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Rethinking sustainable cities: THIS IS ALL IN THE AIR



FOREWORD

The Interchange programme is facilitated by London Transport Museum in partnership with Gowling WLG and Thales. It provides a platform for discussion, debate and collaboration between decision-makers within the wider transport industry.

The delivery of this year's cumulative Interchange report has been proudly led by Jacobs, and contains research undertaken by PTV Group.

This year's Interchange topic is something of a departure. *Rethinking sustainable cities: This is all in the air* takes a close look at sustainable cities, and the challenges and opportunities facing us as we build them. While not solely a 'transport' topic, we believe sustainability is the most critical issue in the industry today. The pandemic exposed the flaws in the way we currently create and use our city spaces. Those flaws are being compounded by an impending climate emergency, and it's clear we need to act quickly to fix them. As we enter 2021, we're uniquely positioned to take these learnings and apply them to transport and infrastructure projects. We now have the opportunity to build back better, adding tangible, long-term value to our cities and the people who live in them.

The report, produced by Jacobs in collaboration with London Transport Museum, Gowling WLG, Thales, and PTV Group, draws on roundtable discussions with transport, legal and

finance industry leaders, policymakers and academics throughout 2020.

Experts from across the industry shared their ideas on topics ranging from transport and infrastructure to policy, diversity and inclusion. *Rethinking sustainable cities: This is all in the air* distills the key messages from those sessions and offers suggestions that citymakers and stakeholders can put into practice. It explains not just **why sustainable cities are so important**, but how all of us can contribute to making them a reality.

This report is only the beginning. Interchange and London Transport Museum will be hosting events throughout the year to build on the momentum we've gathered so far. You can see the full agenda and find out how to get involved online at ltmuseum.co.uk/interchange

Sam Mullins OBE
Director, London Transport Museum



A CITY FROM THE AIR IN 2020

This is how our cities look now. We now have the opportunity to build back better, adding tangible, long-term value to our cities and the people who live in them.

THIS IS ALL IN THE AIR

In 1926, Montague B. Black shared his vision for the city of London in the year 2026. It's surprisingly optimistic. Skyscrapers stand proud against the sunny backdrop of a literal new dawn, the air filled with flying vehicles. Black titled his piece **This is All in the Air**. The name suggests not only his preoccupation with the skies, but also the enormous, as-yet unrealised **potential of the city**.

Almost a hundred years later, the future of our cities is still up in the air. But the outlook today is more uncertain. We stand at a crossroads: act decisively, and the next iteration of our cities will outstrip anything Black could ever have imagined. Fail to seize the opportunity, and we face a spiralling environmental, economic and humanitarian crisis.

The good news is that we've never been better placed to make change. Black's vision was ambitious, but abstract. Our path forward is much clearer, and capable of delivering real

results quickly. In just ten years, we could see dramatic improvements to our carbon consumption, air quality and flood defences; more access to harder-working green spaces; flexible and inclusive city centres and most importantly, whole-society engagement with sustainability. But to reap those benefits in the future, we need to make a considered and collective effort now.

The world is becoming increasingly urbanised. By 2030, 43 global megacities will be home to around 10 million people each. By 2050, 68% of the world's population will reside in urban areas. And while cities are one of the biggest contributors to our economic health, they're one of the biggest detractors from our environmental health. Cities consume over 65% of the world's energy. By focusing on cities, we can impact 70% of CO₂ emissions. 84 of the world's 100 fastest-growing cities are at 'extreme' risk from the climate change they've contributed to.

When we consider the ways in which climate change disproportionately disadvantages poorer populations, it's clear we need to make radical changes to our cities now to protect not only our environment, but our people, too.

The pandemic made the need for those changes even more apparent, exposing the significant social inequality that already exists across cities like London. As we recover from the pandemic, we have a rare opportunity to take stock and ensure we do so in a sustainable way. That means thinking beyond short-term financial gain to how we can future-proof our cities and ensure they function better for everyone. The **UN's Sustainable Development Goals** define sustainable cities as those that are dedicated not only to achieving economic sustainability, but also green sustainability and social sustainability. The three go hand-in-hand.



LONDON 2026 AD - This Is All in the Air is an artwork by Montague B Black from 1926 imagining the future of London in the year 2026 © TfL from London Transport Museum's collection. Montague B Black was a British painter and illustrator, renowned for his work in creating numerous posters. He has done significant work in lithography and watercolours, mostly illustrating marine topics, railroads and cityscapes.

THIS IS ALL IN THE AIR

Truly sustainable cities provide a **resilient habitat** for existing populations, without compromising that of future generations. They focus on inclusive design and steady economic growth that enables opportunities for all.

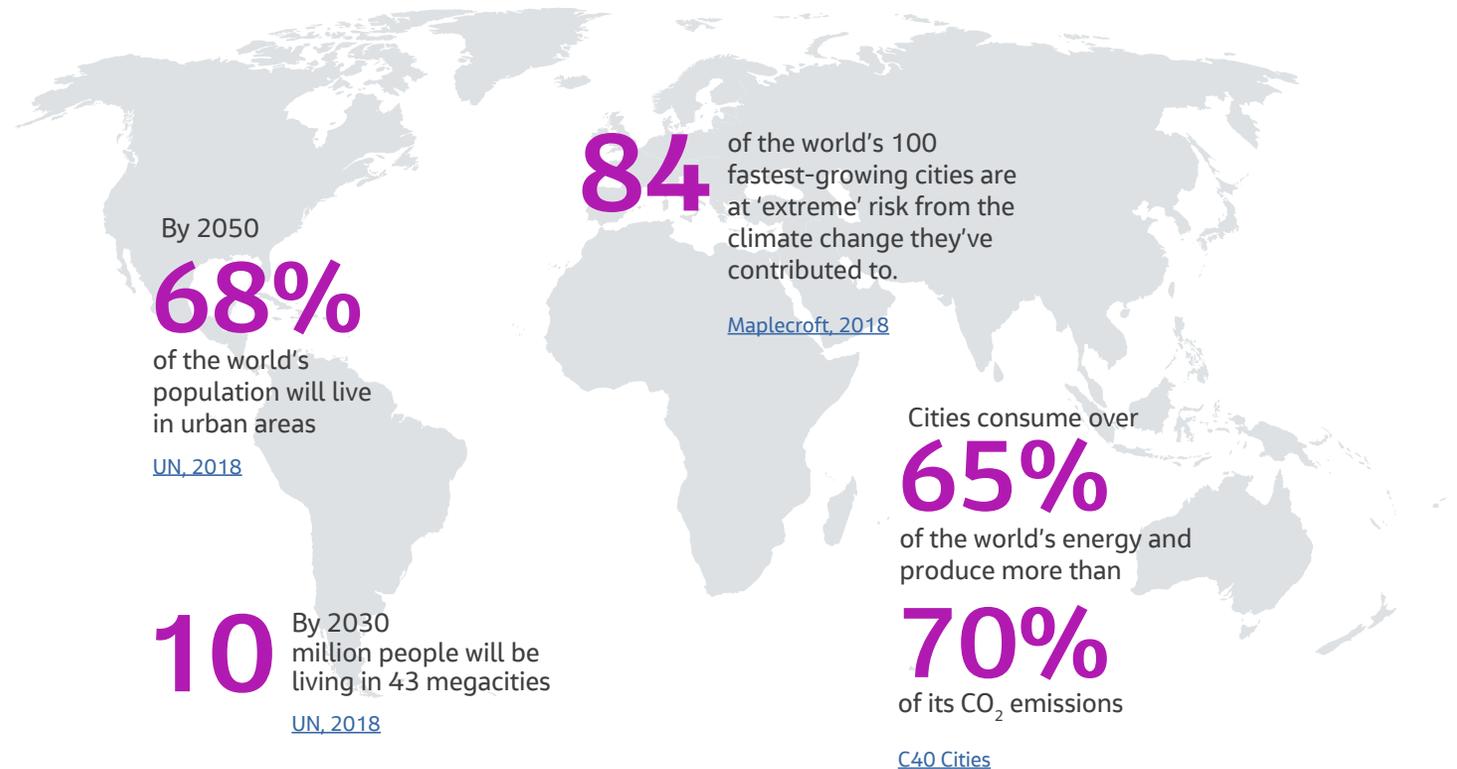
We can take inspiration from every corner of the world. Global cities across the UK, Europe and Asia are leading the way towards sustainability and driving **positive outcomes across economic, environmental and social wellbeing**.

In India, **Aurangabad's Industrial City (AURIC)** is responding to the country's industrial revolution, while embracing its rich cultural past. One of the first sustainable cities being built along the former Silk Road, AURIC is a transit-oriented and walkable township. It was created with water and energy conservation, connectivity and renewable power in mind, and has so far generated jobs for over 330,000 people.

Closer to home, **Meridian Water's Sustainability and Environmental Strategy** is helping bring London Borough of Enfield Council closer to its net carbon zero targets. The project centres sustainability and social responsibility, aiming to create 10,000 homes and 6,000 jobs while increasing biodiversity and access to green space. The mega-development will use recycled material during construction, increase re-use and recycling rates after construction, and provide homes that meet the highest health and building standards.

There's no reason we can't create more world-leading sustainable cities in the UK. They might not feature as many flying cars as Black envisioned, but could offer a range of substantial benefits to our society.

In 2020 and in the midst of a pandemic, PTV Group conducted a survey focusing on 'Rethinking Sustainable Cities'. Through the 528* responses that have been gathered,



THIS IS ALL IN THE AIR

it has become obvious that the pandemic has accelerated many habits that support the notion of a sustainable city.

The survey's intention was to explore how peoples attitudes to mobility may change in the future, considering their behaviours pre-pandemic and how the pandemic experience may alter their view and way of living in the future, once the pandemic is over.

This page provides a snapshot of the main summary findings focusing on:

1. Attitudes to a sustainable city
2. How our travel choices may shape up in the future?
3. How often we may undertake activities per week?

[PTV Group](#) provides software solutions, consultancy and data visualisation services to 'empower mobility and transport for a cleaner and smarter future'.

01

Attitudes to a sustainable city



Understand and support the idea of a sustainable city



See a link between a sustainable city and the climate agenda



Think sustainable mobility will rely on the right technology to persuade people to change habits



Will change their life in some way after the pandemic



Are less likely to own a car in the future and adopt on-demand transit instead



Believe greater awareness will help unlock sustainable city visions



Expect on-demand transit to be prevalent in the future



Will use their car less in the future if it leads to cleaner air



02

How our travel choices may shape up in the future?



Will use active modes more



Will use cars less for commuting

03

How often we may undertake activities per week?



Will travel to work less frequently



Will work at home more frequently



Will grocery shop less often



Will purchase online more often

THE OBSTACLES ON OUR PATH TO SUSTAINABILITY

Sustainability isn't a new issue in our cities. It's been high on city planners' agendas for years and over the last few, has become one of their top priorities. We're making good progress – and there's more in the pipeline. Thanks to London's congestion charge and Ultra Low Emission Zone, traffic volumes are down in the capital and air quality is improving. And with the government's decision to ban the sale of petrol and diesel cars entirely by 2030, we can expect both metrics to keep trending in the right direction. That's good news for the ambitious **carbon reduction goals** that many of our cities are currently working towards.

But there are still a lot of obstacles on our path. Carbon reduction is only one part of the puzzle when it comes to creating sustainable cities. There remain **several environmental and social issues** that our current city planning does little to address, many of which were thrown into stark relief during lockdown.

Their impacts are serious. Apart from the widely-reported economic fallout, the **inflexibility** of our cities has also contributed to a major downturn in wellbeing. The inability to work and socialise safely, lack of access to green space, the barriers to accessibility and general sense of claustrophobia has seen psychological distress worsen substantially. The cost of this mental health crisis is estimated at around £2.25bn per day, or around £43 per adult per day¹.

CITIES' TOUGHEST CHALLENGES

Cities face unprecedented challenges: poor air quality, lack of identity and human scale, poverty, inactive lifestyles, vacancy and increased home working affect our urban environments every day. How can our future life and work patterns become more flexible and adaptable to change?



*contains human scale figures readapted from <https://skalgubbar.se/> (royalty free)

1. [The Wellbeing Costs of COVID-19 in the UK. An Independent Research Report by Simetrica-Jacobs and the London School of Economics and Political Science \(2020\)](https://www.independent.co.uk/news/health/mental-health/cost-of-mental-health-crisis-2020-10-15)

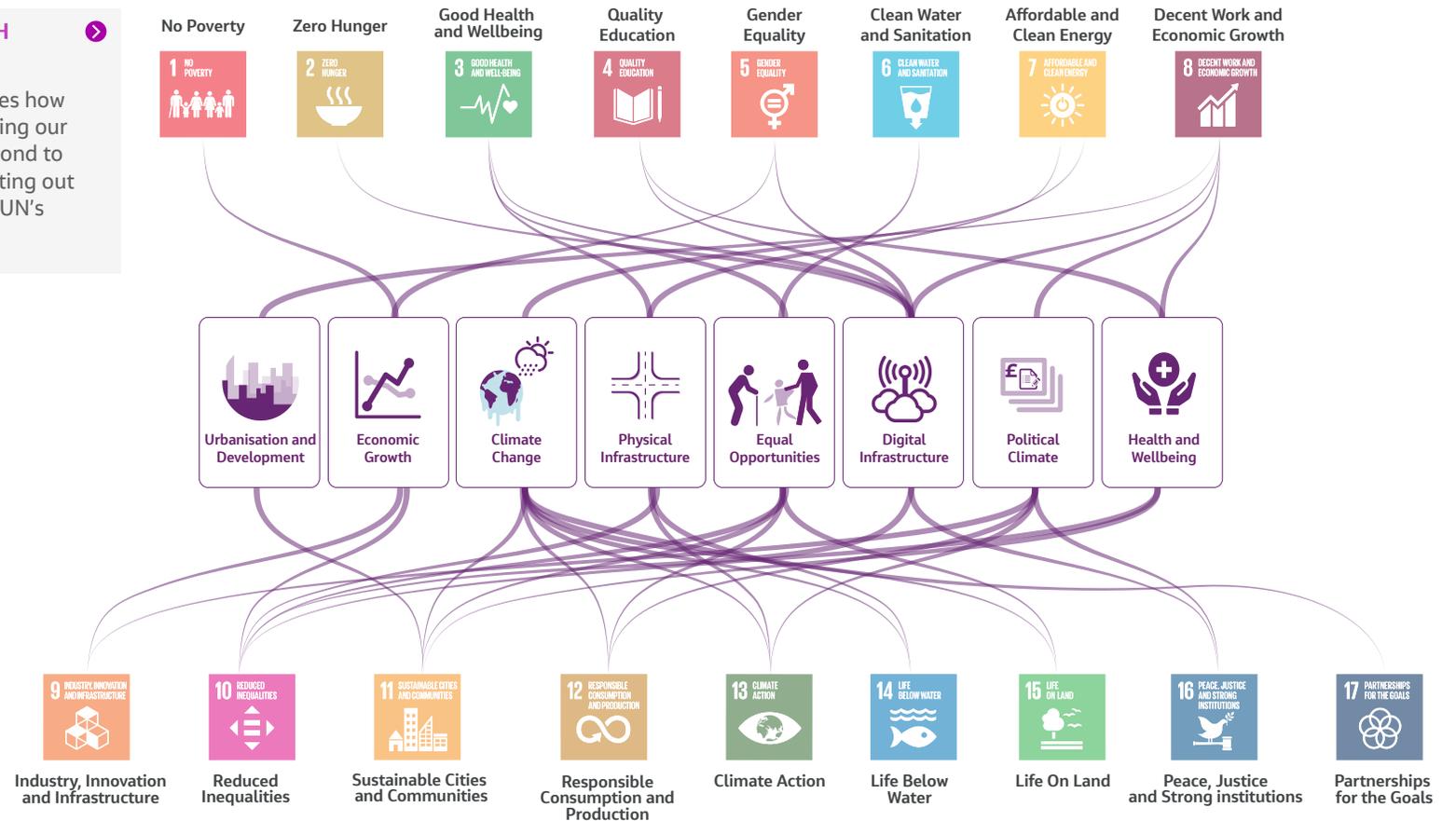
THE OBSTACLES ON OUR PATH TO SUSTAINABILITY

But these issues existed well before the pandemic, and will persist long after it's over. It simply exposed what we already knew to be true: that our fast sprawling cities are prioritising short term financial gain. Left unchecked, this urban sprawl could contribute to habitat fragmentation, water and air pollution, increased infrastructure costs and inequality, obstructing our path to sustainability.

Sustainable cities are the opposite of urban sprawl. To build them, we need to rethink the way we design and evaluate our transport, infrastructure, housing and development projects. They should add maximum value at every stage of the process and across all of the UN's Sustainable Development Goals.

UNLOCKING SDGS THROUGH MEANINGFUL CITY MAKING

The present diagram illustrates how through meaningful city making our urban environments can respond to their toughest challenges setting out innovative paths to meet the UN's sustainable goals.



MAKING MEANINGFUL CHANGE

Progress against our sustainability goals has inevitably lost momentum over the last year. But while it might have slowed us down, the pandemic has also helped us unite around a shared goal. The issues in our cities are obvious to everyone now – as are the potential benefits of doing things differently. One silver lining of the lockdowns was that **pollution dropped dramatically**; another was the **increased uptake of walking and cycling**; a third was newfound appreciation many of us discovered for our **parks and green spaces**. And perhaps most important was the perspective it gave us on what might be possible. These are positive foundations to build upon as we look to the next iteration of our cities.

But it can be difficult to know where to begin, what will have the most impact and how to bring big, ambitious ideas to fruition. In the next sections, we'll look at the opportunities and challenges facing **technology, infrastructure and the built environment**.

SUSTAINABLE CITIES OF TOMORROW ▶

For many years, city planners and designers have been focusing on designing our cities, putting more emphasis on the static and the permanent. Is it time for our cities to open-up to flexibility and adaptability? Example components of sustainable cities are all around us and demonstrate that even small changes can be celebrated; a bike repair shop, an open-air market, a new colourful cycle link, or a mini on-demand bus, collectively materialise an permeable, adaptable and diverse urban fabric.



*contains human scale figures readapted from <https://skalgubbar.se/> (royalty free)

MAKING MEANINGFUL CHANGE: TECHNOLOGY

Technology

Technology is the biggest driver of transformational change today. Little else compares in terms of the scale of the opportunity it presents, the pace at which it's developing and the impact it has at every level of our society. Without technology, we wouldn't be able to deliver the majority of our most important infrastructure projects, or to be so ambitious in the way that we design them.

But **technology isn't just a tactical tool** – it can influence the way our whole economy and society is structured. Take online marketplaces. A relatively new development, companies like AirBnB and Uber have grown over the last ten years into some of the world's most valuable businesses. But they've also changed the distribution of wealth such that the poverty gap is now wider than ever before. Online marketplaces allow those that already have assets (homes, cars) to make more money from them, while those that don't see no additional benefits.

Technology is critical to create sustainable cities, but needs to be developed and applied thoughtfully to ensure **inclusivity**. Sustainable cities are those which enable opportunities for all – not just some. So how can we harness the potential of technology to drive positive outcomes for everyone?

Opportunities

Technological and digital transformation happens in two ways: **from the top down and from the bottom up**.

Top down, technology enables massive infrastructure projects with far-reaching economic and environmental implications. Flexible energy is one such project. **A flexible energy model** would allow individuals and businesses to essentially sell back some of their power to the National Grid. There are a few ways to do this. One would be to incentivise individuals to change when they use power in order to flatten out peaks. Not everyone needs their electric car to be fully charged when

they get back from work at 5pm, for instance. Instead, they could connect their house to a network control system which would automatically turn on and start charging the car when there was enough capacity on the grid. It would ensure their car was charged to say, 40% by the next morning – more than enough to get them to and from work.

Another way would be to ask individuals to enroll in a **scheme** whereby their power is shut off briefly for short windows of time throughout the day – while they're at work, for example. Those gains would then be aggregated and sold back to operators. Not only would it generate wealth for individuals, it would also bring us closer to carbon-neutrality, quicker. At the moment, our power networks are built to deliver against maximum demand – even though those high peaks only happen intermittently. Maintaining that level of service as our cities grow will inevitably mean building more coal

Technological and digital transformation happens in two ways: **from the top down and from the bottom up**.



MAKING MEANINGFUL CHANGE: TECHNOLOGY



and gas power stations; renewable sources simply can't meet this scale of demand yet. But flatten those peaks in demand, and we would avoid the need to build more coal and gas-powered stations, **speeding up our path to sustainability.**

From the bottom up, technology can help improve opportunities for individuals and small businesses. This is especially important post-pandemic, with so many turning to alternative sources of income. **Loaf Bakery** in Birmingham is one example. It was founded by four friends who wanted to start a bakery, and went to a local social media surgery to learn how to market it. While there, they encountered the idea of local crowdfunding, enabling them to finance it, too. Ten years on, Loaf Bakery is a thriving business driving value back to a vibrant local economy. While these might not be the sorts of projects we think of when we talk about technology, technology was unquestionably the driving force behind Loaf Bakery's success.

The transformative power of tech for small businesses has become even more apparent during the pandemic. We've seen swathes of bricks-and-mortar, city-centric businesses embrace digital models in order to remain viable. **London's Crosstown Doughnuts** responded to initial panic-buying and food shortages by teaming up with other independent retailers. Together, they started selling food boxes online, using social advertising and organic content. Meeting people's essential needs for veg, meat, milk, bread and eggs – which were in short supply at supermarkets – enabled London's Crosstown Doughnuts to continue selling its core product: doughnuts. The business not only survived, but thrived.

Initiatives like London's Crosstown Doughnuts and Loaf Bakery don't just drive small returns to individuals. Small-scale innovations can in fact help create '**massive small change**' from which many more stakeholders benefit. Technology gives small-scale innovators the tools they need to

have a better chance of success, and connects them with the market that needs their ideas. Cities are ultimately the product of the collective behaviour of millions of individuals. Tech empowers their positive behavioural change, and that in turn drives widespread social value.

Challenges

Clearly, technology is instrumental to achieving sustainability in our cities. It offers us the smart tools that support behavioural change, whether that be at the individual level or across entire industries. But for those behavioural changes to be effective, they need to be inclusive – everybody needs to be empowered to make them, and to reap the benefits from doing so.

One of the ways we can ensure equitable outcomes is by changing **the way that we fund technology and digital projects.** Technology hasn't reached its full potential yet, and that's in large part due to funding challenges. To date, engagement with

MAKING MEANINGFUL CHANGE: TECHNOLOGY

technology and digital projects from the public sector has been patchy. These projects don't tend to get as much support as others more clearly in the social care arena, despite the substantial social benefits they deliver in the long-term. Instead, investment typically comes from the private sector – a market oriented around profit, and not regulated to require or prioritise those social outcomes. More collaboration between the public and private sectors could help balance the needs and risk appetites of each, ensuring innovation happens where it's needed most. Initiatives like the Mayor of London's Civic Innovation Challenge aim to do exactly that, by inviting collaboration and innovation around critical issues.

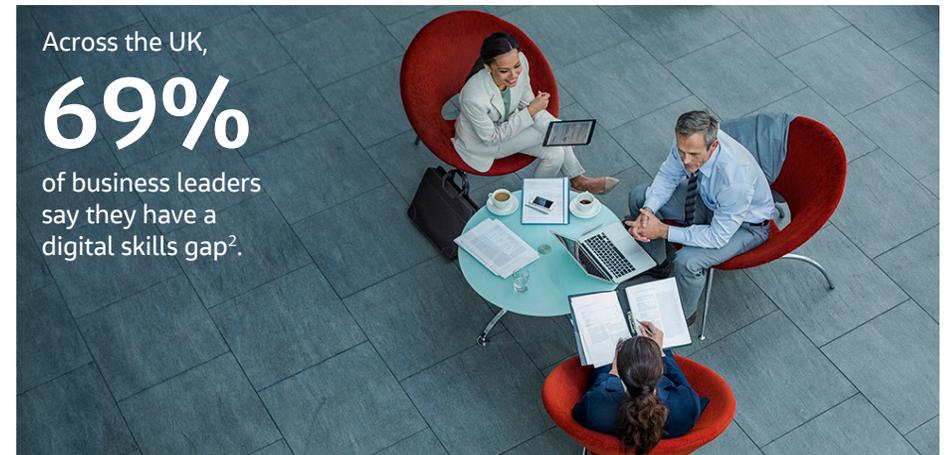
Likewise, small community projects that drive social rather than financial results often find it difficult to **scale**. They might lack the right network or expertise, and be overlooked by accelerator programmes because they're not seen as financially viable. These market conditions mean the full

transformative potential of technology is curtailed, and individuals who could benefit from it most are left behind.

Our digital and green technology skills shortage presents another challenge to **inclusivity**. At the macro level, businesses (and entire industries) lack the tech talent to execute on critical transformation projects. A project like flexible energy requires industry businesses to become experts in software development, data privacy, communications and more – skillsets that are currently poorly represented and difficult to attract away from the tech sector. But it's not just in our industry that these skills are lacking. Across the UK, 69% of business leaders say they have a digital skills gap². This is a challenge that's likely to intensify because schools also lack the expertise to teach those skills – let alone those required for as-yet-unknown jobs in the future.

It trickles down to the individual level, too. The pandemic exposed the areas of our society that lack connectivity

and tech literacy – children from less wealthy backgrounds who weren't able to access online teaching, for instance. Any technology initiatives need to cater to these groups, too. That may require additional infrastructure work to ensure people are able to participate, or communication and education to ensure they can make informed decisions.



Across the UK,
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² Microsoft, Goldsmiths and University of London, 2020

MAKING MEANINGFUL CHANGE: INFRASTRUCTURE

Infrastructure

Urban infrastructure is the operating system which enables growth. It's as critical to modern megacities as it was to the earliest settlements. Historically, roads meant people could meet; that created a hub where they could exchange and create value; that value perception encouraged further investment. Roads and other infrastructure still perform that same critical task today.

Economic downturns are usually followed by a spike in infrastructure investment and activity. As we emerge from the pandemic, we can expect to see a plethora of infrastructure projects – and that's a golden opportunity for us to ensure we rebuild with intentionality to **secure better outcomes**.

There's been more dramatic change in infrastructure over the last decade than ever before. That's thanks to the advancement of technology, which

has arguably been more disruptive to our power industry, for instance, than privatisation. Given the pace of technological change, we need to build resilience and flexibility into our master plans to ensure they're still fit for purpose in the years to come.

So how do we build that resilience and flexibility? As we plan, we need to look at each infrastructure project through multiple lenses. Doing so will help us identify opportunities to add benefits beyond the explicit brief of infrastructure projects. Blue and green, or natural infrastructure, is an example of bold, multi-lensed thinking and the impact it can have in our cities.



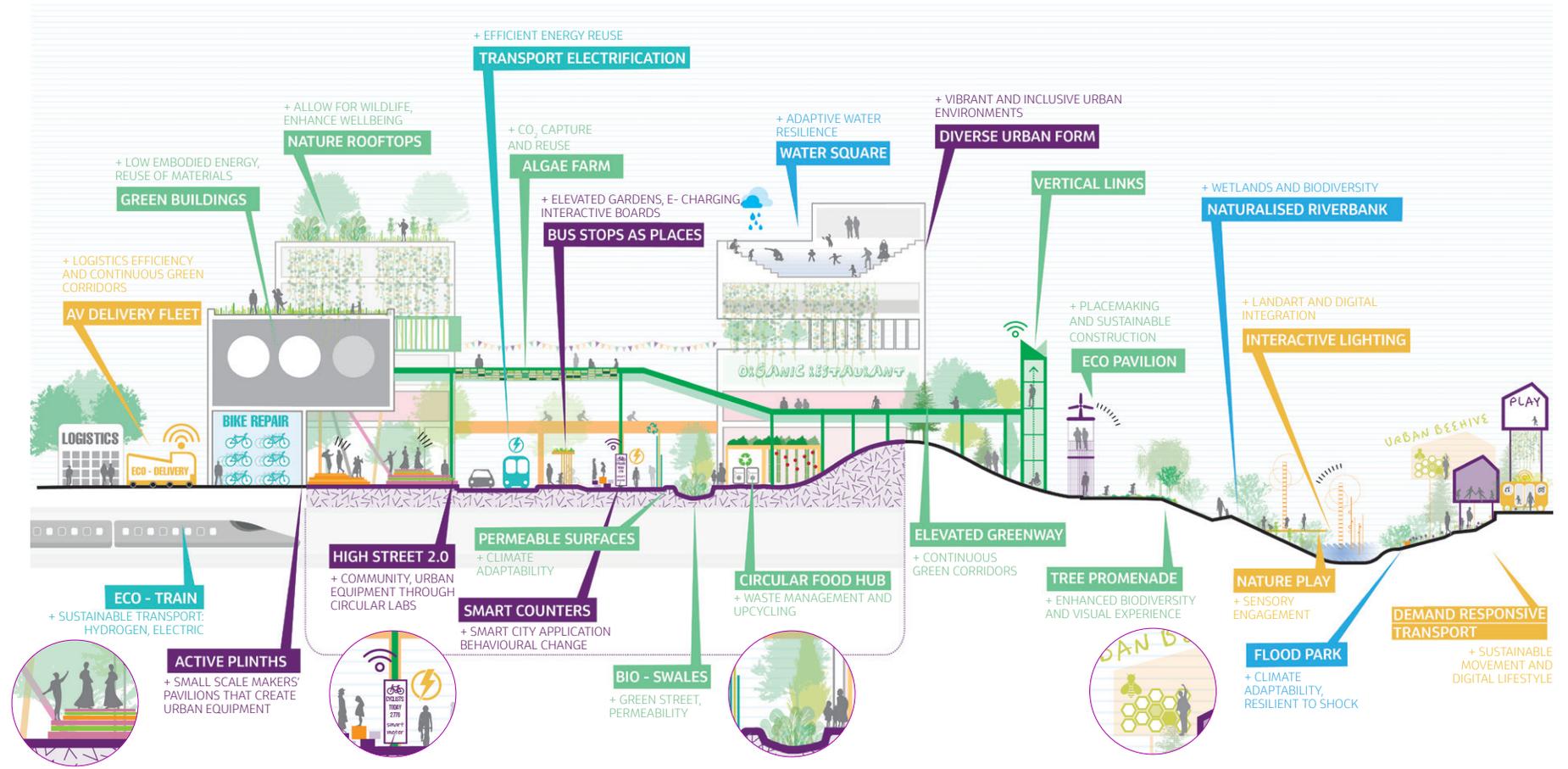
MAKING MEANINGFUL CHANGE: INFRASTRUCTURE

Opportunities

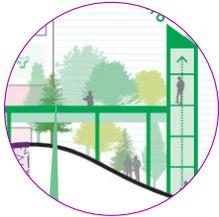
Natural infrastructure represents an enormous opportunity for the development of sustainable cities. The concept of natural capital is a relatively recent development – but as city boroughs become more engaged with activity around climate change, health and wellbeing, the idea of putting our green assets to better use is gaining traction. It's popular with the public, too. The recent uptake in requests for allotments and re-engagement with parks during the pandemic proves it. With interest in environmental issues now at critical mass, there's never been a better time or clearer mandate for change.

URBAN ECOLOGIES AND PRODUCTIVE CITYSCAPES

Green and blue networks can stitch our cities together; allowing local communities to have access to fresh food, breathe clean air and access generous public realm. The cityscape cross-section shows how natural, or green and blue infrastructure can improve the sustainability of the cities whilst having a positive impact on peoples quality of life.

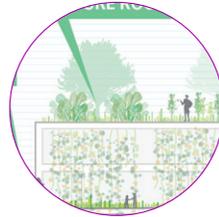


MAKING MEANINGFUL CHANGE: INFRASTRUCTURE



Natural capital offers answers to a range of city planning problems. Take trees: more than just a landscape element, they also help minimise pollution, control temperature and regulate air and water quality. Rethinking the way we plant trees could help cities deliver against both **biodiversity** and **carbon goals**. But **it goes beyond tree-planting**: every linear infrastructure and development project in our city is an opportunity for multi-layered green and blue approaches.

Investment in one area can improve outcomes in a number of others. Social impact is one. Hardworking urban green spaces are proven to deliver **community cohesion**, reduced crime rates and better mental health.



What's more, they can be used **flexibly for a range of activities**. The pandemic has shown us how important this is. It's become apparent how rigid our current city plans are, with distinct work, leisure and residential areas. It's meant that for most of the last year, many of those areas have been left virtually redundant. Using our green infrastructure as the setting for more of those activities would increase the value we get from them in both financial and emotional terms.

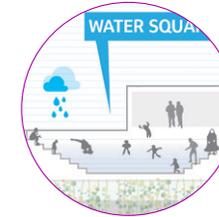
National Park City was launched by the Greater London Authority with exactly these goals in mind. It's aim is to create a more eco-centric city by designing around and integrating existing natural infrastructure. Though still in its infancy, the project could



have significant impacts in making London greener, healthier and more biodiverse, as well as helping re-engage the community around the local environment.

Challenges

Despite the obvious benefits and positive public sentiment, we aren't currently making the best use of our green spaces. Those we have are very conservative and traditional in their design; typically neatly-clipped parks intended purely for leisure. This is in part due to a **lack of creativity** in the way that we think about the purpose of our green spaces, and in part due to more **practical concerns**. Rewilded spaces and wetlands inevitably incur greater maintenance costs, and the



return on that financial investment can be difficult to demonstrate.

We have yet to develop a **shared and accepted language** in the way that we talk about the value of green infrastructure. Though there undoubtedly are financial benefits, they are longer-term, sometimes several steps removed, and only tell part of the story. That's difficult to match up to our current system, which allocates infrastructure spend according to clearly-defined financial metrics. At present, there's an insufficient number of pilot projects that could be used to prove the holistic social, health and wellbeing value-adds of natural infrastructure projects. It's a chicken and egg problem: without the pilots, funding is



hard to come by; without funding, new pilot projects can't launch.

For natural infrastructure to really take off, a **shift in mindset** is needed. That applies to not only the way we think about funding, but also the way in which we design and work on projects, too. In most cities, infrastructure projects are discrete and siloed. A highway project will be delivered separately to a power project, for instance – and this means that opportunities to use multifunctional natural capital are overlooked. **More integrated funding and delivery** is needed at the project planning level to ensure that every initiative adds the maximum and most varied value possible.

MAKING MEANINGFUL CHANGE: BUILT ENVIRONMENT

Built environment

While technology and natural infrastructure offer us new ways of working towards our sustainability goals, there's lots to be done with our current city structure, too. Today, our built environment presents a number of challenges – but it's also a solid foundation upon which we can start to build more consciously and creatively.

The UK Green Building Council (UKGBC) recently announced its 'Net Zero Whole Life Carbon Roadmap' – a 'single, coherent' action plan for transforming the entire UK built environment to deliver net zero emissions. It's an ambitious plan and one that sets a high standard for the rest of the industry to follow.

The architectural industry has known for a long time that the days of building new are behind us. Yet it's still our default mode. Rushing into new building projects without careful consideration could ultimately act as a barrier to sustainable growth – so as work ramps up post-pandemic, we should look for ways to repurpose what we already have. Recycling built spaces helps create a **self-sustaining circular economy**, as well as more **socially valuable space**.

Accepting that this level of change is ambitious and will not always be possible, when we do build new we must challenge ourselves to work against the highest of environmental standards, looking across our industry for inspiration and lessons learnt.

OSD TEAM

Allford Hall Monaghan Morris, AECOM, MLM Building Control, Gardiner and Theobald LLP, OFR Consultants, KM Heritage, Exterior Architecture, Deloitte, Atkins, WSP. Client: Transport for London

Case Study: Southwark Over Station Development (OSD)

- Aiming for BREEAM (Building Research Establishment Environmental Assessment Method) Outstanding³
- Aiming for Well Building (WELL) WELL Core Platinum
- 45% on-site CO2 savings through use of 100kW of waste heat from the Underground Station and use of Air Source
- Air Source Heat Pumps (ASHPs) and photovoltaic (PV) panel array
- 97% of the non-hazardous demolition material can be either reused or recycled
- 60% less deliveries during construction using Cross Laminated Timber (CLT) structure compared to a steel/composite deck structure

The development is an illustrative example of how stations and integrated transport solutions can drive low carbon and vibrant living and work environments. Each element of the scheme carefully responds to existing local needs, while at the same time catering for the future. Sustainable materials like CLT, and good design principles, such as active ground floor, and natural light and ventilation, enhance qualitative and

quantitative aspects of the built environment (safety, animating streets, air quality etc). Climate adaptation and flexibility are in the DNA of the development; with removable floor cassettes, re-use of existing material, high-end facade design and green space pockets. With a strong focus on the needs of existing communities and anticipating the urban trends of the future, OSD sets out to become a key urban hub for retail, work and live.



*Image credit: © Transport For London

3. [New London Architecture 2020](#)

MAKING MEANINGFUL CHANGE: BUILT ENVIRONMENT

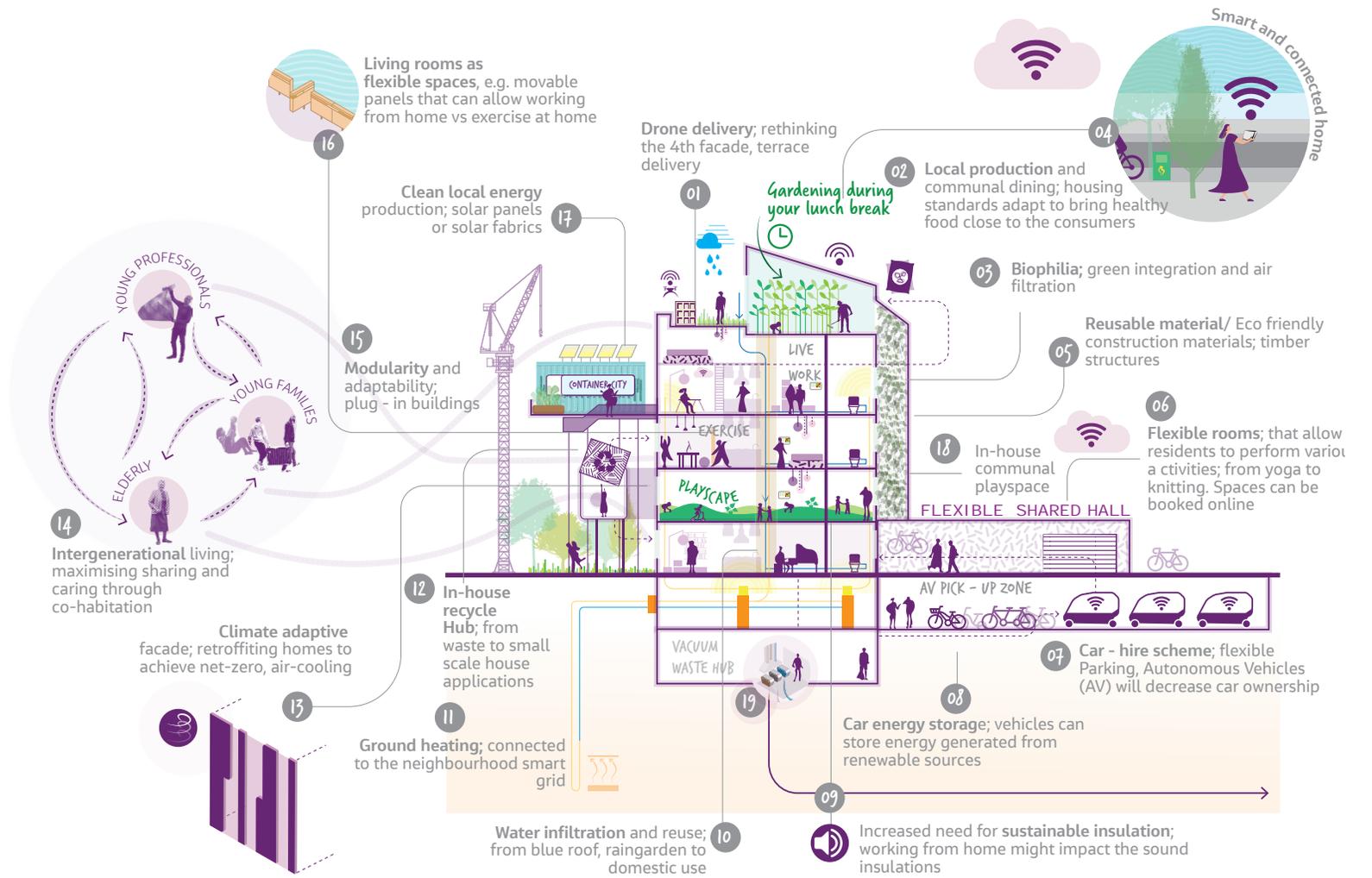
Opportunities

Within the next 5-10 years, major work will be required to retrofit, upgrade and **improve our current housing stock**. Home heating is a big polluter, with gas boilers a major source of nitrogen dioxide emissions. To meet carbon goals, our built spaces will need to be overhauled en masse.

Though a daunting challenge, it's also a massive opportunity. Retrofitting on this scale will require a huge workforce. That means we have a chance to drive wealth back to individuals by **training and upskilling** them, and offering them a stream of important, ongoing work. The government's Ten Point Plan for a Green Industrial Revolution aims to create some 250,000 jobs across clean energy, transport, nature and innovative technologies.

OUR FUTURE HOME

Flexible, intergenerational and eco-friendly; our future living space will be transformed to accommodate the latest urban trends in mobility, technology, architecture and work.



*contains human scale figures readapted from <https://skalgunbar.se/> (royalty free)

MAKING MEANINGFUL CHANGE: BUILT ENVIRONMENT

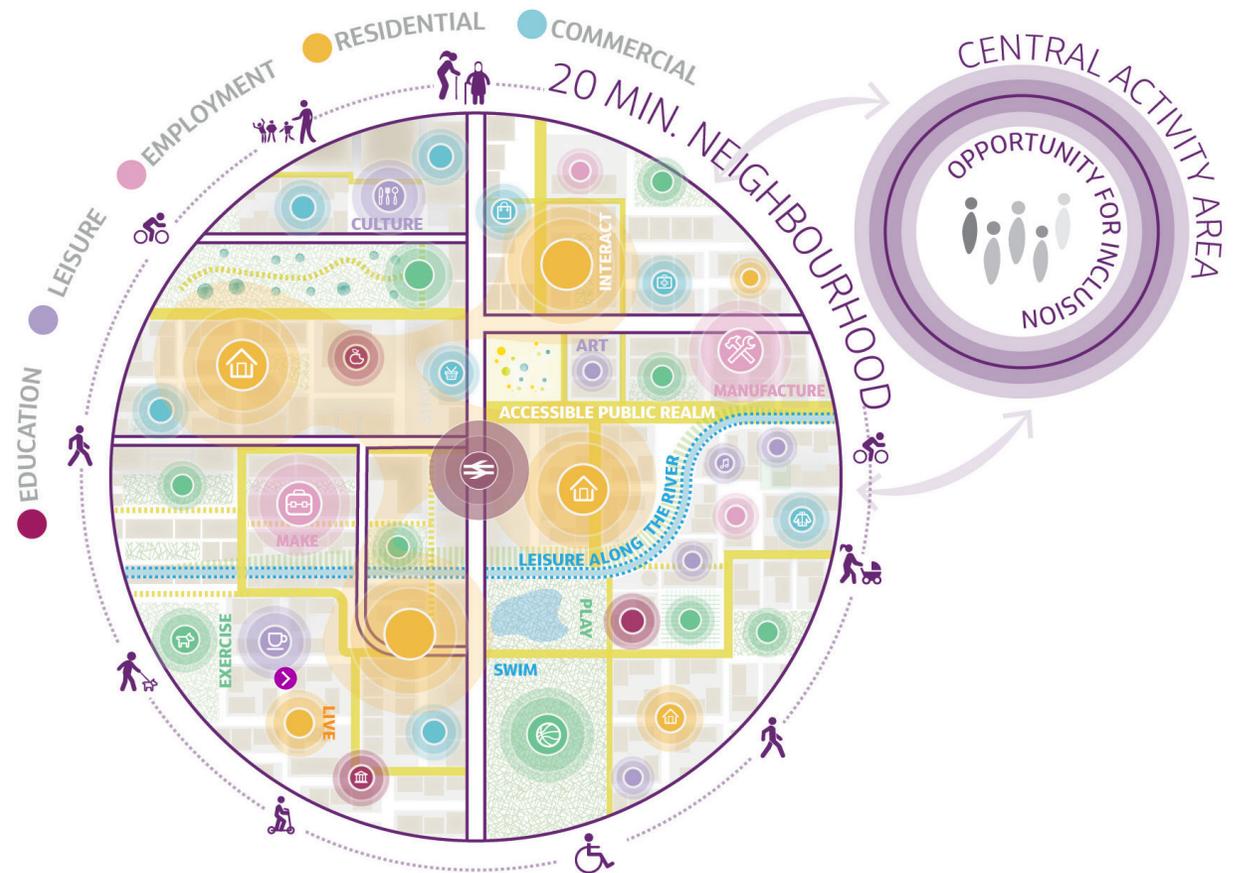
More immediately, **regeneration projects** post-pandemic are a chance to think critically and ensure we build for best outcomes. Instead of investing in the same city structures, we should look to build more flexible, multipurpose spaces. One suggestion is to build around a **platform model**, whereby work, leisure and residential spaces would be connected digitally to optimise their usage and value.

It's also a good time to think about how we repurpose built space to reduce waste. **Second Home** in London's Spitalfields area is a flexible working environment and conference centre. Created out of a converted carpet factory, it uses recycled materials and follows the principles of biomimicry. By emulating natural systems and processes and avoiding new construction, it has helped reduce waste while increasing social value for residents. Businesses of all scales can engage, interact and work collaboratively, bringing us closer to the **'20 minute city'** that addresses a variety of needs in the same locality.

With so many workplaces moving to full-time home-working policies post-pandemic, smart approaches to flexible working have never been more relevant. And the environmental benefits have not been delivered at the expense of good design; the finished product is testament to what can be achieved architecturally when working with what is at our fingertips. **Second Home** is a truly unique proposition that adds to the local **sense of place**.

20 MINUTE NEIGHBOURHOOD: OPPORTUNITY FOR INCLUSION AND DIVERSITY

From Paris to Melbourne and Stockholm, the concept of the 20 minute neighbourhood is a call for our cities to become more diverse; allowing for mixed-use development and active travel. Still, the central activity area retains its vital role as a major transport and economy hub, with green connections to the various neighbourhoods, whilst offering an opportunity for more accessible and inclusive transformation.



MAKING MEANINGFUL CHANGE: BUILT ENVIRONMENT

It will be up to local authorities to embrace the power and potential within their areas and develop their own, individual visions for sustainability. Each area has unique attributes, which can be used to drive value back to local communities. With **design guides** now being created at the borough level, there's an opportunity to take ownership and set new, ambitious standards. Local authorities know their areas better than anyone; we should look to them to lead the way towards unique and uniquely valuable built environments.

Challenges

This is a radically different way of thinking and building from what we're used to. The built environment it produces will **look and feel different**, too. Introducing it into the common vernacular and getting people comfortable with it will require significant **re-education**. Not only will citymakers need to be trained to design differently, individuals might

need to have their minds changed about what a home or office looks like, too.

Aligning market demand and commercial expectation to new, unseen architectural models is no mean feat. Even more of a challenge will be designing and building them in the first place. A different kind of **architectural education** will be required in order to generate a sufficiently skilled and sizable talent pool. **The London Interdisciplinary School** is a good example of teaching beyond the boundaries of traditional vocational practices; it builds its courses around skillsets rather than job titles, helping students think holistically and work cross-functionally.

Once developed, these new architectural models will need to be implemented by all. That means incentivising private landlords to ensure that new homes coming to the market meet the same standards as

those being retrofitted by the public sector. The same goes for small developments with short timelines, which are often less inclined to think beyond quick returns on investment. Inevitably, this results in poor quality of design – and that has a knock-on effect to **quality of lifestyle**. Whether public or private, small or large-scale, all developments will need to be built to meet rigorous sustainability standards. What's more, they'll need to be designed to ensure they stay up-to-standard for the whole of their lifecycle, avoiding the need for future retrofits.



A BLUEPRINT FOR SUSTAINABLE CITIES

As we've seen, each of these critical areas faces significant challenges on the path to sustainability. And though different in the details, the same themes come up again and again. We need to:

1. Redefine the value of projects to prioritise social value
2. Educate and empower individuals to change their behaviours
3. Overhaul policy and governance to drive change

By focusing our efforts for change around these three pillars, we can ensure **inclusion** is embedded into our city design solutions. Inclusivity is the foundation from which truly sustainable cities are built. Inclusive design recognises diversity and offers choice that accommodates everyone. It enables the excluded to integrate into society, providing **safe** and **active** environments within which they can flourish. And it uses technology to create **appropriate, flexible** and **resilient** spaces.

Sustainable cities start with **inclusive design**. It's why so many of us – 90%⁴ – list diversity and inclusion among our most important business values. Inclusivity and diversity of thinking is proved to enhance innovation by 20%⁵, as well as reducing the cost of social services, improving mental health and increasing productivity. So how can we ensure that the principles of inclusivity are baked into the way we design sustainable cities?

In the following sections, we'll look at the three areas for change in more detail.

THE BENEFITS OF INCLUSIVE DESIGN

With our cities becoming every day more and more diverse, inclusive urban design sets out to welcome and invite various groups and individuals to shape our cities based on their needs and for the public benefit. The present diagram summarises some of the benefits of inclusive design.

Inclusive design embraces **flexibility in use** that could welcome and address various group needs.

Inclusive design acknowledges and celebrates **diversity**; **through form and process** it seeks to spatially embrace it.

Inclusive public space design embodies **technology**, allows for **mix of uses, appropriation and safety**.

Inclusive design is responsive and adaptable; it **offers choice** and accommodates different users.

Inclusive design promotes **social inclusion** contributing to the social integration of those who are isolated and excluded.

Design for the city at night: cater for **safe and active urban environments** - safe transport.



4. Jacobs, 2020
5. CEBR, 2018

A BLUEPRINT FOR SUSTAINABLE CITIES

Redefine the value of projects to prioritise social value

Cities have diverse populations, and extremes of poverty and wealth can therefore exist in relatively close proximity. The pandemic has made the divide between these two groups, and the way our infrastructure contributes to it, even more apparent. It has revealed dramatic disparities in access to green space, the ability to work from home, digital connectivity and so on. As we rebuild, there are lots of opportunities for us to use investment in technology, infrastructure and built environment to 'level-up' poorer areas. Investing in these less 'desirable' and often overlooked areas would improve **value perception**, open up more opportunities for residents and promise more **equitable and inclusive growth**.

But to redistribute wealth and drive these outcomes, we first need to rethink **how we evaluate projects**. While short-term financial returns remain the priority, it will be impossible to scale sustainability projects at the required speed. Instead, we should be looking at the **holistic, long term benefits** of each project to ensure investment works hard and has the maximum possible impact. In a sustainable city, a successful road-building project wouldn't just be measured by immediate cost and benefit – but relieved congestion, better air quality, improved health and environmental change across the whole life of the project. These kinds of benefits are orders of magnitude more significant, but **harder to define and quantify**.

Case Study: Edinburgh City Centre Transformation Strategy

Wellbeing Benefits

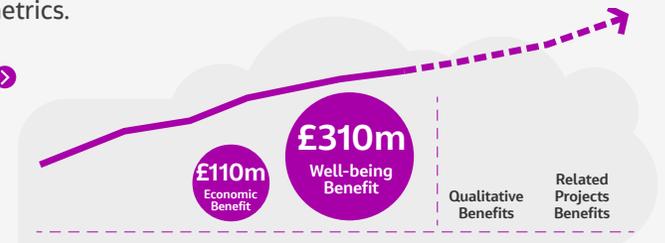
- Decrease congestion - £20m
- Increase green space visits - £40m
- Decrease air pollution - £140m
- Belonging - £40m
- Public transport - £70m

Edinburgh City Centre Transformation (ECCT) is an ambitious plan for a vibrant and people-focused capital city centre which seeks to improve community's health and wellbeing and economic and cultural life. It outlines a programme to enhance public spaces to better support life in the city, an exceptional city centre that is for all. A place for people to live, work, visit and play by prioritising movement on foot, by bike and by public transport.

Jacobs led and managed this programme with a multi-disciplinary team of in-house specialists and sub-consultant partner organisations that worked collaboratively with the City of Edinburgh Council (CEC) and wider stakeholders to deliver the ten-year ECCT Strategy. The team was able to demonstrate and monetise wellbeing benefits in an innovative way on top of conventional benefits for £310m of the total. In that sense, the project highlights ways that infrastructure investment can provide social value, that is monitored and evaluated alongside technical metrics.



Edinburgh City Centre Transformation could bring about £420m of benefits to health and wellbeing, economic activity and the safety of our streets.

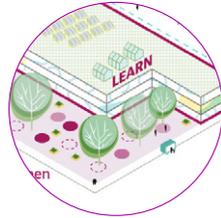


A BLUEPRINT FOR SUSTAINABLE CITIES



Some progress is being made, but there's still a way to go. As industry leaders, there's a clear opportunity for us to step in and steer the ship. By working together through programmes like Interchange, we can develop and define a **new industry standard for what good looks like**, with sustainability as the critical factor.

A city is only sustainable if it's **inclusive**. That means building carefully to ensure opportunities are created across every part of society, and that developments in technology and infrastructure don't unintentionally end up widening the wealth gap or limit physical and social access. Equality of opportunity in turn leads to better health and wellbeing, as well as numerous other social



benefits. As such, prioritising genuine inclusivity should be at the heart of all our design solutions moving forward. It takes us beyond accessibility to help drive better outcomes for all.

Educate and empower individuals to change their behaviours

Another way in which we can ensure **inclusivity is through education**. Though funding has a big part to play in redirecting investment to the areas that need it most, individuals also need to be empowered to make behavioural change. Cities are ultimately a product of the people who live in them. It's up to every individual to take personal responsibility and make sustainable

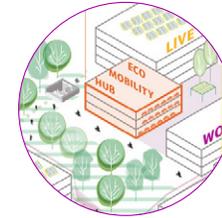


choices – otherwise, even the most well-intentioned and thoughtfully designed projects will fail.

Community buy-in is critical. Too often, the professional sector dictates changes without consulting with locals – or only consults with them on relatively superficial decisions. That's to their detriment; leveraging local knowledge not only enriches projects, but also helps generate more meaningful engagement. It can be challenging to incentivise time-poor local stakeholders to contribute, but including them earlier in the design and development process means we can ensure we're building the right solutions. Some of London's Business Improvement Districts have shown how well this can work.



This community engagement isn't just nice to have. Without communication and education, individuals will not be able to act. It is vital to provide them with the **tools** to help them make more informed decisions – especially those groups that might otherwise be left behind by technological advances, like the elderly. These tools exist at the industry level; equivalents could and should be created for consumers, too. The Jacobs evolve tool, for instance, measures project impacts against the United Nations Sustainable Development Goals. A version which helps individuals understand the varying costs and outcomes of their choices about transport and consumption could be incredibly valuable.



But education and empowerment must be matched with **incentivisation** for it to really work. One possibility would be to create a social digital currency. If individuals are personally contributing to positive change, they should be able to personally profit from it, too. A tool that allowed them to understand and change their behaviour could also **reward** them for doing so, with more sustainable choices exchanged for currency.

A BLUEPRINT FOR SUSTAINABLE CITIES

Overhaul policy and governance to drive change

Shifting the perception of value to this more **holistic and inclusive model** will also help relieve some of the blockers to innovation at the policy level. Baking the UN's Sustainable Development goals into **quality benchmarking** will ensure that the projects that drive the most value to the most people are prioritised and more importantly, funded.

More urgency is needed from policymakers to rapidly drive us away from business as usual, and redirect funds and efforts into the right places. Big projects like retrofitting are an example of the real gear shift that's required - but are yet to gather enough momentum. As it currently stands, we have 26 million units of residential property in the UK, and 29 years to get to carbon neutrality. That's a retrofitting workload of about 1 million units a year, or 20,000 units a week; a colossal target. To

meet it and avoid compounding the problem, we need to ramp up efforts considerably and quickly. The issue remains that although we have declared a climate emergency, we aren't yet moving energetically enough to avert it.

Decisive action from policymakers now could help drive change not only at the macro level, but at the micro level, too. Incentivisation measures like those discussed above are helpful for driving behavioural change, but could be pushed further. Taxation and pricing could help make sustainable options more attractive and available. Reducing stamp duty for low-carbon homes, for instance, encourages the right behaviour at no extra cost to the consumer. It's proven successful in Norway: a green tax shift comprising zero purchase tax, VAT and road tax on electric vehicles (among other things) has driven uptake of electric vehicles to the extent that sales in 2020 amounted to 54% of total car sales. Making sustainable choices cheaper

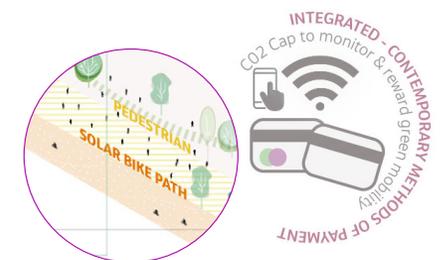
means there's not only a moral incentive but a financial one, and that means that more of our society is able to participate in green initiatives.

As the success of the **plastic bag tax** has shown, people are willing to make change – but only if it's made easy for them. One reason policy initiatives fail is because they're too hard to implement. The Green Homes Grant, which initially only gave a 6 month timeline for changes to be made, is one example. Policymakers can help by being more prescriptive and simplifying the measures individuals and businesses need to take. Take Medium Energy Efficiency Standard (MEES) certificates. Currently, the rules around when they should be created and updated are incredibly complicated – unlike Asbestos Management surveys, which are comparatively straightforward. Clearer guidelines around MEES would help standardise practice and encourage adherence.

Much of what needs to be done will be done with borrowed money – and funders will lend more readily where regulations, taxation and subsidy are predictable in at least the minimum term. Uncertainty will increase cost, or if too great, drive the lenders away completely. But laws and regulation, even if well planned, can't guarantee compliance. Fully resourced, rigorous inspection and enforcement will therefore also be essential.

The issue is that MEES are only one small piece of the puzzle, and there are many more that need addressing — from big-ticket legal changes down to small pieces of certification. To make movement on any of them, divisions of responsibility need to be overcome. At the high level, local and national governments need to find a way to coordinate effectively. Locally, landlords need to be incentivised to make their buildings more efficient. If it's ultimately the tenant playing the electricity bill, they might not be.

Likewise, conflicts of priorities will need to be addressed. How can **heritage protection** be balanced against emissions reduction on the UK's 400,000 listed buildings? How can local authorities persuade commuters to cycle, free of charge, instead of prioritising profits from car parking charges? Policy decisions have the power to change behaviour at every level, and that's critical. It's only when all these ecosystem elements are pushing in the same direction that we'll be able to drive sustained improvements.



TIMELINE TO NET ZERO

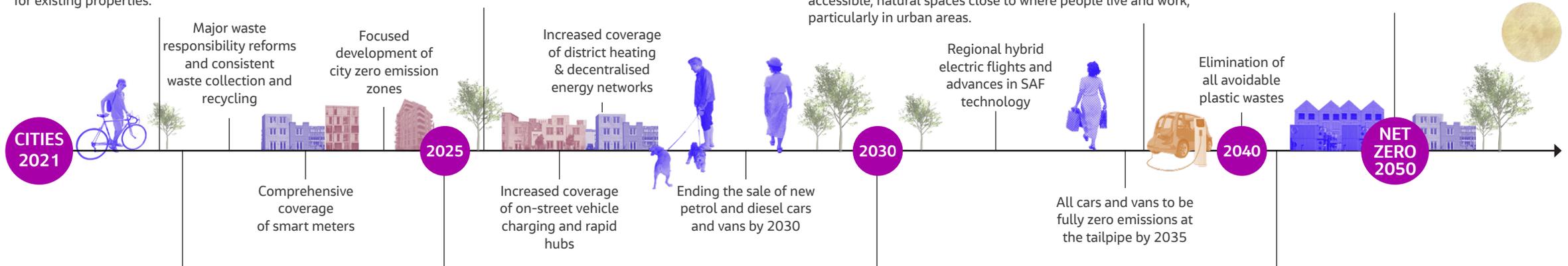
We have recently witnessed city authorities around the world set targets and establish visions for achieving Net Zero. The UK Government's target to achieve a 68% reduction in emissions by 2030 (from 1990 levels), backed up by the 10 Point Plan, will drive further policy development and delivery plans to accelerate decarbonisation across our cities. After declaring a climate emergency, the Mayor of London stated an ambition to drive towards net zero by 2030, introducing policy and focusing investment to support this where possible. Similar visions have been established by city authorities in Glasgow, Birmingham and Cardiff, who have set out priority projects and key partnerships needed to deliver a road map for a carbon neutral city by 2030. If successfully applied, this action will drive early adoption and will help to put these cities on the path to net zero in advance of the current target date. **So what might this journey look like?** The below timeline has been developed to provide an indication of some of the significant changes required to achieve Net Zero and how we might see them come together in the lead up to 2050.

Tackling energy efficiency of domestic and non-domestic buildings, including extensive retrofit programmes and adoption of Future Homes and Buildings Standards, with an interim 2021 target to reduce carbon emissions of new buildings by up to one third, plus alignment of uplift to building regulations for existing properties.

Net-zero ready buildings by 2025, including ending gas grid connections to new homes, which will drive the installation of alternative low carbon heating technologies such as heat pumps, new heat networks, and hydrogen as a heating option, plus home-vehicle connectivity for zero emissions vehicles.

Aligning policy and strategy on natural capital, land use and blue and green infrastructure which will improve resilience and benefit carbon sequestration. Policies include a rolling programme of tree planting, achieving environmental gain from all developments (currently targeting an increase of 10% in biodiversity) and making sure that there are high quality, accessible, natural spaces close to where people live and work, particularly in urban areas.

Beyond zero development where we create fully integrated, smart and flexible city buildings and spaces which are adaptable and modular, which means they can be easily upgraded to benefit from new sustainable technologies and have a minimised need for reinvestment or development long term.



Transformation of our transport systems as directed in the National Infrastructure Strategy, driving significant investment in more inclusive, efficient transport networks, extensive electrification of rail and bus fleets, plus targeted investment in integrated travel infrastructure, additional ULEZ and route charging, and bus and cycling corridors, all driving travel mode transition by 2023.

Digitalisation will enable smart, responsive solutions which can help harmonise demand for energy and other resources and support more conscious and positive behaviour choices. This will be supported by Government moves to achieve high-quality 4G mobile coverage across 95% of the UK, a minimum of 85% of UK premises with gigabit capable broadband coverage and operational 5G demonstrators, all by 2025.

Energy transition of the electricity grid and improved grid resilience will support new transport infrastructure and align with net-zero ready builds. This includes sustained and increased deployment of renewable energy such as solar PV and a Government target for offshore wind to produce more than enough electricity to power every home in the country by 2030.

Transition to a circular economy, maximising the value and benefits we get from resources and reducing the carbon emissions associated with their use. This includes goals to achieve zero avoidable waste and double resource productivity by 2050. This will see greater integration of our utilities, industrial systems and resource management processes and is likely to drive changes in ownership models e.g. for mobility.

CONCLUSION

The next three years will be pivotal for our cities. Our long-term recovery from the pandemic depends upon us changing the way our cities work. While it's exposed some deep flaws and slowed down our progress, it's also provided inspiration, unification and a real imperative for change.

There is a lot of opportunity to build sustainable cities that drive substantial benefits for us all. But it will take a lot of work - work that needs to happen collaboratively and quickly. It is everyone's job to keep pushing towards our shared vision.

London Transport Museum's Interchange programme has initiated some wonderful dialogue across the industry, which needs to be kept alive to ensure we continue to generate and act on ideas. By working together to create and deliver a strong plan of action, we can drive truly transformational change. With that in mind, London Transport Museum will be running a

new series of sustainability-focused thought leadership events throughout 2021. These will focus on how the UK can develop an inclusive green industrial strategy that prioritises the environment as well as economic growth and explore the ways different industries and sectors can work together to effect positive change. It will also examine how our workforce is equipped with the right skills required to deliver a greener future.

Beyond that, we aspire that this year's Interchange programme and the work done to date becomes a sign posting exercise for wider engagement and action. Our collaborative efforts form a powerful call to arms in the lead up to one of the most important upcoming events for the future of our cities: The United Nations Climate Change Conference (COP26), which will be held in Glasgow in 2021. This event will be a unique opportunity to agree how all corners of our globe come together to tackle the toughest challenge of our time. In the lead up

to COP26, and in the spirit of inclusive city making, everyone reading this report has a role to play in ensuring our cities citizens of all ages, groups and background engage in the COP26 discussion.

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Enfield Council	Space Syntax
Field Consulting	SusTrans
Gowling WLG	Systra
Greener Transport Solutions	Telefonica UK Limited
Hitachi Rail Europe	Telent Technology Services
International Data Corporation	Thales
Jacobs	Transport Focus
Jaguar LandRover	Transport for London
London Borough of Newham	Transport Select Committee
London Cycling Campaign	UCL Bartlett Centre for Advanced
London Transport Museum	Spatial Analysis
London Transport Museum Friends	University of Leeds
Magway	Women in Transport
Microsoft UK	

Jacobs



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