace, WWF, The Big Smoke: the global emissions of the UK financial sector, May 2021, wwf.org

Provenance of asset management companies for funds domiciled in Luxembourg, EOY 2020 in EUR bn

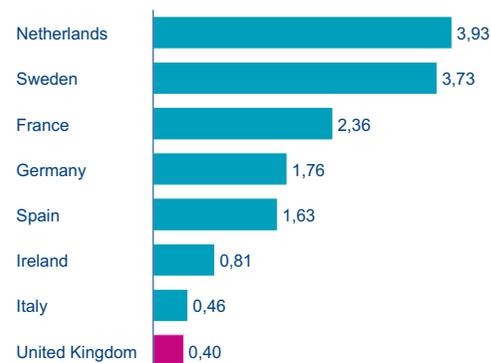


1. In the pie chart, total sustainable net assets in EUR bn 2. In the pie chart, total conventional net assets in EUR bn
Source: Association of the Luxembourg Fund Industry (ALFI), European Sustainable Investment Funds Study 2021: Catalysts for a Greener Europe, July 2021, www.alfi.lu

Outstanding sustainable debt as a % of total debt

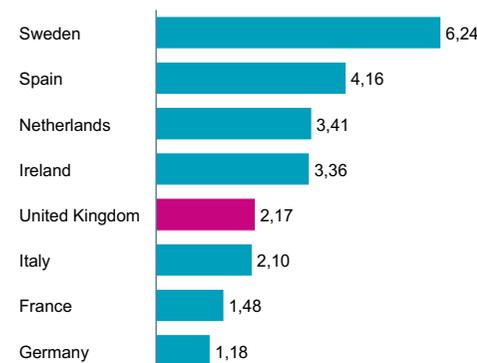
Outstanding sustainable debt securities as a % of total outstanding debt securities

August 2020



Outstanding sustainable loans as a % of total outstanding loans

August 2020



Source: Analysis conducted using data from the European Central Bank and Dealogic databases

Provocative idea 5

What if London boosted the momentum in green financial services to fund the world's green capex needs and transitions to a green asset book?

What does it involve?

London's financial companies could join the UN-convened Net Zero Asset Owners Alliance, an international group of 69 institutional investors committed to net-zero emissions by 2050 and commit to interim decarbonisation targets. This would help the city to reduce emissions and increase its market share in green finance. For example, all institutions agreeing to decarbonise their portfolios by 25-30% by 2025 would bring them level with leaders in the field⁹³. Bringing together those seeking green finance with financiers shifting their portfolios could help tackle the main barriers to financing the sectors with the greatest and most pressing needs.

What are potential benefits?

Achieving interim emission reduction targets could accelerate the shift the financial services sector requires. UK asset managers and banks have already made significant steps towards addressing the sector's carbon footprint, by setting climate targets for \$16 trillion of underlying assets⁹⁴. The challenge now lies in delivering on these targets.

Helping the industry to switch to greener finance is in some ways a no-regrets move. The returns of funds are a complex and highly nuanced science, but green finance has already been seen to outperform conventional finance in many instances; ESG funds have, for the most part, delivered better returns. One study that tracked the performance of ESG funds against the S&P500 between December 2020 and May 2021 found that more than half of the funds tracked performed better than the market. Green finance is also growing more quickly than the rest of the market: European sustainable flows accounted for 42.7% of all European inflows in Q2 2021⁹⁵; globally, green energy bonds are expected to grow by more than 30%⁹⁶. More flows suggest more opportunity.

The financial sector setting interim targets, while bringing together relevant parties who have capital and require capital, could be the missing piece in the puzzle. Two other critical areas for green investment to happen - regulation and directional certainty - are being developed by existing initiatives. On the first, there is regulation in the pipeline that will support the UK's sustainable finance industry including Sustainability

Disclosure Requirements, which will provide an industry wide standard for key sustainability information and the Green Taxonomy, which will define what constitutes a green activity. On the second, the government also recently published the UK's Net Zero Strategy, which provides greater clarity on which technologies, and hence investments, will be instrumental going forward.

If London's financial sector can achieve a 25% portfolio emissions reduction by 2025, the annual saving from the UK's 10 largest asset managers and largest banks would by itself be 201 Mt CO₂e. Of course, the best method to shift assets in a way that delivers climate impact requires careful exploration. Immediately divesting assets is one method but is not a guarantee that emissions will be reduced by a new investor, and so working with management teams to drive down emissions (potentially with transitional 'brown to green' investments, e.g., converting oil and gas refineries to biofuel refineries) may in some cases be a more fruitful path. Such an emissions reduction target would also provide £1.5 trillion of funding to the net zero transition, equivalent to the total CAPEX required for the UK to reach net zero by 2050⁹⁷.

⁹³ United Nations Environment Programme (UNEP), "Major Investors to Reduce Portfolio Emissions 25-30% by 2025", October 2021, [unep.org](https://www.unep.org)

⁹⁴ Net Zero Finance Tracker, Climate Policy Initiative, [accessed 27/01/2022] <https://www.climatepolicyinitiative.org/netzerofinancetracker/>

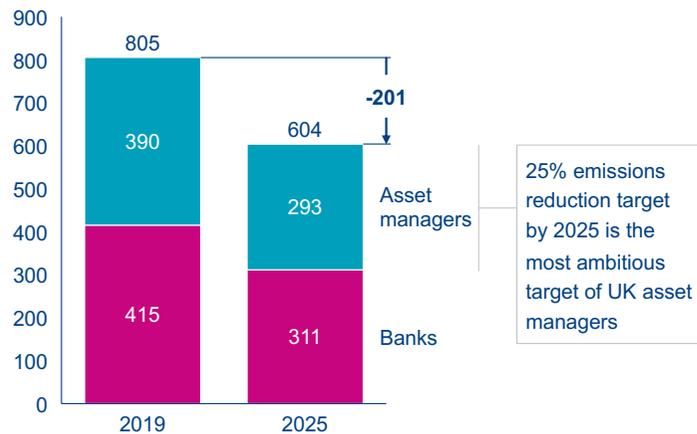
⁹⁵ Esther Wieldon and Robert Clark, "Most ESG Funds outperformed S&P 500 in early 2021 as studies debate why", S&P Global, June 2021, [spglobal.com](https://www.spglobal.com)

⁹⁶ Sunniva Kolstyak, "European Sustainable Fund Flows Slow in Q2", Morningstar, July 2021, [morninstar.co.uk](https://www.morningstar.co.uk)

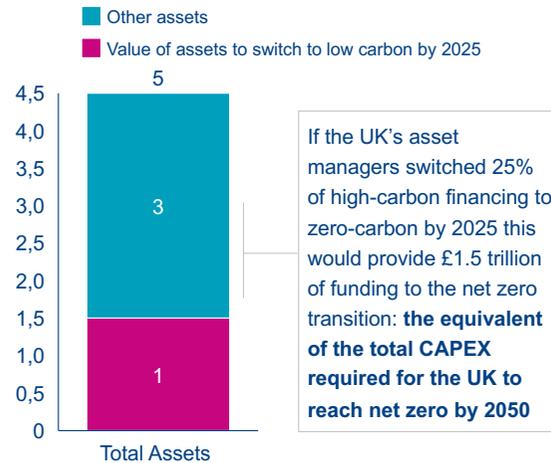
⁹⁷ Climate Change Committee, Sixth Carbon Budget: The UK's path to Net Zero, December 2020, www.ccc.org

The impact of the UK's largest asset managers and banks decarbonising their portfolios by 25% by 2025

Emissions of UK's 10 largest asset managers and 15 largest banks investments, MtCO₂eq



AUM of UK's 10 largest asset managers, £ trillions



Source: Greenpeace, WWF, The Big Smoke: the global emissions of the UK financial sector, May 2021, wwf.org

Assuming London's market share in asset management can be used as a proxy for the broader market, between 70% and 80% of financial services jobs are at stake by 2050 if London does not expand its market share in sustainable finance as the financial system pivots. This figure is heavily dependent on the growth trajectory of total employment in the sector, which will be driven by multiple factors

including market growth and digitalisation. The lower bound assumes that the same number of total jobs remain in the industry over this period. The upper bound assumes that the reduction in number of jobs over the past 10 years in the financial sector continues and total jobs in Europe fall by ~20% whilst the UK loses market share⁹⁸.

⁹⁸ European Banking Federation, Banking in Europe: EBF Facts and Figures 2019, January 2020, ebf.eu

Provocative idea 6

What if London became a leading centre for voluntary carbon trading?

What does it involve?

While the priority of corporates must be to reduce their own emissions on a 1.5C pathway, voluntary carbon markets today can support carbon abatement by funding for projects in other geographies that, for example, engage in nature restoration, develop climate technology, and deliver energy efficiency improvements. In the near future and in to the long term, they will be critical for providing income for carbon removals, which the IPCC says the world may need up to 10Gt of by 2050 to address residual emissions and manage overshoots of the carbon budget.

The market for voluntary carbon credits has experienced fast growth in the past with a 45% CAGR in credit issuances from 2017 to 2020 (retirements grew at 29% for the same period)⁹⁹ but it remains an emerging market that has yet to coalesce around specific market infrastructure providers. It is also a global market where most demand for carbon credits is concentrated in North America and Europe while supply is spread out with most credits today originating in the Global South and in particular, Asia with over 50% of credits issued since 2002. Given London is already an established global trading centre, London's financial

firms have an opportunity to collectively become a hub for the infrastructure required to support carbon trading.

What could a cluster for voluntary carbon infrastructure look like?

It would span the carbon value chain addressing pain points that have thus far prevented voluntary carbon markets from reaching their full potential: carbon credit originators who can aggregate supply from small, highly localised developers in the Global South, financial institutions capable of channelling funding towards these suppliers, exchanges who can provide liquidity and price transparency in the market and a range of certifying, auditing and verification bodies who can ensure buyer confidence in the integrity of the underlying carbon credits.

While voluntary carbon is not a standalone measure for climate action, when paired with strict 1.5C-compliant emission reductions by corporates, it can be a powerful tool towards funding additional climate action in the short term and driving carbon removals in the long term. As London-based financial and professional services firms reflect on where their expertise can be utilised in voluntary carbon markets, it is critical that they also consider pursuing high integrity carbon claims that include direct reduction of emissions across Scopes 1, 2 and 3.

What are potential benefits?

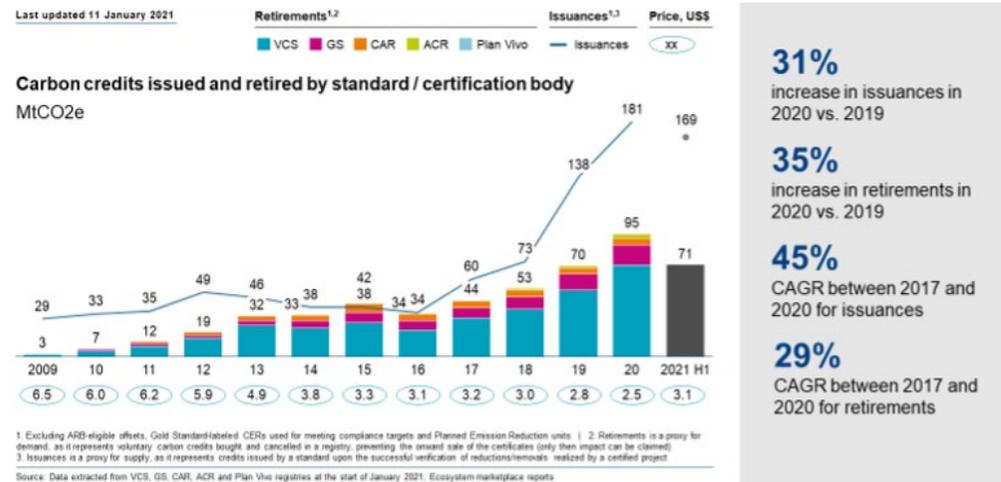
The carbon credit market is expanding and housing the industry could help put London firmly on the sustainable finance map. London also has innate advantages that give it a natural right to play in a global market like voluntary carbon.

Carbon credit trading will be a new industry in the sustainable finance landscape. The carbon credit market is expected to grow rapidly. Surveys to members of the Taskforce on Scaling Voluntary Carbon Markets suggest demand could grow as much as 10-fold by 2030 and 30-fold by 2050 [see figure]¹⁰⁰ while the Network for Greening the Financial System estimates a theoretical need of 7-13 Gigatons of offsets by 2050 – or up to 100-fold growth by 2050. The Coalition for Negative Emissions states that 4-10 Gigatons specifically of removals – which are likely to rely on credit markets for income – will be needed by 2050 to avoid catastrophic runaway climate change.

⁹⁹ Ecosystem Market Place, *State of the Voluntary Carbon Markets 2021*, September 2021, <https://www.forest-trends.org/>

¹⁰⁰ Taskforce on Scaling Voluntary Carbon Markets, *Taskforce on Scaling Voluntary Carbon Markets Final Report*, January 2021, [iif.com](https://www.taskforceonvoluntarycarbonmarkets.org/)

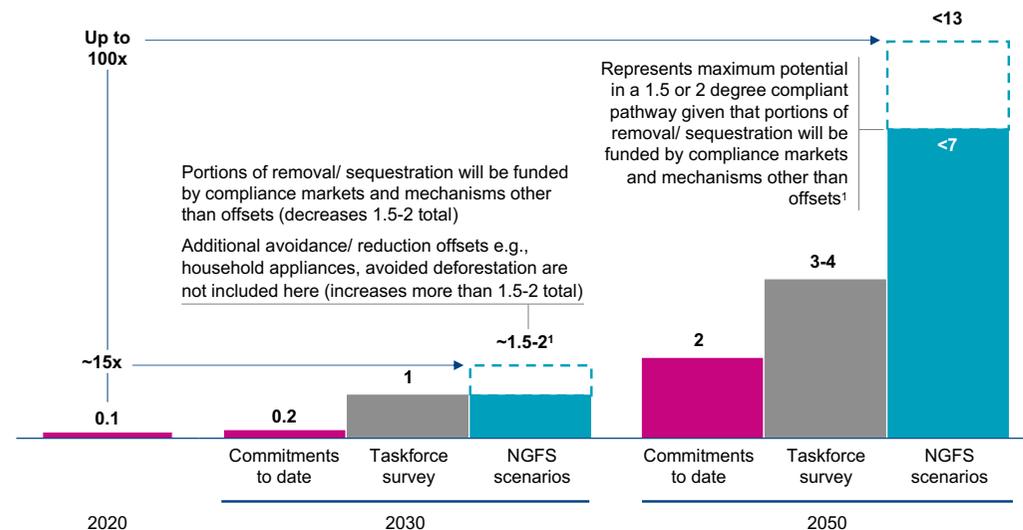
The voluntary market is growing rapidly (\$M)



Being at the centre of Europe’s carbon credit market could both bring returns to London and help establish the capital as a sustainable finance hub. While many of the initiatives to address challenges in voluntary carbon markets are tied to UK institutions¹⁰¹, there is yet no established voluntary carbon trading hub in the UK. In fact, despite 56% of global demand being in Europe, the continent is still yet to see any one city becoming the main market, while Singapore for example, hosts two voluntary carbon exchanges (CIX and AirCarbon Exchange) [figure].

London is well positioned to fill in this gap with significant expertise in project finance, the presence of trading hubs for other commodities and a legal system that shares similarities to many of the Global South jurisdictions where carbon credit supply originates from. The London Stock Exchange’s recent announcement that it will develop a new voluntary carbon solution suggests growing interest in making London a future carbon trading hub and could spark further interest from adjacent market infrastructure providers¹⁰².

Voluntary carbon market demand scenarios in 2030 and 2050, GtCO2/year

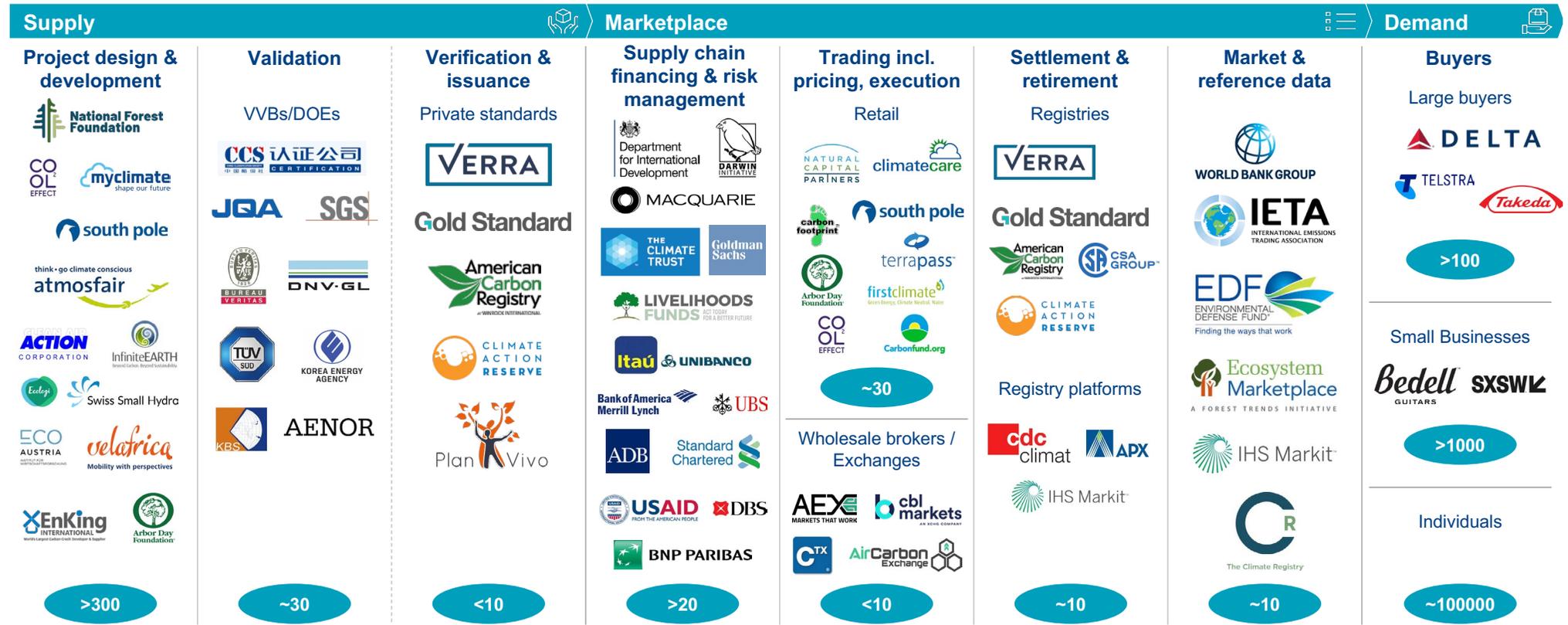


101 The UK is home to the Taskforce on Scaling Voluntary Carbon Markets; UK Voluntary Carbon Markets Forum; Supply Initiatives including the Coalition for Negative Emissions and the Natural Climate Solutions Alliance; and Voluntary Carbon Markets Integrity Initiative

102 London Stock Exchange, "London Stock Exchange's Voluntary Market Solution", Nov 2021, londonstockexchange.com

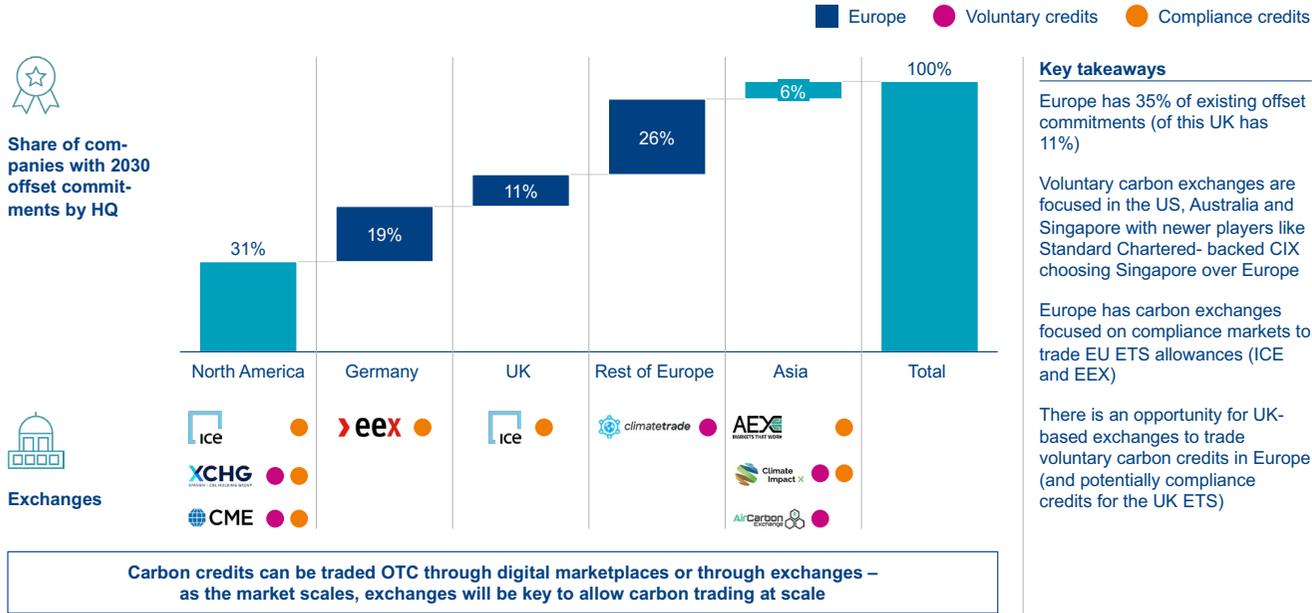
1. We note that compliance markets will likely grow over time as regulatory requirements (national and sectoral) increase
 Source: McKinsey Sustainability Practice; Taskforce for Voluntary Carbon Markets (TSVCM), Network for Greening the Financial System (NGFS)

Voluntary carbon markets currently have a fragmented value chain (not exhaustive)



Source: Ecosystem Marketplace, UNFCCC, South Pole, Google Adwords Market Data

Europe leads in demand for offsets – but is lagging the exchange infrastructure to trade voluntary credits



Source: McKinsey Sustainability Practice

Leading on voluntary carbon could provide numerous benefits. Assuming the UK captures 25% of a 1 Gt voluntary carbon market predicted by the TSVCM in 2030 (i.e. assuming the UK can trade its domestic demand and a further 33% of all European demand), this would represent an opportunity to trade an estimated \$1 – 3 USD billion¹⁰³. Carbon removals in particular will need to be traded (e.g., as championed by Puro), and if these grow as required, the value at stake could be much higher.

¹⁰³ The lower range is a conservative estimate assuming current credit prices are maintained (at 3.1 USD/ton), the higher range represents a momentum case where prices rise at 15% CAGR (2021-2030) to 10USD/ton by the end of the decade. There is considerable uncertainty on carb credit prices, and if alternate scenarios unfold, e.g., the prioritisation of carbon removals, values could be much higher

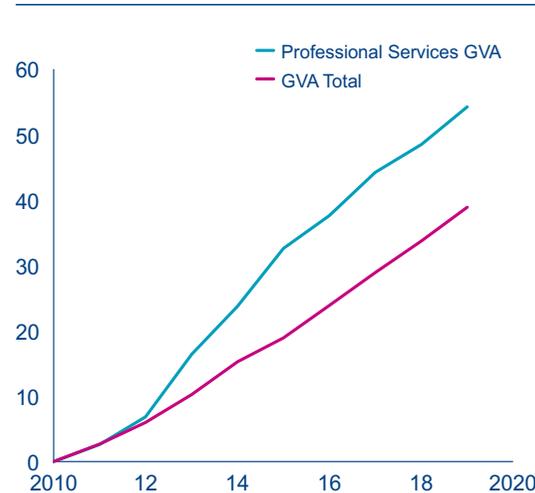
London as the centre of green professional services

Professional services are one of the UK's economic success stories of the past decade. Over this time, the sector's GVA has grown 55% – roughly 15 percentage points more than the rest of the UK economy¹⁰⁴. In London, financial and professional services collectively employ 806,000 people [figure]¹⁰⁵. The sector is diverse, but one common attribute is the value companies derive from London's ability to attract talent. Executives in professional services attribute 76% of their value to their employees¹⁰⁶. According to The Global City, of the top professional and financial service hubs, only New York enjoys greater access to talent and skills than London¹⁰⁷.

The professional services sector has outperformed the UK economy and is diverse across functions

The Professional Services sector has grown faster than the UK's total GVA since 2010

% of 2010 base year



UK Professional Service sector employees by sub-sector

%



786,000

People employed in London

27%

Of services exports

25%

Of UK businesses

Source: Nominal Regional Gross Value Added (balanced) Per Head and Income Components, Office for National Statistics, ONS, [Accessed 27/01/2022], <https://www.ons.gov.uk>; Department for Business, Energy and Industrial Strategy, Professional and Business Services Sector: Creating Further Demand Outside London, February 2020, gov.uk

¹⁰⁴ Nominal Regional Gross Value Added (balanced) Per Head and Income Components, Office for National Statistics, ONS, [Accessed 27/01/2022], <https://www.ons.gov.uk/economy/grossvalueaddedgva/datasets/nominalregionalgrossvalueaddedbalancedperheadandincomecomponents>

¹⁰⁵ The Global City, The UK Offer, [accessed 28/01/2022], <https://www.theglobalcity.uk/the-uk-offer/london>

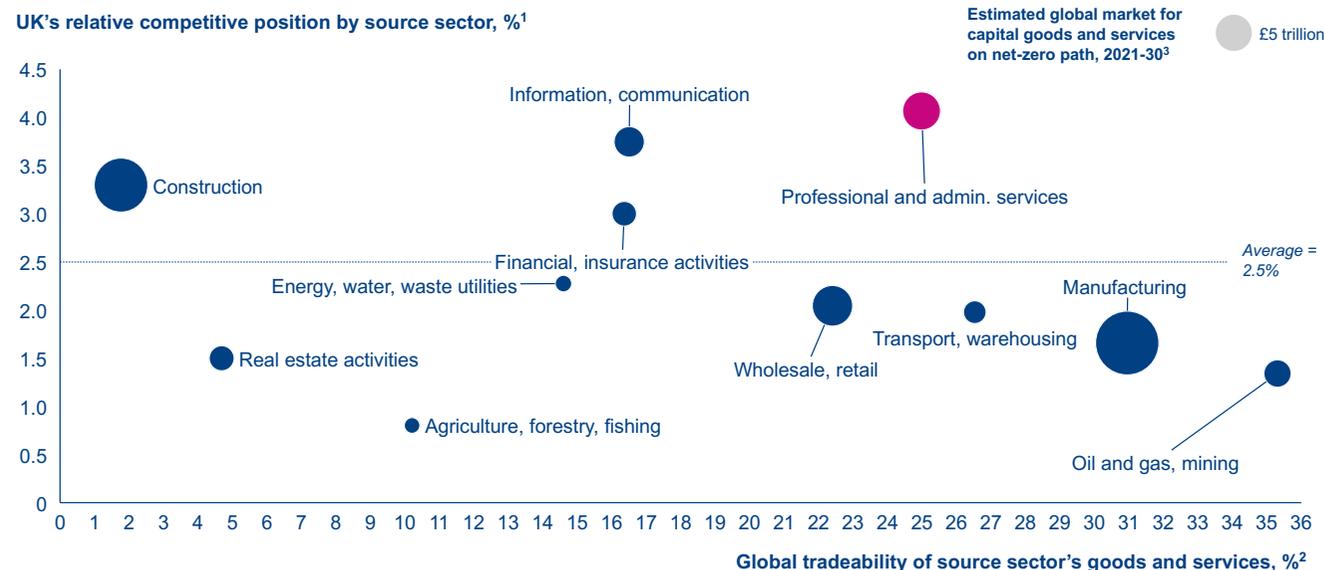
¹⁰⁶ The Predictive Index, 2020 State of Talent Optimization Report, January 2020, www.predictiveindex.com

¹⁰⁷ The Global City, Our global offer to business: London and the UK's competitive strengths in a changing world, January 2021 2021, theglobalcity.uk

Professional services produce their own carbon emissions, mostly from building operations and transport. However, these emissions are typically small versus many sectors, and firms can address them with the help of previous provocative ideas and other solutions. Where professional services have much greater potential to influence and accelerate the UK's transition is in the services they provide to clients that are heavy emitters. If service firms can help their clients reduce their carbon emissions, they will have an impact far beyond what they can achieve by reducing their own direct carbon footprint.

For example, in 2020, according to Adviser Rankings, PwC; Deloitte; KPMG and EY all served more than 20 of the FTSE 100 each, nearly one third of these emit carbon dioxide at a rate consistent with global temperature increases of 2.7C or more by 2050¹⁰⁸. The global green capex market is likely to be worth £50 trillion by 2030 which will require advisory services to deploy. The UK historically performs very well on professional services exports. Thus, by capitalising on the growing need for countries and companies to decarbonise, London (and the UK's) professional services firms could capture a significant share of it [figure]¹⁰⁹.

UK professional services are well positioned to capture a significant share of the £50 trillion green capex market to 2030



1. UK's share of the value-added content in global gross fixed capital formation by source sector, 2015; 2. Global average share of foreign value added in final demand by source sector, 2015; 3. Based on source sector shares of total value-added content in global gross fixed capital formation in 2015 and global capital expenditure on a net-zero 2050 pathway from 2021 to 2030 in constant 2020 US dollars, converted to pounds using 2020 market exchange rate; public sector and sectors smaller than £500 billion not shown; 4. Based on capex requirement on a net-zero 2050 pathway from 2021 to 2030, assuming UK's current market share by source sector remains at its 2015 level.

Source: OECD Trade in Value Added database; World Bank; "Net-Zero Europe: Decarbonization pathways and socioeconomic implications," McKinsey & Company, December 2020; "Net Zero by 2050," International Energy Agency, July 2021; "A review of trends and drivers of greenhouse gas emissions by sector from 1990 to 2018" Environmental Research Letters 16 (2021); McKinsey analysis

Right across the spectrum, professional service firms can contribute to the transition. For example, accounting and auditing are key tools to communicate reliable climate information; management consultants can bring insights to clients on decarbonisation strategy; architectural and engineering firms could incorporate net-zero into design

and construction or urban planning; legal services could engage with policymaking, advise clients of climate risks. Engaging with clients on climate change will require the sector to ensure it has the right skills within their workforces, understand best practice tools, agree to common standards, and align on how to measure impact.

108 Arabesque S-Ray, "Analysing the Temperature Score", February 2020, arabesque.com

109 Estimated using OECD Trade in Value database, World Bank, "Net-Zero Europe: Decarbonisation pathways and socioeconomic implications"; McKinsey and Company, December 2020; "Net Zero by 2050", International Energy Agency, July 2021; "A review of trends and drivers of greenhouse gas emissions by sector from 1990 to 2018" Environmental Research Letters 16, 2021.

Provocative idea 7

What if London's professional service firms came together to make it the number one hot spot for ESG talent?

What does it involve?

London's professional service firms could form a coalition that builds the infrastructure to maximise and seize the opportunity presented by green professional services. The coalition could focus on four areas: ambition, measurement, upskilling and flexibility [figure]. To recognise firms that are part of the coalition, a green professional services badge could be provided by a local government authority or industry body.

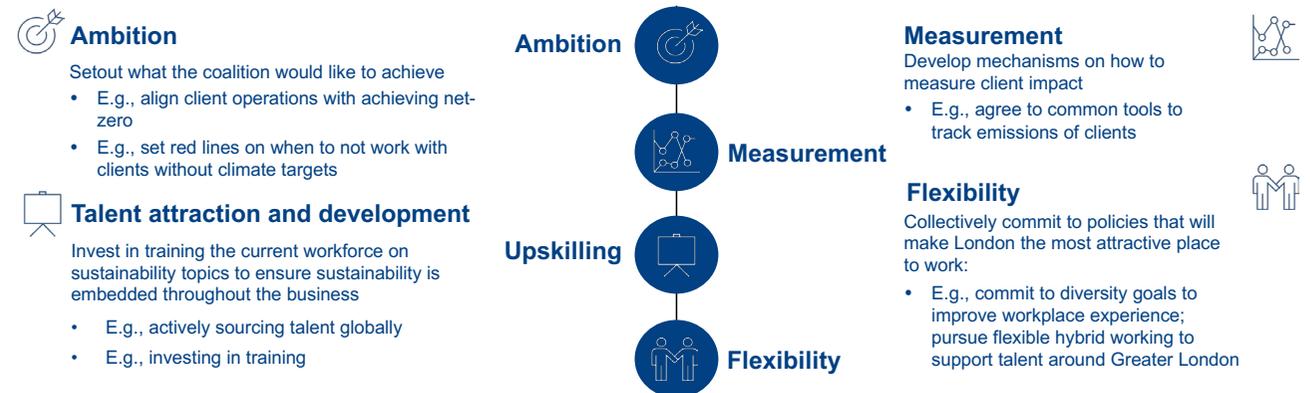
What are potential benefits?

A coalition would make positive impact in two ways. First, coalition members would share knowledge vital to solving the climate challenge, enabling them to make faster progress. Other industries have been quicker to collaborate in this area, including the Clean Skies for Tomorrow movement in aviation and the Net Zero Asset Owner's Alliance in green finance. Individually, professional service firms have already made commitments to reduce their clients' emissions. PwC has committed to 'work with its clients to support their efforts to make a net zero future a reality for all'¹¹⁰; Deloitte has committed to collaborate

Professional services players in London could collaborate to develop the city's ESG brand and become a hub for top talent

London's professional services firms could come together to form a coalition around four central pillars that would embed London as the center for green professional services

- **Attracting talent and increasing value for our clients**, whilst enabling the UK to reach its net zero ambition as quickly as possible
- The GLA could **support the coalition through making the coalitions commitments a pre-requisite for public procurement**



¹¹⁰ Price Waterhouse Cooper (PwC), "PwC's climate targets validated by SBTi", September 2021, pwc.com

with clients to create innovative climate solutions¹¹¹; and EY is investing in solutions that help clients profitably decarbonise their businesses¹¹². A coalition could allow firms to share best practice and operationalise these commitments. The coalition could be centred around an annual ESG conference and potentially be the home of ESG accreditation, support by London's esteemed professional institutions. In time it could be that the Coalition brings members to make shared commitments, e.g., to refuse to work with organisations that do not have a science based target, or to specifically to avoid support the extraction, refinement, or transportation of certain hydrocarbon-based fuels (as championed by Arup). Secondly, climate co-operation would mark London as a leader in ESG professional services. Not only would this attract clients, but it would also signal to talent that London is the place to work in this field. Even for jobs not directly in sustainability, individuals are increasingly drawn to firms with a positive impact beyond their own bottom line.

“ Young people want to join us; half of graduates say they joined because of the Unilever Sustainable Living Plan (USLP) ”

Paul Polman, Former CEO of Unilever¹¹³

Improvements in London's talent attraction could contribute to overcoming the challenges to talent attraction posed by Brexit¹¹⁴. In professional services EU citizens account for 12% of employees¹¹⁵.

Securing the interest of talent globally, including Europe, will be critical to ongoing success. London could solidify its status by developing structural advantages, for example creating institutions that are the global standard for accrediting climate change advisory service professionals or hosting a world conference on the topic.

A world-class ESG professional services sector would have far-reaching impacts across the UK economy. Better performance on ESG has been shown to increase top line growth, reduce cost, lower regulatory risk, and improve access to finance. To give just one example, the average cost of capital for better ESG performers is 2 percentage points lower than for poor performers¹¹⁶. If an ESG professional services sector could improve the FTSE 250's ESG score, the collective saving through lower costs of capital could be £700 million¹¹⁷. Beyond the improved financial performance, the climate impact of reorienting UK businesses to have a lower climate impact is impossible to quantify but could be game changing.

¹¹¹ Deloitte, 2021 Deloitte TCFD Report, October 2021, [Deloitte.com](https://www.deloitte.com)

¹¹² Gabriella Waterman, "EY announces ambition to become net zero by 2025", January 2021, [Climate Action, climateaction.org](https://www.climateaction.org)

¹¹³ Dan Schawbel, "Unilever's Paul Polman: Why Today's Leaders Need To Commit To a Purpose", *Forbes*, November 2017, www.forbes.com

¹¹⁴ Daniel Thomas, Kate Beioley and Michael O'Dwyer *Financial Times*, "UK Professional Service Firms Hit by Talent Shortages", *Financial Times*, October 2021, [ft.com](https://www.ft.com)

¹¹⁵ The City of London, "Record number of European workers in the City of London", January 2018, www.cityoflondon.gov.uk

¹¹⁶ Ashish Lodh, *ESG and the Cost of Capital*, MSCI research, February 2020, <https://www.msci.com/www/blog-posts/esg-and-the-cost-of-capital/01726513589>

¹¹⁷ Calculated using total 2021 CAPEX of FTSE 250, Refinitiv ESG scores of respective companies and MSCI data on ESG and the cost of capital

Conclusion

The business community is already playing a significant role in responding to the climate challenge. In London specifically, many London First members are championing London as a leader in business transformation to net zero. London First will continue to encourage and support members to put in place Climate Action Plans (CAP) that are transparent and standardised through participating in the UN Race to Zero, and other initiatives like the Glasgow Financial Alliance for Net Zero and the Mayor's call to action to adopt the UK Green Building Council's Net-Zero Framework for commercial buildings.

But ambition can and should be higher. And actions should be viewed as not just environmental, but economic too. These provocations aim to build on what's already being done and offer huge opportunity to contribute to the UK's decarbonisation goals, create jobs, and deliver growth. They offer a glimpse of how London could make the UK a leader by seizing the green economic growth opportunity the cities highest performing sectors present.

The ideas presented here are just the beginning. They do not present a substitute for a green economic strategy for the city, but they do demonstrate how London's businesses can harness the capital's competitive advantages to

drive climate impacts. Whilst not currently London First policy, the ideas in this work are intended to encourage debate on the role of business in green growth.

The climate and economic impact of the seven provocations are substantial. Cumulatively, the quantifiable provocations could deliver a significant emissions reduction beyond London's current trajectory. Provide additional jobs and protect current jobs. But most importantly deliver social and economic benefits in London and beyond the city's boundaries - be that export opportunities, jobs in historically deprived areas or reskilling opportunities.

The long-term success of delivering in these areas requires overcoming some significant but not insurmountable barriers. We invite London's businesses to work with London First, the GLA, boroughs, national governments, investors, citizen representative groups on this mission to establish London and the UK as a leader in green growth.



Our mission is to make London the best city in the world in which to do business.

London First was set up by business leaders with the belief that by harnessing business assets we can drive positive change. We operate as a business campaigning force, with over 175 members, and are uniquely placed to champion the city:

- We've done it before: back in the 1990s, London's prospects looked bleak. Business leaders came together to lead when others wouldn't;
- We've achieved a lot: over the past three decades, we've campaigned for the creation of the office of London Mayor and Transport for London, for Crossrail, for congestion charging and for expansion at Heathrow; we incubated Teach First and created the UK's largest annual jobs and careers fair for school leavers, Skills London;
- We give London's employers a powerful voice, prioritising the critical interventions needed to keep our capital competitive and connecting with allies to create solutions that help our country succeed as one.

Now, we're stepping up once again. With our members – and the millions of people they employ in the UK – we are pursuing an agenda that will keep London at the forefront of global business, working with and for the whole UK.

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You can also find us on Twitter @London_First or at

[londonfirst.co.uk](https://www.londonfirst.co.uk)