

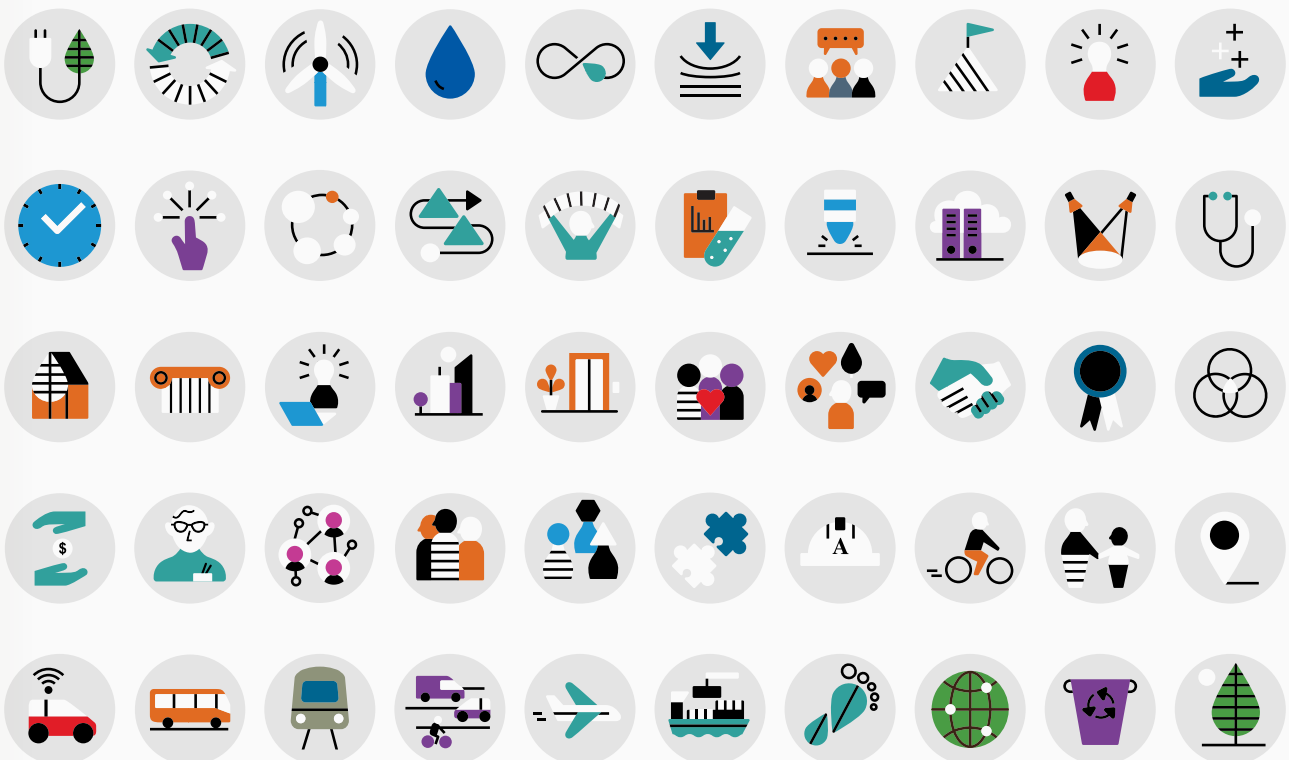
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ARUP

UK Cities Intelligence

June 2023

Active travel / Nature-based solutions / Social value



Welcome to the first edition of our UK Intelligence Unit's collection of research and stories.

Each month, a group of technical experts from Arup explores a topic impacting the cities in which we live, work, and enjoy life.

These will be combined each quarter into an Intelligence Unit *'long read'* which captures our findings, ideas and responses to these urban opportunities and challenges. With thanks to our clients, there is also a selection of interviews and observations from a range of organisations who are driving innovative approaches to these topics.

This inaugural edition is all about how we can improve the climate and social outcomes for communities across the world. We look at active travel and the ways we can move through our cities enriching health and wellbeing, reducing congestion, and improving air quality. This is followed by nature-based solutions, where we discuss the way to design for nature and people, creating resilient places which perform best for our changing environments. We conclude with social value, where we explain how

we have defined social value elements which are not just about monetised benefits but guide how we can deliver the best possible outcomes for people and place.

Whether you want to dip in and read up on a certain topic, or prefer to sit down with a cup of coffee to reflect on it all, our teams would be delighted to discuss these projects and ideas further with you.

We look forward to sending you the next edition in the autumn, but to kick us off, please do turn the page to read a perspective from COP27 provided by our UKIMEA Chair, Jerome Frost.



Joanna Rowelle
Director, Cities Planning and Design, UKIMEA

The 20th March 6th Assessment Report of the IPCC made for difficult reading. We are now at the mid-point between COP27, held last year in Sharm el-Sheikh, and November's COP28 in Dubai and there is clearly a lot more progress needed to address the effects of Climate Change that are already with us and to limit further global warming.

The first edition of this Intelligence Unit publication is an opportune moment to reflect on some of the themes I took away from COP27, and consider not only what progress has been made, but also what more we need to do as a firm and as an industry, to build a more sustainable and resilient future for our cities and their inhabitants.

Over the two weeks in November, we heard a lot about technological innovations designed to combat the effects of climate change.

For me, some of the most interesting are the tools and datasets which give us confidence to help cities plan for their futures. 'Terrain' is one such tool, a digital solution that helps deliver large-scale blue and green Nature-based solutions in cities to solve urban flooding challenges. It has helped us rapidly assess how 'spongy' cities are and their capacity to accommodate urban greenery to improve water retention and reduce heat island effects. It is vital that we secure and preserve the natural environments of our cities to make them more resilient to extreme weather events, and Terrain gives us the knowledge we need to help cities plan for future growth in the right areas – finding a sustainable balance between the built and natural environments.

Unsurprisingly, another key topic was the pace of change needed if we are to reach our climate goals. Thanks to Arup's 'Zero' software we now have a database of over 1000 projects to give us both a baseline and a clear pathway to significantly reduce embodied carbon and operational carbon at an individual building scale.

With our increased ability to project windspeeds, assess optimal sunlight conditions and map ocean terrain, we are ever more confident that we can speed the energy transition needed at national scales. However, to really accelerate transition we need to give extra focus to accelerating transformation at the neighbourhood/district scale - the 'missing middle'. Harnessing 'district scale' transition will be vital in enabling us to work with communities more effectively to bring about accelerated and comprehensive change.

Finally it is clear that more collaboration and integrated thinking are essential. In particular, nature and biodiversity can no longer be seen as adjuncts to net zero. We must advocate for integrated Nature-based solutions in cities to reach mitigation, resilience and goals. We have never needed to go further and faster in pursuit of positive climate action.

We can only do this together.



Jerome Frost
UKIMEA Chair

Active travel is walking, cycling and wheeling around our towns and cities.

It aims to minimise carbon emissions and other environmental impacts, improve physical and mental health, and create more resilient and liveable places.



Chris Boardman
Active travel Commissioner for England

“There is no crisis today that would not be improved by active travel.

The positive effects of high levels of cycling and walking are clearly visible in pockets around the country where people have been given easy and safe alternatives to driving. Perhaps most important of all, though, it makes for better places to live while helping both the NHS and our mission to decarbonise.

Change isn't going to be easy, but it's essential. And it's inevitable.”

National Travel Survey (England) (2021)

The vast majority of trips are short enough to be made by walking, cycling and wheeling.

72%
of personal journeys in England in 2021 were under 5 miles

31%
of trips in England in 2021 were made by walking

2%
of trips in England in 2021 made were by cycling



Social benefits

Physical health benefits

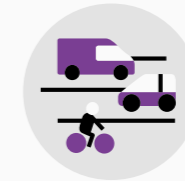
Can reduce obesity, coronary heart disease, stroke, depression, diabetes and several types of cancer, as well as reducing short term absence from work.

Community cohesion and mental health

Increases opportunity for spontaneous socialising, provides space for children to play, reducing feelings of loneliness and improving residents' and visitors' satisfaction with their local areas.

Social inclusion and reduced inequality

Active travel can make public space inclusive for all, regardless of whether they move around in a wheelchair, using other physical or mental aids, or completely unaided.



Transport benefits

Reduced congestion and maintenance

Walking and cycling is a far more efficient use of urban space, and imposes less of a strain on streets and other infrastructure, thereby reducing maintenance costs.

Environment and climate change

By reducing energy use for transport at the point of use, active travel can contribute to lowering emissions, and assisting with compliance with net zero, and improved air quality and lower noise pollution.

Sustainable infrastructure

Benefits through synergy with green and blue infrastructure, such as sustainable drainage systems, can help increase resilience to climate change and increase ecological diversity in the project area.



Better places

Supports economy and local business

Boosts the high street and local town centres. Can increase retail spend, footfall and prevent an increase in vacancy rates.

Infrastructure for sociability

Walking, cycling and wheeling routes can more easily fit in and around public spaces that offer space for socialising as well as climate resilience.

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Local controversies and political buy-in

Many car drivers remain reluctant to use cars less, and small protest groups can have significant impact on decision-making.

Data availability and lessons learned

Availability of data remains a challenge in some areas. This impacts post-delivery monitoring and evaluation of schemes and their wider outcomes.

Short term budgetary constraints

Long-term cost savings are considerable, but local authority capital and maintenance budgets may be limited in coming years.

Inclusion challenge

Net zero targets necessitate a fundamental change in travel behaviour, for all. We must ensure that walking and cycling are inclusive for all, rather than infrastructure designed for certain groups.

E-mobility proliferation

E-bikes help widen accessibility, but other forms of e-mobility could distract from the core aims of active travel.

Industry capacity and skills

Growth in the capacity and skills of the industry and sharing of knowledge will be a key enabler for improving delivery of active travel infrastructure.

Support in establishing Active Travel England

Arup has played a leading role in developing national Active Travel policy for England, working with the Department for Transport.

Transport Planning and Town Planning teams in our Liverpool and Manchester offices worked with Sustrans to provide guidance for the Department for Transport on the role and functioning of the new national Active Travel inspectorate, Active Travel England (ATE).

We advised on the size and role of ATE including defining the development typologies and scales for which the new body will be a statutory consultee as well as how ATE should review and assess local plans.

We created assessment frameworks for ATE to review both development proposals and local plans. The frameworks integrated the vision of the Gear Change Cycling and Walking Plan for England and LTN 1/20 guidance whilst also including other relevant design standards and best practise.

We then tested the assessment frameworks against real life cases and refined our proposals to finalise these frameworks for ATE's use.

We also drafted pre-application and standing advice for developers and local authorities to use to understand the expectation of ATE as well as provide guidance on the core principles of designing and planning for places which enable active travel.

Community-led street improvements

Arup is leading a project on behalf of Transport for Greater Manchester (TfGM) to develop proposals for ten Active Neighbourhoods, one in each district of Greater Manchester.

Across the UK and throughout Greater Manchester, residential streets have become short cuts for drivers attempting to avoid traffic on main roads. This has been exacerbated through the increase in the use of sat navs and other similar applications over the last decade, turning previously safe and quiet streets into ‘rat runs.’

Active Neighbourhoods seek to reclaim residential streets from through traffic, to create dedicated spaces and safer conditions for communities to undertake short trips by walking or cycling, and to build places to play and socialise.

Community-led from the outset, each of the ten Active Neighbourhoods will focus on creating and delivering a scheme that has been ‘co-designed’ with the community through a series of workshops.

Arup is leading the consultant team alongside partners Sustrans and 10GM. Through a mix of online and ‘real world’ community engagement, which includes interactive online platforms, workshops, community meetings and printed materials, the approach allows us to reach the people that each neighbourhood scheme will serve and ensures community buy-in has been sought from start to finish.

Arup will also lead the development of business cases to support the scheme, which will be submitted to TfGM by each district under the Mayor’s Challenge Fund.

Rural cycle route and infrastructure design

Arup undertook a feasibility study for a multi-user route between Hawes and Garsdale in the Yorkshire Dales National Park along the route of a former railway line.

Working for the National Park Authority, Arup identified the key constraints to creating the route which included land ownership, structures, drainage and fast rural roads.

Drawing on knowledge and experience of delivering greenways, Arup produced a set of key design principles to inform the future detailed design including surfacing, width, gradients, accessibility and connections to the wider network. Arup produced a cost estimate for the route using benchmarked rates of similar recent schemes in the area, and undertook an economic appraisal of the route, benchmarking it against other similar multi-user routes, considering additional benefits such as health and tourism to fully appraise the value of the scheme.

The study was brought together in a high-quality report with user-friendly maps to support funding bids.

Client feedback: “Thank you for producing a superb feasibility study for our proposed cycle route from Hawes to Garsdale. We recognised at the outset we were asking for a lot in a very short time period. However your project management has been superb, and we have been particularly impressed by the way you have communicated with us throughout. The report is exactly what we wanted and delivers the detail of our brief and will help us move to the next stage.”

Active travel

Case studies: Leeds Transport Strategy



Paul Foster (Leeds City Council's transport strategy manager) and Alastair Gordon (Arup director and transport planning lead) have been working together on projects in the city for more than ten years.

They reflect on how active travel has taken its place at the heart of the Leeds Transport Strategy, and working together on the projects that are helping to transform the city centre.

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Paul

Active travel had been something of a peripheral issue for Leeds, but was brought into the mainstream when we opened the cycle superhighway between Bradford and East Leeds in 2015, which opened people's eyes to the level of quality we could deliver. And after that, the declaration of climate emergency really focused people's minds beyond traditional transport planning – thinking about peak hour congestion and commuting – to considering and providing alternatives for every journey. Active travel and particularly cycling was seen as a huge opportunity for modal shift, especially for shorter journeys where the numbers don't easily justify a bus service or mass transit.

The fundamental change in our 2021 Transport Strategy is that we are targeting modal shift and reduction in private car use of 30%, and a 400% increase in cycling and a 33% increase in walking. These targets mean you can do more; you can reallocate space at junctions, to put in active travel provision - adding longer pedestrian phases at crossings, taking a car lane out to build a bi-directional cycle track etc.

Alastair

The vision in the strategy is for Leeds to be "a city where you don't need a car". What's interesting for me, which you don't get everywhere, is that when you speak to politicians, they are very much behind that. Almost every city has made a declaration of climate emergency, but councillors here really seem to get it, when you are talking about tough decisions about taking away highway capacity, and making it better for active travel and public transport. And other departments in the council are also lined up.

Paul

There are still local challenges when you get down to the detail of this particular parking place or that specific road closure, but most of the time we find a way, find some compromises that still deliver a quality project but it just takes a bit more time. Through the pandemic we did some low traffic neighbourhoods. We called them 'active travel neighbourhoods' to try to get away from the stigma, but that didn't necessarily work. We've had to draw back on elements of those, but we are also doing some more with a much greater level of local public co-design, which has led to greater support and better schemes.

We've also transformed the way we communicate. We were in a difficult place following the collapse of the tram and trolleybus schemes in 2005 and 2016, and that was the point where we created the 'Connecting Leeds' brand and put more resource into open communication and consultation. One example is our consultation portal, which now allows everyone to share comments, so that people can see other viewpoints leading to a more discursive experience amongst the community. We've also done a lot of work with the press, explaining our vision. There are still some negative headlines, but they have a broad understanding of what we are trying to do and in general support it. And building a better public image of what we are trying to do has strengthened political support in turn.

We did have some successes during the pandemic too. We used orcas and wands (lightweight bollards) to mark out a temporary segregated cycle lane on the A660 from Headingley to Leeds city centre, our busiest cycling and public transport corridor. Whenever we tried to do anything like this in the past, it's always been too controversial, but everybody loved this, and Arup worked with us to develop the business case for making that a permanent cycle superhighway scheme, which has now been awarded funding.

Alastair

We are also supporting the landscape architect on the City Square project, outside the Station, right next to the new Channel 4 HQ. And we worked with Paul and colleagues on the South Bank masterplan. There we came up with this concept of a park on the south bank of the River Aire with a new bridge connecting to Sovereign Square on the north bank, to bring people south to what was once an industrial area, and very highway dominated. And you've stolen a march, Paul, in that you're putting the public realm in first and the development will follow and fit round that.

Paul

The South Bank Masterplan was key for planning for the HS2 station, and considering how we regenerate a whole area of city, with active travel networks built in from the outset.

There are other schemes we've delivered in the city centre. For example, Cookridge Street was a big wide road by a hotel and the art gallery, and in the summer we closed it occasionally and put AstroTurf down for kids to play, along with picnic tables. That established that it wasn't really needed as part of the network, so now we've made permanent changes. This is one of those instances, where everyone is saying how good it looks now it's been delivered, which helps when we are looking at doing things elsewhere, because you can cite the success of the scheme.

Alastair

The next big project is the city centre plan. Leeds have just closed 'The Loop' – the circuit of streets inside the inner ring road. So it won't be as convenient to travel through the city centre as it has been in the past.

Paul

The principle of removing through traffic from city centre is established, so rather than measuring traffic and designing streets to accommodate it (plus some growth), which is what we used to do, we're clear that we want to reduce private car use, to improve active travel and ultimately make a better place. It's important to say, you can still access everywhere if you need to; it might be less convenient, it might take longer, but we didn't close the city centre to cars altogether.

Alastair

That's important for inclusivity, for blue badge holders, and also for the servicing and delivery needs of businesses. There is still a reason for some vehicles to get to the city centre, but there is a lot of through traffic that uses the city centre that doesn't need to be there and makes it an unpleasant environment.

Paul

As The Loop is going, there are areas of redundant space, so we are going to try to create a cycle loop, accessible however you approach the city centre. Getting the city centre right is key, and then our next challenge is the routes that connect the rest of the city together. I often talk about the network as a spider's web, which we are filling in and making sure there are no missing threads, starting from the city centre and moving outwards. In a way the biggest propensity to change is within that core urban area, the 2, 3, 5 km around the city centre.

And together with Arup, we're taking a whole-network approach in the city centre. So when the designers come up with something for an individual street, there's a framework for what they need to fit in there – so we can say, for example, this road needs to have a bus corridor and cycle lane. It sets out our plan for the network as a whole, so we don't have to look at the transport impact on the whole city for every single scheme.

Alastair

We split the city centre into something like 120 links, and really challenged ourselves on each of those links. What was the aspiration for that link? What was the reality of what could we fit in? So what would have to give, what were the compromises we were going to have to make? What became obvious was – no surprise here – we couldn't get everything that we wanted in terms of public transport, walking and cycling infrastructure.

So we established this green-amber-red system. Green was where everything already fitted in, usually because Leeds had already done what they wanted to do for that link. Amber was relatively simple; with some compromises, eg slight departures from standards or other things that people were reasonably comfortable with, you could turn the amber to green. The reds were a bit more problematic, so were places that we had to consider doing something radically different.

Then we came up with a vision of how the network could operate if we turned the red and amber to green. And we tested it with typical journeys to ask, 'If we do this, can you still get to the key destinations, like the hospital or the railway station?' We tested out the approach with stakeholders in Leeds, but also looked at what Arup had done globally – we'd done a similar matrix in Sydney, and we looked what we'd done in London and other cities – to work out what the Leeds approach looked like.

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Paul

There were a couple of places where we had to compromise, to make a street one way, for example, or to require servicing traffic and mass transit to share for short sections. But now, apart from one area where we are still looking in more detail, we have options for most routes, and we are just taking this through our internal processes, to get buy in.

Alastair

My view, Paul, is part of the benefit of the exercise was stepping away from the day job, thinking ten years in the future, and having a process to get you there. You gave us a challenge: we know what we want the network to look like in ten years' time, but how does it work, how do we get there? For us living and working in the city it's been really exciting, we love working on the project. Paul and I have talked about this being our favourite project on both sides of the fence, because you feel like you're shaping the future of the city for the better; fundamentally, we are making it a better place.

Paul

It's what we got into this job for! You've still got to do the detail and the consultation, but we have established a direction. The other benefit was that the workshops we held to discuss the plans got people out of modal and project siloes, and made them see the bigger picture, and a shared problem to solve. It's not about making the best tram system, or just doing cycle facilities, but coming up with the best holistic network for the city.

In terms of support Arup has been giving us, my take so far has been of really high-quality professionalism. What really comes across from Alastair especially is the desire to improve the place where he lives and works, beyond just doing the job. That really does help. If you get a consultant who comes in and the work is farmed off to a person who lives miles away in another city, it doesn't work the same; they won't have the same passion for the project as people who have been based locally and working in the city for that time.

Alastair

What I think works well is that it feels very much like a team effort. Yes, you are the client and we are your consultant, but we've really worked together; that's meant we've shared stuff with you that isn't finished, that's in draft, there might be typos, and you've taken it in that context. That's also given you an opportunity to come forward with your ideas, helping shape the plans. Because there's so much knowledge within the council: you know the politics, you've spoken to the local businesses, you know the place. We'll never have all that knowledge, but we have a different expertise. And when you bring those together you get a better outcome.



Susan Claris, transport planner and vice-president at Living Streets, talks about behaviour change, community engagement, and the projects that have inspired her in the UK and abroad.

Q. How did you become involved in active travel projects at Arup?

I've been working as a transport planner for thirty years, but I can actually pinpoint the specific moment when I got involved in active travel. It was an event in December 2013 in Arup's London office. We were discussing what our mission 'Shaping a better world' means – what would a better world look like? I said it would be a world in which we all walked more, and talked through the different benefits of walking. People came up afterwards and said, 'That's really interesting', or 'I hadn't thought about that before'. So I started writing a blog and speaking at conferences and it all went from there.

Since then I've seen growing interest among clients too. When I started my career, cycling and walking never featured in anything; it was all about junction capacity and how to maximise car parking space. But priorities are changing: clients are now much more interested in decarbonisation and health.

Q. How has your academic background in anthropology affected your approach?

It has been central. Anthropology is about trying to understand different people's perspectives, which is really relevant to transport planning whatever the mode, but particularly to active travel. For example, it's not enough to just put in walking and cycling infrastructure; you need to think whether it will be attractive and safe for all the people you want to use it. So you can do something that works well for a six-foot, fit, able-bodied man, but not for a 70 year-old woman with walking difficulties. It's about trying to see things

from users' perspectives, not a top-down 'planning' perspective. That's the way you build infrastructure that supports behaviour change.

Q. What are the big behaviour changes we need to see?

We need less reliance on cars for short journeys. Car travel needs to be seen as a privilege not a right. Not every journey can be walked, wheeled or cycled, of course, but so many short journeys are undertaken by car without considering their true cost in terms of the risks to others, the impact in terms of carbon emissions, air pollution, noise.

Q. What are the levers for achieving this change?

You need to make walking and cycling attractive options. Any journey is a bit like a chain, and you only need one bad link to mess it up. When you ask people what are the barriers to walking and cycling, they quite often identify a specific junction, roundabout or gyratory. In the past there was a tendency to put in cycle lanes or better pavements where it's easy to do so or where there's space, but we need to get away from that, we need to focus on the most difficult areas – because they can unlock wider take-up.

Also, over the last couple of years, people have discovered the joys of their local neighbourhood, and the joys of walking, wheeling and cycling, with less traffic, noise and pollution. There are incentives in terms of people's own health, travel costs, the quality of how they spend their time. I have the best conversations when I'm walking, and you see that when parents are taking children to school. So the pandemic has acted as a lever for people to try

walking and cycling, and you can see their attitude change from 'Well, this is not as bad as I thought it would be' to 'Actually, this is enjoyable'.

But you also need road pricing. When people have to pay for using roads, they will start considering the real costs of driving. You can give people lots of information, but we all know that we eat and drink things we know we shouldn't. Information helps, but pricing can shift behaviour.

Q. You have been a trustee and are now a vice-president at Living Streets, the UK charity for everyday walking. How did that come about?

When I started talking and blogging more about walking, someone I knew got in touch saying there was a trustee position available at Living Streets, and was I interested in applying. I was a trustee there for six years, and then became vice-president from 2020. It was fascinating being involved with a charity, as I'd only worked in the public and private sectors previously. It also gives me a broader platform – for example, chairing events at COP26.

When Living Streets was founded in 1929, it was a lobbying organisation, campaigning for things like pedestrian crossings, the driving test, speed limits – things we now take for granted. Its focus now is more on placemaking, having streets that are attractive places for people to be. We do a lot of work on campaigns such as walking to school, on health benefits, on working with businesses who may have put in cycle parking but have done less to encourage staff to walk.

Q. What interventions work for active travel?

Low traffic neighbourhoods are key. There has been a huge increase in through traffic on residential roads in the past 15 years, and you can date the change from when people started having maps on smartphones, and these started taking motorists down residential streets. Taking traffic out of these neighbourhoods immediately makes them better for walking and cycling and improves air quality.

Also building parklets can take private parking spaces and turn them into community spaces, with planting and seating for everyone. These sort of things can really improve public space.

Q. Where are the good examples?

Places like Waltham Forest, who have been developing their 'mini-Holland' active travel schemes for a bit longer now can show good data on impact. They also show a virtuous circle – when people see something good they begin to want it on their own street. In Freiburg in Germany, they started improving residential streets one at a time, only where there was support. So they did it in street A and the people in street B said, 'Wellcomma, I want a bit of that'.

These examples are quite replicable from small places to big cities. Someone said at one of our workshops, 'We don't need much but we need it everywhere.' It's those small changes, footway maintenance, making sure footways aren't obstructed, having planting and greenery for shade and shelter, having seating. These are small things, but they need to be done at scale. It's every street that needs improving.

1929

Living Streets was founded

2021

Living Streets chaired session at COP26 in Glasgow

My favourite international example is Pontevedra in north west Spain, who started to pursue traffic reduction from 1999, saying cities belonged to people and cars were permitted in certain circumstances as guests. It's a small city with a population of around 80,000, and has 20 years of data: road casualties have decreased, air quality has improved, but most importantly the population, particularly of children, has gone up, while surrounding towns have declined. Children as young as 7 or 8 feel safe walking to school alone. Also, the mayor has been elected six times – walking improvements are something that politicians can do within a short time, and see a difference and the benefits for all their citizens.

Q. What are the barriers to more active travel interventions?

At one level, people don't like change. When you consult people, they fear they are losing something, particularly if it comes to reduction in parking spaces or reallocation of road space. Cars have stealthily taken over more and more space, and it's quite difficult to draw back from that. There is more strong policy and political support than there has ever been. We have the [Gear Change](#) cycling and walking plan for England, and we have the UK [transport decarbonisation plan](#). But there is still a bit of a disconnect with delivery.

You need engagement that works with people from the outset so they understand why change is needed, rather than seeing it as something being done to them. If you make the process as inclusive as possible, then even if people's points are not being taken on board, they can understand why and

they may be more accepting of the outcome. You need to talk about what you are trying to achieve, so rather than framing a discussion in terms of putting in a cycle lane, you talk in terms of improving the local economy, making a neighbourhood a more pleasant place to be, decarbonisation, lower pollution and improved health.

Q. What projects have you been most proud of?

I was very pleased to lead our [Cities Alive Towards a Walking World](#) publication back in 2016. Arup commissioned that through our internal 'Invest in Arup' programme, as there wasn't one document that drew together all the benefits of walkability, so we developed that document with a truly global team, so we could show benefits and case studies. And six years later it is still quoted and used, though the policy discussion has advanced, so that was a great piece of work that really shone a light on walking, and the benefits it can have for decarbonisation, health, cost of living, the energy crisis, the public realm, safety, biodiversity – for everything.



Mark Bowman leads Arup's Active Travel team in Scotland, Northern Ireland and North East England.

Mark talks about everyday walking and cycling, designing for families, and the role of regional and devolved government.

Q. How did you come to specialise in active travel projects?

I studied civil and environmental engineering at university, so had always been engaged in environmental issues. I joined Arup on graduation, working both in transport planning and as a civil engineer – seeing the bigger picture but also designing the nuts and bolts of projects.

I had always been a really keen cyclist and walker, and having young kids also made a big impact in terms of considering the climate, and how we moved about as a family. I undertook some cycling feasibility studies early in my career, but in the last five years, sustainability and climate change have made active travel central to our work as well as my interests. There's been a snowball effect in terms of building a team and delivering strategic projects, as well as networking in the world of active travel and becoming more engaged in debates and discussions.

Even a few years ago, walking and cycling were a bit of an afterthought – the last page of the report you presented to clients. Now walking and cycling is front and centre, and anything to do with cars is the last page of the report.

Q. How fast is behaviour changing?

It's hard to get good numbers on changing travel patterns, but I'm generally positive in terms of the shifts we are seeing, which I can see every day on the street in Edinburgh. The pandemic shifted behaviour in the short-term, but more importantly allowed people to experiment and fast track projects, and to trial pop-up schemes.

We need to focus on everyday active travel. It's not about encouraging people to go out for a leisure ride or a walk on a Saturday morning, though that's great. It's about walking or cycling to work, but also about the five-minute trips – to shops, to school, to see friends – that are part of everyday life. We make many of these types of trip each day, and they are the trips where walking and cycling can be as easy and as quick as car journeys, especially in town and city centre environments.

“I had always been a really keen cyclist and walker, and having young kids also made a big impact in terms of considering the climate, and how we moved about as a family.”

Q. What role does public policy play?

It's important. In Scotland, for example, the Government has committed to increasing active travel funding to 10% of overall transport expenditure or £320m by 2024/25 – nearly doubling previous expenditure levels, and representing one of the highest per capita active travel budgets in Europe.

The Scottish Government also has a commitment of reducing car kilometres travelled by 20% by 2030, which I think is one of the first commitments of this type in the world. As the saying goes, your cycle or walking plan is only as good as your car plan. You need to have a plan to reduce car use as well as making it easier to walk and cycle.

Q. Against this backdrop of policy support, what are the challenges for implementation?

From my experience, you still find councillors and council officers getting cold feet about taking away parking spaces and road space from cars. People still think it is their right to park outside their house, or outside the front door of a shop. We need to transform our understanding, to see that streets are a public right for everybody, particularly in city centres where a significant proportion of people don't have a car. So there's an inclusivity angle. But there is still nervousness about an anti-active travel backlash. Some drivers think their interests should be paramount, which isn't what policy and strategy says, but hasn't filtered down into society yet.

Q. How do you shift that discussion?

There should be a win-win. People say, 'I'm not going to cycle 23 miles', but these aren't the trips we're trying to target. It's the five-minute drive to the shop, the five-minute trip to pick the kids up. If these could be a seven-minute cycle ride or a ten-minute walk, then that's half the battle if not more. So the more people walk and cycle, the more space there is for people to drive when they really need to.

Also, we're trying to get over the fact that everyone lives in a street – so your driving route is where someone else's kids live. We need to tell stories: this is not just a transport project, it's about creating better places for everyone. It's not my phrase, but we need 'sticky streets' – you want people to spend time in their local area, and ultimately spend money in the local high street, go to local markets, and not just treat places as through-routes from A to B in the quickest time possible.

Over the next few years, we need to see it become socially unacceptable to jump in a car for that five minute trip in a town centre. It's like smoking in public spaces; people said we could never stop smoking in pubs, or that it would kill pubs off, just as they say cycle projects will sound the death knell for town centres. In both cases, the reality is often the opposite.

Q. What makes interventions successful?

Firstly, any infrastructure changes need supporting behavioural change plans and communications. You need to explain what the project is, even how to use it.

You also need to be bold and ambitious – with separate walking and cycling ways

so that everyone can feel comfortable. In Scotland all cycling infrastructure has to be designed so that it can be used by an unaccompanied 12 year old. You need consistency as well – too many schemes just stop at difficult junctions, and you need to fill in that final 200 metres.

Quick wins include making sure there's cycle parking at destinations, and installing seating and benches, and planting, to make walking pleasant and accessible for all. Fundamentally it is about making sure that projects are rooted in place.

Q. What's one project that you have particularly enjoyed working on?

About three years ago we started work on the [SEStran Strategic Network](#). We were asked for a strategic vision for an active travel network to connect the towns, cities and transport hubs across eight local authorities around Edinburgh, and we developed a plan for 600 km of mainly off-road walking and cycling routes. We presented it in a schematic that looked a bit like a rail network, and that landed really well with decision makers and clients, who called it a 'game changer'. We are still working on the project, moving towards implementation, undertaking feasibility studies and concept designs for different phases of the network as funding becomes available.

The regional approach has been important. The public don't care where local authority boundaries are, and linking active travel networks to public transport hubs allows longer distance trips without using private cars.

6 Lessons for implementation

1

Engage early and broaden the discussion

Local authorities can play a crucial role in boosting active travel through strategic transport and public realm planning. However, the reallocation of road space from cars can be controversial. To ensure buy-in from residents and local businesses, early engagement and accompanying behavioural change programmes are essential.

Research from the University of Westminster has shown how different approaches to engaging communities, especially residents, appears to have influenced the extent and nature of opposition experienced in different active travel schemes across the UK. Identifying the collective views of the community can build confidence around the desired scheme – a visibly open approach to seeking views from a wide

range of stakeholders at an early stage is likely to result in a better design and will reduce the risk that distrust arises, which can impact the implementation of the scheme later down the line.

Broadening the discussion to the wider benefits active travel can have, from decreased street crime, to positive effects on mental health and wellbeing, and improvements to the public realm can help gain people's support.

Arup VRCycle is an immersive virtual cycling experience that Arup is using to help design and communicate different transport route options. Using a physical bike or tricycle combined with a virtual reality headset for a truly immersive experience, Arup VRCycle is being shared with clients and stakeholders as a tool to support design and engagement on their active travel schemes.

Arup is also leading on developing community engagement methods to support the adoption of ambitious cycling schemes in Colombia. The project (Planning green mobility corridors: Conceptual study and capacity building for the city-region bike network for the municipalities of Cali, Jamundi, Candelaria, Yumbo, and Palmira) aims to formulate concepts and build local capacity to promote a green bike network for the region.

2

Understand impacts and target support

Walking, wheeling and cycling are healthy and environmentally friendly ways to travel. They provide access to education, jobs, food, health services, community and cultural activities, and green space. Active travel can also increase community cohesion and social equity, but scheme promoters need to understand winners and losers.

Evidence shows that more deprived areas typically have more traffic. Reducing traffic can reduce community severance, make streets safer, reduce air pollution and allow the reallocation of road space for spending time and interacting in, enhancing community cohesion.

However, it is important to understand the winners and losers and to review the impact of measures on vulnerable communities, and to take action to ensure that we maximise benefits and minimise negative impacts for vulnerable groups.

Community-led engagement, ongoing participation across different levels of decision making, and targeted information and support can all help to mitigate negative impacts and make sure that schemes can maximise success by being tailored to the specific, place-based needs of residents.

Arup is leading the design and business case for ten Active Neighbourhoods across Manchester on behalf of TfGM. We are working with local communities, district officers, councillors and other key stakeholders to identify local issues and opportunities and 'co-design' with communities to create schemes that work for each area. The project includes a comprehensive engagement plan that brings local people and decision-makers along the project process through a series of four workshops, community pop-up events, mail and poster campaigns.

3

Demonstrate and maximise benefits

Demonstrating that active travel can be easy, available for everyone, safe, and fun raises the profile of walking, cycling and wheeling and their benefits for accessibility, community cohesion, physical activity, and mental health.

Within the UK, studies of people from ethnic minority groups cited safety and security as a concern when walking. Concerns about safety increase at night and when there are few other people around. Ensuring that spatial planning, street and building design seeks to increase footfall and street-level activity helps to foster a sense of belonging, ownership, and custodianship – making neighbourhoods safer for all and creating bustling centres of economic activity. This should go beyond city centres and larger high streets to bring life to streets in residential areas, smaller towns, suburban and rural areas.

Independent mobility also has many benefits to children, for example, improving children's cognitive development, such as developing wayfinding abilities and sociability, building relationships with others beyond

their immediate family and developing a sense of community. Making active travel the norm from an early age allows children to make more decisions for themselves, and in turn learn to handle the responsibilities which go with decision making. School active travel is also an effective policy for preventing obesity and improving physical and mental wellbeing.

Connswater Community Greenway is a visionary urban regeneration project delivering significant upgrades to the quality, safety and vibrancy of East Belfast and supporting community cohesion and interactivity, economic development, improvements in public health, cleaner rivers and greater flood resilience.

4

Implement a package of measures

Successful active travel goes beyond high quality infrastructure – the phrase “build it and they will come” is an oversimplification. If potential users are not aware of the infrastructure or how best to use it, we are unlikely to achieve the healthy, happy and thriving neighbourhoods we seek.

It is critical to take an holistic and urban design-led approach to active travel, bringing together wayfinding and public information schemes, blue and green infrastructure, lighting and place-making services alongside footways and cycleways. This not only makes networks more user-friendly and attractive, but unlocks a range of co-benefits, enhancing biodiversity, safety, and sustainable urban drainage. Creating multi-faceted active travel schemes creates more collaboration across disciplines, partners, and ultimately funding sources.

Greener Grangetown is a sustainable drainage system (SuDS) project that has also been designed to transform the quality of the public realm and improve cycling and pedestrian infrastructure across a neighbourhood in Cardiff. The installation of new crossings, attractive planting that

moves parking away from junctions, and a central textured strip in the road that prompts drivers to take extra care, have transformed the street.

With the rising popularity of e-commerce and the prevalence of ‘out-of-town’ shopping centres, high streets across UK towns and cities are looking for different ways to attract pedestrians. Arup created a legibility framework for Stockton town centre. This framework focuses on the design of an on-street wayfinding and information system to show and communicate what the town centre has to offer, and how to locate and find key destinations. The result is a consistent set of signage across the town centre and a comfortable pedestrian experience for locals and visitors alike.

5

Build in excellence and continuous improvement

High-quality inclusive design and focussed delivery help to make active travel safer and more attractive. To make cycling, wheeling and walking natural choices for short journeys, implementation of active travel schemes needs to be timely, efficient and reflect best practices and standards.

The Department for Transport's Local Transport Note 1/20 provides guidelines for higher standards, inclusive design principles and recommendations to deliver cycle infrastructure effectively. Arup collaborated with Sustrans to advise the Department during the development of this national guidance. A key element included testing and refining assessment frameworks in real life cases. The guidance sets out best practice, with design and planning recommendations that take a placemaking approach to active travel schemes and promote uptake.

Design of excellent active travel schemes, integrated with improved public realm and green infrastructure, can affect how people use and enjoy spaces. Delivering something aspirational, which helps to transform a place as well as enhancing infrastructure,

can make the case and provide an evidence base for subsequent phases – even helping to win over people who are concerned about proposals ‘on paper’.

Maintenance and monitoring is a critical requirement post-implementation of active travel schemes. It measures effectiveness, highlights gaps and ultimately informs continuous improvements. Arup developed a machine learning-based usage prediction model for the Cork City Shared Bike Scheme. By predicting usage patterns, the model helped optimise the placement of docking stations and fleet deployment, and to reduce operational wastage, thereby enabling more cycle trips and informing delivery of cycling infrastructure across the city.

6

Leverage open-source data

A positive experience is fundamental to encouraging more people to choose walking and cycling. Using open-source data to understand what drives people's preferences and behaviour ensures that interventions are optimised for active travel take-up.

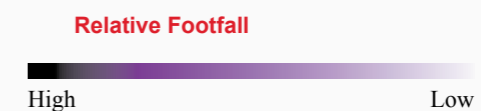
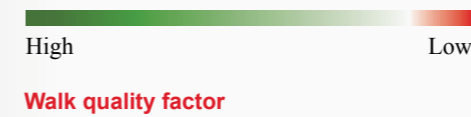
Arup's new urban movement modelling toolkit, uMove helps clients understand and predict pedestrian travel patterns in urban areas. We know that people don't always take the shortest route to get from A to B, but may take longer routes that are more convenient, pleasant and attractive. uMove takes this into account in its unique routing algorithm.

uMove uses an automated process to retrieve data and perform routing calculations. It is based on open-source data, meaning it can be used on projects almost anywhere in the world. uMove considers route attraction and people's willingness to travel further to avoid unpleasant routes. The tool considers distance, steepness and straightness, street type and land-use attractiveness. Each link is assigned a classification of quality informed by Transport for London's Healthy Streets.

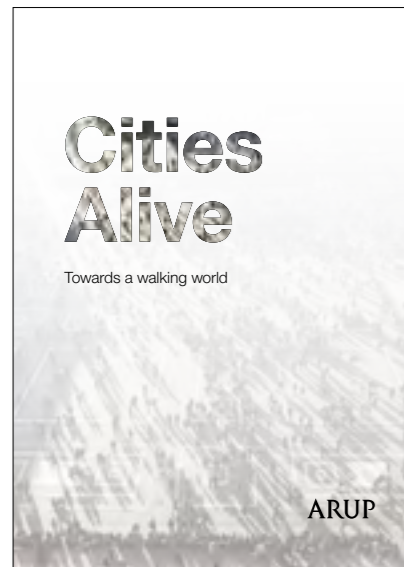
Over the last year we've used uMove on a number of projects to analyse how pedestrian/cycle friendly an area is, testing the effects of active travel proposals and assessing accessibility to public transport services.

For example, Arup was commissioned by Manchester City Council (MCC) to undertake a review of the city centre walking network and develop a prioritised schedule of small-scale interventions to improve the environment for walking. The proposed interventions will seek to improve aspects such as walking connections between key attractions, street clutter, crossings, and help to ensure places are safe and attractive both during the day and at night.

Leveraging our uMove toolkit (see examples, right), we were able to review a large study area in a condensed time frame, enabling us to prioritise improvements based on key journey metrics and walkability analysis. To do this, all of the streets within the city centre needed to be assessed in a data-driven and consistent way. uMove, offered a novel and unique method to achieve this.



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Cities Alive - Towards a Walking World

This report highlights the benefits of walking, drawing on case studies from across our global network of offices to highlight benefits, case studies and actions for city leaders.



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Walking for Everyone

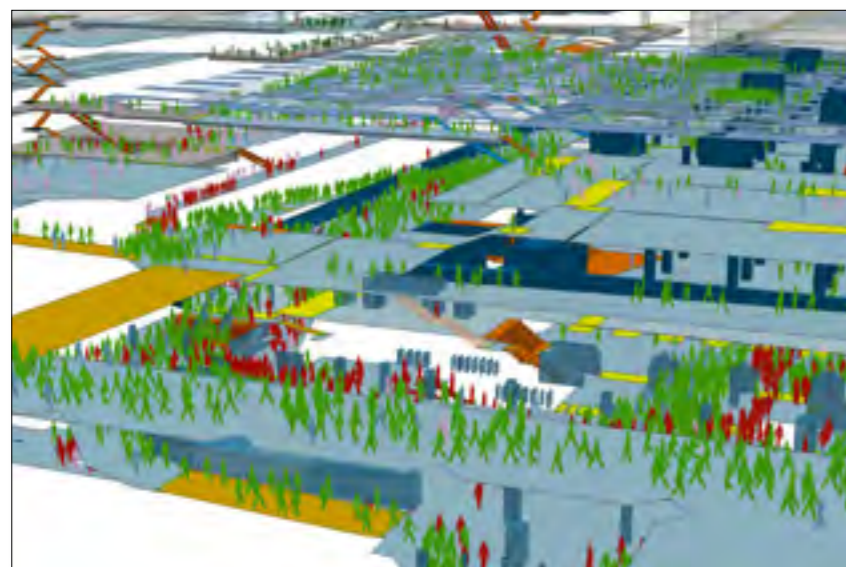
Walking and wheeling policy, plans and delivery should be designed to help reduce the health, economic and societal inequities many people encounter.



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People, Place, Health

This report explores five steps to create a more effective health and care ecosystem. Active travel forms a key role in a preventative model for healthcare which supports local places.



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MassMotion

MassMotion provides technical analysis of people's movement through physical spaces. It allows us to test designs, population levels, and operational overlays from a human perspective.



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Cycling for Everyone

This guide is a call for people working in transport across the UK to ensure cycling is inclusive and helps address wider inequality within cities and towns.



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Active Train Stations

To achieve a more sustainable, healthy approach to travel, we need to reframe our understanding of active mobility – connecting public and active modes of transport.



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Enhance cycling and walking safety liA

This research reviews and maps some global best practices for safe and inclusive walking and cycling for children which use smart technologies and universal design.

Active travel
Further reading

Nature-based solutions use regenerative and sustainable stewardship of water and land (‘blue and green assets’) to meet social, economic and environmental goals.

Nature-based solutions

Overview: **The case for Nbs**

In responding to challenges such as flooding, biodiversity loss, urban heat and landslips, Nature-based solutions (Nbs) can offer better **value for money**, more **sustainable** solutions, and enhanced **community benefits**, compared to traditional ‘grey infrastructure’.

Nbs are critical to meeting **net zero carbon** targets and adapting to the impacts of climate change.

Government regulations and investor stipulations will bring Nbs to the **forefront of planning and delivering** major infrastructure in coming years.



Shared imperative to tackle climate crises

Nbs help society limit global warming, adapt to climate change, combat environmental degradation and halt biodiversity loss.



Risk to society and businesses from extreme weather events e.g. flooding

Nbs such as natural flood management, reduce risks to businesses and society whilst providing wider benefits such as increased biodiversity, improved air and water quality and carbon sequestration.



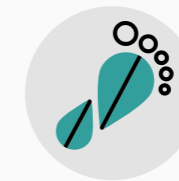
Available government funding for Environmental Land Management

Nbs can unlock funding by increasing the public goods delivered through land such as improving water quality, improving biodiversity, mitigating climate change.



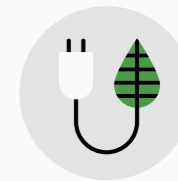
Regulatory requirements for reporting on natural capital and climate related risks and Environmental, social, and governance (ESG)

Nbs can offer practical pathways to increase the sustainable use of land, maximising natural capital and minimising the financial risks climate change poses to businesses.



Net zero and climate change adaptation

Nbs can support climate mitigation and adaptation through carbon sequestration, cooling urban environments, green infrastructure and flood resilience.



Attracting green investment

Green investors seek to fund projects that offer carbon offsetting and sequestration, environmental net gain and biodiversity units.



Commitments to social value

Access to green and blue spaces which provide health benefits, alongside improving social cohesion and enabling economic development.

Zero carbon and energy transition

Achieving the vision of net zero cities

We need to move from target-setting to implementation across all urban systems and at all scales. Green and thriving neighbourhoods can accelerate active travel through encouraging behaviour change, and lower energy use through adaptation of existing assets.

Developing climate positive construction materials

Materials such as steel and concrete have high embedded carbon emissions. Arup have been exploring the use of new materials such as mycelium, which can be generated from food waste, developing products that range from internal structural elements and acoustic panelling to water purification products.

Sustainable energy – accelerating the transition

More sustainable energy systems that work in harmony with natural systems for heating and cooling will reduce carbon impacts, lower costs and increase resilience.

Carbon sequestration

Tree planting and landscape recovery schemes at all scales can help capture and store carbon. Arup is pioneering techniques for cost-effective measurement of carbon capture at scale.

Adaptation and resilience

Green building facades to lower temperature

Higher temperatures mean more air conditioning and other cooling equipment is installed, which generates more heat, leading to ‘urban heat islands’. When trees and other vegetation are planted at scale, significant drops in urban temperatures and humidity are the result, alongside cleaner air.

Green and blue infrastructure to manage flood risk

In many locations climate change means more extreme rainfall and more frequent flooding. Our infrastructure teams have pioneered techniques that allow places to act like sponges. A system of interventions using natural vegetation and existing watercourses – ‘green’ and ‘blue’ infrastructure – hold back, attenuate, and absorb excess water. These techniques prioritise water security, environmental protection, and ecological restoration.

Disaster recovery and risk reduction

Climate change impacts often affect the most vulnerable communities. Taking a nature-based approach – for example, planting trees to reduce risks of landslides – ensures that new adaptation measures don’t exacerbate existing resource shortages or local environmental fragility.

Restoring land and natural systems for resilience

Climate change calls on cities to strengthen and protect the natural systems (air, land, water, biodiversity) on which we rely. Restoring and regenerating land can add resilience against flooding, heat and crop failure, while enhancing biodiversity and society.

Quality of life and equity

Access to nature for a better quality of life

Transforming footpaths and cycle routes can support Nature-based solutions to manage rainwater and create new habitats. Nbs delivers health benefits in enabling more active travel and improving air quality, alongside increased flood resilience, new habitat creation and an improved sense of place.

Local habitat creation for nature, flood resilience and play

Small scale habitat creation brings nature back to urban centres, while rain gardens help mitigate localised flooding. Play areas are combined with seating areas to allow space for both children and the elderly to interact and engage.

Health and wellbeing

Access to nature can improve both physical and mental health – through improving air quality and mitigating the impacts of heat, through supporting recreation and active lifestyles, and through a well-documented direct effect on mental health.

Green equity

More deprived communities often have least access to urban green and blue space, and are most exposed to environmental risk, compounding other sources of disadvantage. Implementing Nbs across cities can bring the benefits of access to nature and resilience across communities.

Regional scale

Regional systems, from food production and energy generation to flood protection and waste management, bolster the resilience of towns and cities.

- 1 Energy production**
 - Solar farms
 - Wind farms
- 2 Food system resilience**
 - Local market gardens
 - Regenerative agriculture
- 3 Waste management**
 - Organic waste composting
- 4 Weather protection and risk reduction**
 - Tree windbreaks
 - Tree planting to reduce risk of landslides
- 5 Flood protection**
 - Sand dunes
 - Water sinks
 - Re-wiggling rivers
 - Re-wetting rivers
- 6 Biodiversity protection and rewilding**
 - Forests
 - Salt marshes
 - Kelp and seagrass
 - Nature corridors
 - Wildflower meadows

City scale

A city's green and blue infrastructure ensures resilience, improves health and creates a framework for better living.

- 1 Health and wellbeing**
 - Walk and cycling green corridors
 - Green open spaces

- 2 Increasing biodiversity**
 - River re-naturalisation
 - Flood risk reduction

- 3 Circular economy**
 - Urban food production and local markets
 - Sustainable waste management
 - Community engagement
 - Sustainable waste management

Neighbourhood and street scale

Nbs in buildings and public spaces make for more liveable, healthy and sustainable neighbourhoods.

- 1 Carbon sequestration**
 - Tree planting
 - Landscape recovery schemes
- 2 Health and wellbeing**
 - Open green spaces
 - Green cycling corridors
- 3 Climate positive construction**
 - Nature-based materials
- 4 Social cohesion**
 - Urban food production
 - Land terracing
 - Child-friendly landscapes
- 5 Lowering temperatures and increasing biodiversity**
 - Green roofs
 - Green walls
 - Green spaces in urban areas
- 6 Management of flood risks**
 - River re-naturalisation
 - Sustainable urban drainage
 - Balancing ponds

Beauty, flood protection and social inclusion

The creation of East London's Olympic Park for the 2012 Olympic and Paralympic Games aimed not only to create a stage for the world's leading sporting events, but also to create a platform for a lasting legacy in an area of East London that had a history of environmental degradation and socio-economic neglect.

Arup provided landscape engineering to support the design and build of 102 hectares of parkland, the largest public park created in London for more than 100 years. Sustainability and multifunctionality, as well as beauty, were at the core of the project, from the installation of a soil-washing plant to clean 30,000 tonnes of site material for reuse in the works (ensuring a cut and fill balance for the project) down to the detailed specification of non-PVC pipes for surface water drainage to reduce the use of plastics and cut embodied CO2, and the use of concrete mixes with the highest possible recycled material content.

At the heart of the Park was a restored waterway system, which involved the reclamation and cleaning of 8.5km of riverside. Canals were transformed into naturalised rivers, with a three-dimensional mosaic of wetland, swales, wet woodland, dry woodland and meadow – new habitats that together form an absorbent flood-control measure. As a consequence, some 5,500 homes have been removed from the 'At Risk' Register for potential flooding. The river valley also enhanced biodiversity, with specific habitats created for species such as kingfishers, sand martins and European eels.

The Park has now become the centrepiece of a longer-term programme of urban regeneration, accommodating new cultural and educational institutions, alongside new homes and retained sporting facilities. It also provides green space, play and leisure facilities for communities who previously lacked access, as well as facing overcrowding.

Using nature to enhance a city's climate resilience

Traffic congestion and pollution, poor air quality, flood vulnerability, urban heat, low green space per capita, and the effects of urban sprawl are key challenges facing Tirana. An orbital forest surrounding the city has been proposed as a green infrastructure solution.

The forest would wrap around the urban perimeter of the city with a mix of land uses including woodland, shrubland, agricultural land and recreational areas for local residents.

This nature-based solution is intended to support enhancing air quality, reducing the impact of the 'urban heat island' effect, support wider strategic city planning and provide opportunities for local residents to enjoy nature.

Additional benefits from this project include improved flood resilience, increased local economic activity and greater health and wellbeing for both residents and the natural environment.

The project is a follow-on investment from Tirana's Green City Action Plan, developed through the city's participation in the European Bank for Reconstruction and Development (EBRD) Green Cities programme.

Tirana Orbital Forest is an important milestone in the EBRD's mission to support investments in nature-based solutions. The Bank recognises the economic benefits green infrastructure can have in comparison to traditional, 'grey' interventions.

Arup supported the project's development with an interdisciplinary team to understand the wider environmental and economic benefits, using machine-learning tools to establish commercial viability.

Renewing a town centre with green infrastructure

Hastings, a town of around 90,000 people on England's south coast, is seeking to revitalise its town centre, through devising new public realm and connections between the railway station and the seafront.

The district and county councils, supported by UK government funding, commissioned Arup to develop a concept design for the heart of the town with a focus on public realm improvements, active travel and greening initiatives.

Proposals were informed by the vision of Hastings as a future Garden Town, by the concept of 'creative ecology', which brings together horticulture and natural change, and by the ongoing Hastings Greenway project, which is seeking to deliver a network of green corridors across the town for wildlife and people.

We will be undertaking a full co-design process this year now funding has been secured to reimagine a river that used to run through the town centre. Ribbons of fluvial, coastal and meadow planting will trace the path of this river, while creating enhanced habitats for wildlife, and improving climate and flood resilience.

Flexible spaces are designed to accommodate a range of events and activities through the year, to enliven the Town Centre and to enhance the pedestrian experience whilst managing vehicular flows.

The project will be an important first step towards realising the Garden Town vision and will establish principles to inform wider public realm improvements across Hastings.

Using natural systems for resilience

A masterplan proposal for a hilltop site uses topography, planting, landscaping and water management to create a new type of sustainable urban settlement.

Kinyinya Hill, 6.5 km north of central Kigali Rwanda, will be home to a population of 130,000. Arup worked with a team of local and regional architects to create the masterplan proposal.

The plan is based on the foundations of affordability and equity, resource efficiency, climate resilience and cultural sensitivity. The hilltop site is surrounded by wetlands, with water run-off leading to a high risk of flooding and significant soil degradation. Rainfall is anticipated to increase in coming years, making these challenges more urgent.

The plan proposes a green ribbon 'helical park' wrapping round the hill, forming a social and economic connector between habitats, and between new neighbourhoods and the informal settlements that have grown up over the years. Valley parks would follow existing water courses down the hillside, with new habitat creation as well as softened river banks and natural dams to allow water to gradually soak into the ground.

Productive landscapes would also be included as a testbed for emerging agricultural technologies, including through pulling existing agriculture out of the wetlands and up the slopes onto new agricultural terraces, allowing portions of the wetland to be returned to a more natural state.

The new housing would be mixed density, and would maximise the use of shade from tree-planting and buildings themselves to manage temperature rise.

Restoring nature in the urban fringe

The Colne Valley is a special place – a surprising survival of a rich and varied lowland wetland landscape so close to the western fringe of London. The rivers act as unifying green threads linking a remarkably varied network of country parks, protected habitats and open spaces alongside a complex network of urban areas, motorways, rail corridors and London Heathrow Airport.

The valleys now sit sandwiched between two of the biggest engineering projects in Europe – the HS2 railway and planned expansion of Heathrow Airport. Arup was commissioned as part of a call to arms to conserve and protect these outstanding landscapes for future generations to enjoy and to ensure resilience in a time of unprecedented change. The resultant green infrastructure strategy defines a vision for the Colne and Crane valleys to become a valued, connected network of open spaces for nature, recreation and wellbeing by 2050.

The strategy, covering an area of more than 300 sq km (1/6th the size of London) defines a roadmap for delivery of green and blue infrastructure projects behind which partners, organisations and stakeholders can unite. The projects are all driven by a deep understanding of the changing landscape character of the valleys to ensure future change is positive for the value of the landscape, the diversity of flora and fauna present, and the communities living, working and enjoying the valleys. The strategy works at all scales, supporting delivery of short-term projects along with a long-term transformative vision. It addresses the challenges of major infrastructure schemes and the impact of climate change more generally.

For the first time, the strategy provides a platform and programme for coordinated green infrastructure project delivery across the Colne and Crane catchments, influencing the lives of over 1.5 million people who live within walking distance. The actions, some already being delivered, include protection of existing habitats, promoting management techniques which allow natural flood management, supporting food growing and alternative forms of agriculture, providing opportunities for carbon capture, creating space for walking, cycling and recreation and improving the environment including air and water quality.

A low carbon city masterplan

Oman's challenges include economic diversification, public transport, resource consumption and long term environmental management. The Irfan masterplan is a catalytic change and a model to create long-term resilience for communities.

The masterplan covers 624 hectares and acts as a new sustainable development model for urban development within the region. The masterplan is consistent with the UN's Sustainable Development Goals, the Paris climate agreement and the PAS2080 low carbon infrastructure standard.

Development is structured around the area's dramatic undulating topography defined by a network of dry river channels or wadis which run the length of the site. Arup's landscape-led approach benefitted Irfan by introducing opportunities for urban food production and palm plantations, restoring historic water flows and ecology, and integrating views and landscape amenities throughout the new district.

Microclimate design input has shaped and informed the public realm, streetscape, urban massing, and building design of the masterplan which aims to enhance walkability and building energy performance over current regional practice. Design concepts were supported by advanced analysis techniques including wind simulations, solar studies, and thermal comfort network analysis.

Local people have been involved in creating robust design codes so that all future parts of the city are designed sensitively and in accordance with local culture and tradition.

The masterplan promotes social sustainability, economic diversity and community building through its emphasis on walkability, dense mixed-use neighbourhoods, and the incorporation of heritage and culture in land use, open spaces and built form.

Nature-based solutions

Arup people: **Iona Clive** / **Dima Zogheib** / **Simon Green**

Iona Clive (Regenerative Landscape Designer), Dima Zogheib (Landscape Architect and Associate Director) and Simon Green (Landscape Architect and Associate Director), discuss landscape and ecology, their own careers, the challenges facing nature-based solutions, and the projects that have inspired them.



Iona Clive



Dima Zogheib



Simon Green

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Q. How has your career journey led to a focus on nature-based solutions?

Iona

My interest in sustainability goes a long way back. From a young age I was making websites about saving tigers and other conservation projects. Inspired by my father's work in solar tech, I was interested in innovation, and wanted to learn more about how our minds work, and how we can create interesting and immersive spaces, which led me to study interactive design. But then my sustainability thinking became more of a dominant focus, and I wanted to think about how we could create more sustainable communities, living in tune with nature, and then my passion grew towards restoration. So I went back to university, and joined Arup after completing an MSc in land and ecological restoration in summer 2022.

Simon

As a child in the 1970s, I grew up outside – in gardens and parklands, and woodlands – and as I got older I travelled more, living in Germany and the USA, seeing and experiencing different landscapes and discovering different cultures.

Landscape architecture is fundamentally about people and natural systems and their interaction. I studied at Edinburgh College of Art and Louisiana State University. Ian McHarg's book, *Design with Nature*, which brought together natural systems and urban planning, was an important influence for me, and both courses had a strong emphasis on the design process but also on the systems of soils, climate, water and plants – for both urban and rural projects.

Initially, most of my work was urban, delivering projects like parks and streets for Gillespies, then I moved to Llewellyn Davies, where I started working on larger scale masterplans and planning frameworks. When I joined Arup, there was starting to be more thinking about green infrastructure and systems thinking, as reflected in our [Cities Alive: Rethinking green infrastructure report](#). Working at Arup also gave me the chance to work at different scales – taking in rural, peri-urban and urban projects, and also projects based around large-scale infrastructure. Having moved from the city to a rural community, this has developed my interest in rural landscapes and regenerative landscape design at scale.

Dima

I was born and grew up in Beirut, and studied landscape architecture there. The course was actually called 'Landscape design and ecological management', and it was in the Faculty of Agriculture and natural sciences, rather than architecture, which was a deliberate choice – we studied soil science, pests and water management alongside design skills.

But my interest was always in cities and how we can make them more liveable, rather than in agriculture. I grew up in a city that lacked green spaces: the most important public space in Beirut was the seafront Corniche, not a green park. And living in Lebanon, I was also very interested in informal settlements, and the role of green infrastructure and landscape in improving the quality of life for people living in them. That ultimately led me to doing a degree in cities – city design and social science – at the London School of Economics, studying cities in more depth, understanding what shapes them and the problems they face.

When I graduated in 2007, I joined Arup as a landscape designer. But then I had the opportunity to develop resilience strategies for 25 cities globally, examining how cities can survive and thrive in the wake of shocks and stresses. Green infrastructure was a really important part of that, so this gave me an opportunity to work on the links between green infrastructure and nature and urban resilience – which is at the heart of my interests.

Q. How has thinking on nature-based solutions and landscape architecture changed in recent years?

Dima

The term is new but its roots in ecological thinking stretch back a long way, particularly to the rise of the environment movement in the 1960s, when ecological thinking and systems thinking began to influence architecture, landscape architecture and urban design.

Simon

I think within Arup, we landscape architects have the benefit of seeing things at a bigger scale, and of working with other disciplines on a day-to-day basis. The profession outside is maybe evolving slower, and in some ways still focused on landscape architecture and public realm design but it is evolving rapidly.

We are also moving from just considering beauty and aesthetics, which are of course important, to a more fundamental engagement. There's loads of work to do, but now we are more often brought in at an early stage and given the opportunity to drive and lead design concepts from the outset – we are natural systems thinkers, so we can help think outside the red line of projects.

Dima

I think Simon's right, our discipline has moved from beautification to thinking about how landscape and nature can help us respond to urban challenges. We are also recognising that as humans we have always sought to control nature in many ways – we farmed it, or tamed it in our gardens, because something wild and unmanicured was not seen as beautiful. So what is happening today is a total shift, where nature can take its course more, but can also help to protect us and connect us to each other. We talk about three roles for nature: providing, protecting, connecting.

Simon

I think landscape architecture is also drawing more on the knowledge of indigenous cultures and how they work with land and nature. We know we can't come in with all the answers, so we collaborate with local partners, as we did on our masterplan for a new neighbourhood in Kigali. There's a western view about landscape which is all about control and order, but there are other approaches. For a project in Tunisia we were working with a community with a 3,000-year history, who had a deep tradition of working closely with nature in farming and in medicine. Our initial design approach was very western, but when we learnt more and partnered with local experts, we changed our site concept and strategies to make them deliberately 'light touch' - more about what we take out rather than put in, in recognition of the complex, layered history of the site.

Q. How far can nature-based solutions deliver social inclusion, as well as environmental benefits?

Iona

A lot of my experience before Arup was in movements that tended to think of themselves as outside modern society. And though there was a level at which that really resonated with me, I became more interested in understanding different perspectives to see how we can bring people together to create the places and the conditions where they can thrive. Part of that is about realising we are part of nature, not something outside of it, but also reliant on it.

We do still need to do more in relation to designing for different ethnicities and disabilities. It's sometimes difficult to create environments that work for a population that is as diverse as ours, but I do think that more natural, less manicured spaces will appeal to more people.

Simon

I think we need to resist stratifying landscapes too much for different users. Having worked on projects across the world, I've seen that, of course, there are nuances of different cultures, but there are fundamentals about how people use landscapes – urban and rural – in terms of production, for movement, for trading, for social interaction. We should be striving for a good common base condition that's usable by all.

I think nature-based solutions projects offer real opportunities in terms of social inclusion and stewardship. In Hastings, alongside our Green Connections scheme, they have established a Garden Towns team, to help broaden the scope and reach of our project, which is just one part of the jigsaw. That's exploring

opportunities for local employment and local supplies, to maximise the impact, but it will also help with stewardship: in the past I've seen public realm delivered, then run out of steam and disintegrate – the Hastings approach should ensure long-term economic and social and environmental sustainability.

Dima

In many cities, like London, the minute you come into poorer, more vulnerable, more diverse areas, they have less green space. Green space helps bring people together, as I have seen living in a war-torn city. Access should be equitable, part of people's right to the city. Equity becomes even more important when we look at climate change adaptation: climate risks disproportionately affect the most vulnerable and poorest in cities, so the provision of nature-based solutions to cool spaces, to mitigate flood risk, to help sequester carbon, can be targeted to help those people most at risk.

A better urban environment also helps people across generations. We know that air pollution is a big problem; it causes deaths for children, and hastens ill-health in an ageing population. Nature-based solutions can be a critical part of improving air quality.

Simon

This is connected to what nature-based solutions can do about health and productivity. In the UK, for example, the two massive issues for economic resilience are about productivity and health. Apparently we lose 131 million work days every year owing to ill health, and incorporating nature into urban planning can make a huge difference. Nature can foster a more productive,

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creative, happier, healthier population, which is intrinsic to a country's ability to perform economically, and I think we're missing a trick in the UK on that. There are good examples internationally: the Nordic countries, but also examples from the Global South, in places like Medellin in Colombia or Curitiba in Brazil. Our circumstances are very different but there are lessons to be learnt.

Q. What's holding back the potential of nature-based solutions?

Dima

Financing can be a challenge, but really it's a governance challenge – of how to smartly package projects together so they can be financed, and how to create delivery and stewardship mechanisms that can link different departments – like the Friends of the High Line in New York.

The bigger challenge is the behavioural change that people living in cities need to take on, if we're going to work with nature. For example, the Earthshot Prize was just awarded for a replacement for plastic generated from seaweed, which is great, but seaweed is also overconsumed at the moment, so reducing use of plastics altogether would be a better option. If we don't change behaviour, we won't be able to change the planet.

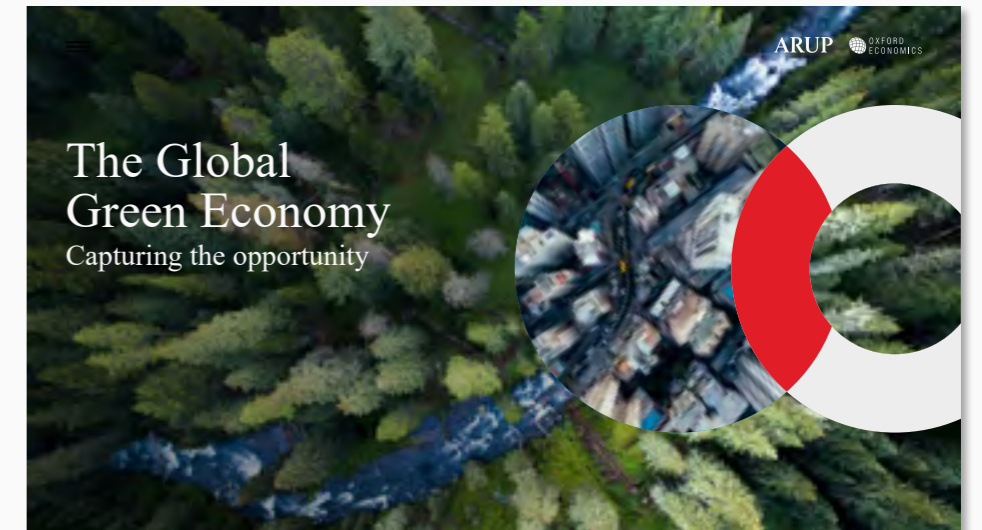
Simon

I agree with Dima's points but would add there's a capacity deficit in some institutions. Organisations like Public Practice are doing great work to bring new skills in, but local authorities have really been hollowed out in the UK. There are supply chain challenges too: you can make grand statements about planting a million trees, but where are they going to come from and who's going to look after them?

And I think the final question is, what does good look like? We've got a consensus about the value of nature-based solutions and green infrastructure, but there's a lot of space for interpretation. Some developers get it and understand it, but others just tick the box, so I think we need more clarity on what good looks like and what positive outcomes have come from Nbs and green infrastructure.

Dima

I think the only thing I would add is that Nbs are not always the right solutions. If we claim they are then we risk just greenwashing the problem. So, sometimes we need a more traditional grey solution, sometimes we need a hybrid solution, and I think we should say that explicitly.



Q. What are the favourite projects you have worked on or have inspired you?

Simon

When I started work at Arup, I was told I was going to work on a sewer system, and I was a bit like, ‘Really?’. The project was Thames Tideway, and while it was quite controversial as a big, hard engineering solution, it’s going to provide numerous public spaces along the river, and will fundamentally transform water quality in central London, which will bring back fish stocks, make the river safer for bathing, etc – creating environmental and social benefits.

The Olympic Park was also a hugely ambitious landscape-led project, with lots of inspiring multi-agency working – everyone in our industry claims involvement, but perhaps that is key to its success! It’s great to see the Park maturing when you walk round, the pride people take in it, and the genuine transformation in people’s lives – I was there recently and saw huge numbers of schoolchildren there enjoying it recreationally and educationally, and I think that will have a huge impact on them in years to come.

We are also moving at scale and pace, to transform much wider areas of land off the back of big infrastructure projects, in the UK and beyond – working with water companies on everything from sustainable urban drainage at a street level, to much bigger catchment-based interventions. We’ve also been looking at the edge of cities in the Middle East, helping them plan for what you might call an ‘arid belt’, which can supply food and energy, can constrain urban growth and can provide a mitigative zone between urban and desert landscapes.

Dima

One recent project that I have enjoyed is the Tirana Orbital Forest. It was exciting to work with a new client – a development bank interested in financing a nature-based solution and replicability of this. If we do this right and can demonstrate return on investment, more investment and other banks will follow. It also brought together multiple disciplines that do not usually collaborate – climate specialists, ecologists, economists, landscape designers, water specialists, forestry experts – which led to great learning opportunities for all of us. Finally, we developed new methodologies, including digital tools and machine learning, to undertake cost-benefit analysis at scale.

Iona

Before I joined Arup, I worked on a large landscape restoration project in Morocco. The land was heavily farmed, almost desert, and the idea was to restore the land, bring its waterways back and re-establish the culture that had been lost, to help farmers to farm more sustainably. So it started with land but also was about creating more regenerative communities to thrive there. And it inspired me because it was just very inclusive, looking at problems and solutions holistically, so that people and nature could thrive together.

That’s why I’m at Arup; it’s interesting to think about things more holistically, though I do think that we have a long way to go. We need to go deeper in considering our policies and priorities for our landscape.

Beyond funding: how to grow the biodiversity capability the world needs.

Luke Thompson, an Associate in Arup's City Economics team, reflects on what will be needed to make a reality of COP15's plans for nature recovery.



The 15th Biodiversity Conference of the Parties to the Convention on Biological Diversity (COP15) was held in December 2022 bringing together governments from around the world to negotiate an agreement to halt and reverse nature loss. Funding and finance were, as anticipated, central to the debate, but I want to explore the other developmental dynamics that need to be addressed before the funding turns into benefits to nature and the environment.

Funding commitments

First the positives. Among the various targets agreed at COP15, a key commitment (Target 19) was to substantially increase the level of finance from public and private sources to implement national biodiversity strategies and action plans, mobilising USD \$200 billion per year by 2030 with regulation, incentivisation and investment:

- Increasing biodiversity related international financial resources from developed countries to developing countries to at least USD \$20 billion per year by 2025, and to at least USD \$30 billion per year by 2030
- Significantly increasing domestic resource mobilisation, facilitated by the preparation and implementation of national biodiversity finance plans
- Using private finance, promoting blended finance, implementing strategies for raising new and additional resources, and encouraging the private sector to invest in biodiversity, through impact funds and other instruments
- Stimulating innovative schemes such as payment for ecosystem

services, green bonds, biodiversity offsets and credits, benefit-sharing mechanisms, with environmental and social safeguards.

These measures provide a platform to enhance our natural environment and reduce biodiversity loss, but this will take continued collaborative working between governments, communities, investors, and non-governmental organisations. Most countries do not yet have a plan for biodiversity or a systemic register of their nature assets with which to target interventions, attract lending, or engage investor networks. Governments should create systemic biodiversity investment plans that are embedded in national and sectoral plans, to help build a better-quality pipeline of business cases for biodiversity projects. The task is formidable, but there are three key areas for action that could help achieve Target 19 and deliver biodiversity investment at all scales.

Demonstrate the benefits of biodiversity investments

Economic systems are fully dependent on biodiversity – from air and water to food and raw materials. However, the economic benefits provided by well-designed biodiversity investments are often undervalued, or not valued at all in market prices. As a result, there are often insufficient economic and financial incentives for investors. For example, green infrastructure solutions such as mangrove swamp, wetlands, and seagrass restoration can capture and store carbon, protect assets from coastal flooding, enhance land values, and provide a source of fisheries employment. They can be built in combination with other forms of infrastructure such as living seawalls,

and provide just as much flood resilience as conventional grey infrastructure, as well as a range of additional benefits.

Delivering these types of hybrid grey-green projects, as part of a portfolio of biodiversity investments in a city prone to coastal and inland flooding, could provide even more benefit and diversify investment risk. Yet improper accounting of the economic benefits that accrue from these projects, and the lack of ability to capture windfall benefits such as private land value uplift, undermine the case for choosing green over grey. To overcome this, governments need to better monetise the value created beyond carbon reductions: for example, additional local income, higher land values, and asset protection values. To unlock the investment and finance needed to meet Target 19, governments have roles to play in reducing private sector free-riding, for example, through more extensive use of taxes to disincentivise biodiversity-depleting activities in the first place, developing better systems of valuations to allow investors to better capture financial benefits from projects, including ‘beneficiary pays’ approaches.

Improve governance to unlock more concessional finance

The investment needed to halt and reverse biodiversity loss is most acute in emerging and developing economies. Excluding China, these account for around 90% of the investment opportunity from 2020–2030. East Asia, Latin America and Africa have the most critical sites for sustainable land use and nature preservation. Yet few countries in these regions have the fiscal capacity to fund all the necessary investments. High debt-to-GDP levels and lack of

access to international capital markets makes it harder for them to raise debt at affordable levels. The use of low interest (concessional finance) from multilateral development banks is essential and indeed called for in Target 19.

So how do countries unlock these funds? Making the case for concessional finance requires countries to put forward investment propositions that deliver predictable benefits and meet strict performance expectations. However, unlike more mainstream types of infrastructure historically financed by multilateral development banks, such as road and rail projects, the inherent complexities of nature mean economic and financial returns of biodiversity investment are subject to large uncertainties, their benefits derived over long time horizons. This requires stakeholders to be coordinated in their delivery and maintenance. There is a clear capability and capacity issue to overcome.

Governments without prior experience in biodiversity scheme development will need assistance in identifying viable projects, engaging multilateral partners early on in project definition, and putting the right leadership structures in place. Some projects, such as floodplain restoration schemes in combination with natural habitat expansion, could potentially span several administrative departments and external stakeholders. Again, coordination is key to developing solutions that meet investors’ needs for predictable benefits and clear performance metrics. Putting these fundamental elements in place is critical for bringing concessional finance to projects and action plans.

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Increase funding for biodiversity, and source private investment

The creation of a market for voluntary biodiversity credits offers huge potential to scale finance for biodiversity. The market here would be different to that for carbon offsets; credits would be purchased by companies seeking nature positive investments, rather than an offset for damage. There are some emerging schemes such as the Bosque de Niebla – El Globo Habitat Bank in Colombia, which has issued Voluntary Biodiversity Credits, each corresponding to 10 m² of forest in the Bosque de Niebla preserved and/or restored for 30 years.

Meanwhile a working group of global financial institutions, convened by the Wallacea Trust, is developing a voluntary biodiversity credit methodology to be applicable in all ecoregions of the world. Credits would be issued by an internationally recognised body, sold to investors linked to an uplift or an avoided loss of biodiversity within a project application site. The credit would be a legal document, describing where the environmental action has taken place, who has developed it, according to what methodologies, and that it has been verifiably certified according to an agreed system. Demand could come from companies with commitments on social responsibility, or obligations for nature-related disclosures under the emerging Taskforce on Nature-related Financial Disclosures (TNFD) Framework, which will strongly encourage companies to assess, manage and report their dependencies and impacts on nature through their supply chains. Governments could sell credits to the market to fund major biodiversity programmes, creating revenue streams

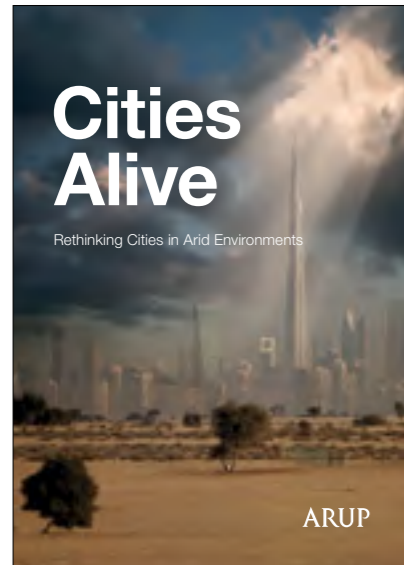
to fund projects that would otherwise not have been possible.

For voluntary biodiversity credits to work, they will need to deliver high integrity outcomes. Through setting minimum prices and strengthening land tenure rights, governments could help develop the market. While this model is promising, more robust data on ecological units and managed registers of biodiversity are needed for it to scale up to achieve its potential.

Beyond funding

The current focus on nature is overdue, but as the above examples have shown, the dynamics of converting funding sources into nature positive actions at scale are complex and challenging. We need a shift in appetite for investment tolerance, better accounting of benefits, and new governance structures suitable for biodiversity assets. The challenge will require intensified collaboration between governments, businesses and non-governmental organisations if we are to succeed in halting and reversing nature loss.

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Cities Alive: Rethinking cities in arid environments

A strategic rethink of how we plan and design cities in arid regions.

At the heart of the report sit three key recommendations to shape the next century of city building in arid regions.

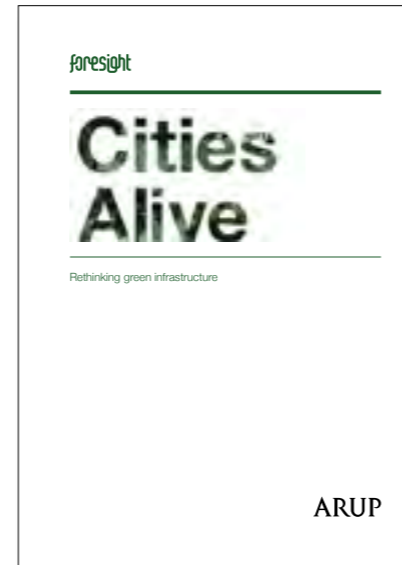
The report proposes 36 actions that local governments, planners, architects and investors can consider to support the development of more inclusive, resilient and competitive cities.



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Cities Alive: Green Building Envelope

The comprehensive research considers whether green building envelopes can have a special role to play in improving our cities for their inhabitants. Experts from eight Arup skills networks across the globe cross-examine this question with a view to shape better cities.



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Cities Alive: Rethinking green infrastructure

This report looks at how we can build nature into our urban systems at all scales through high quality landscape design, via new development or retrofitting through a green infrastructure design approach.

It is a collaborative initiative by our Landscape Architecture practice and Arup's Foresight team. The initiative is supported by the UK Landscape Institute and the Royal Botanic Gardens, Kew, who have been reviewers and contributors.



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Green and Thriving Neighbourhoods

This guidebook from Arup and C40 Cities provides cities, as well as national governments, private sector developers, residents and communities, with the framework and approaches to develop ambitious net zero and people-centred neighbourhoods that showcase today the future we want to see.

Nature-based solutions
Further reading

Social value is the enduring and systemic change created within communities.

It leads to improved quality of life for individuals, and a more inclusive, equitable and just society.

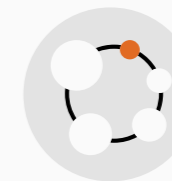
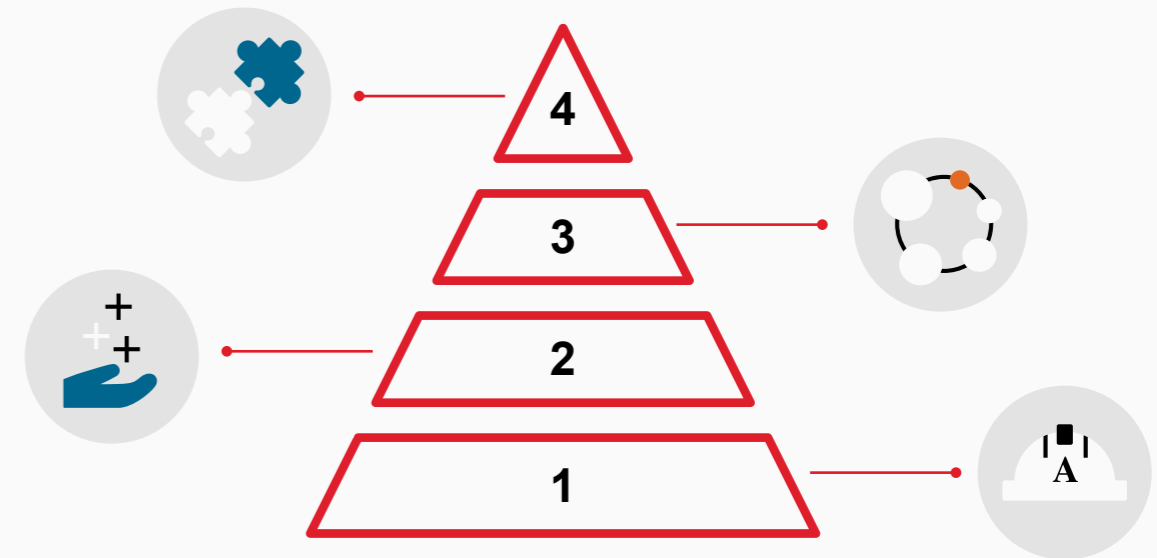
Social value can be seen as sitting at the intersection of debates on the **nature of social goods** and the **good society**, and growing interest in **responsible business practices**.

It is closely linked with terms such as **social justice** and **social equity**, and considers impacts across **generations**, **communities**, socio-economic groups and **geographies**, linked to the UN's sustainable development goals (SDGs).

Social value should be embedded throughout projects, and should be seen as going above and beyond basic regulatory compliance.

Social value

Overview: Layers of value



1

Social licence to operate

The project needs to meet basic criteria and regulatory requirements related to social outcomes and wellbeing, such as health and safety, fair work, and mitigating construction impacts.

2

Inherent social value

This is the value created for UK society by delivery of the project scope. This value is typically measured by social cost benefits analysis in the economic case of a business case.

3

Embedded social value

Embedded social value is created by taking additional steps to design and deliver the project in a way that maximises social value creation. It can also include value created by the client and project delivery organisations taking additional steps to improve how they operate.

4

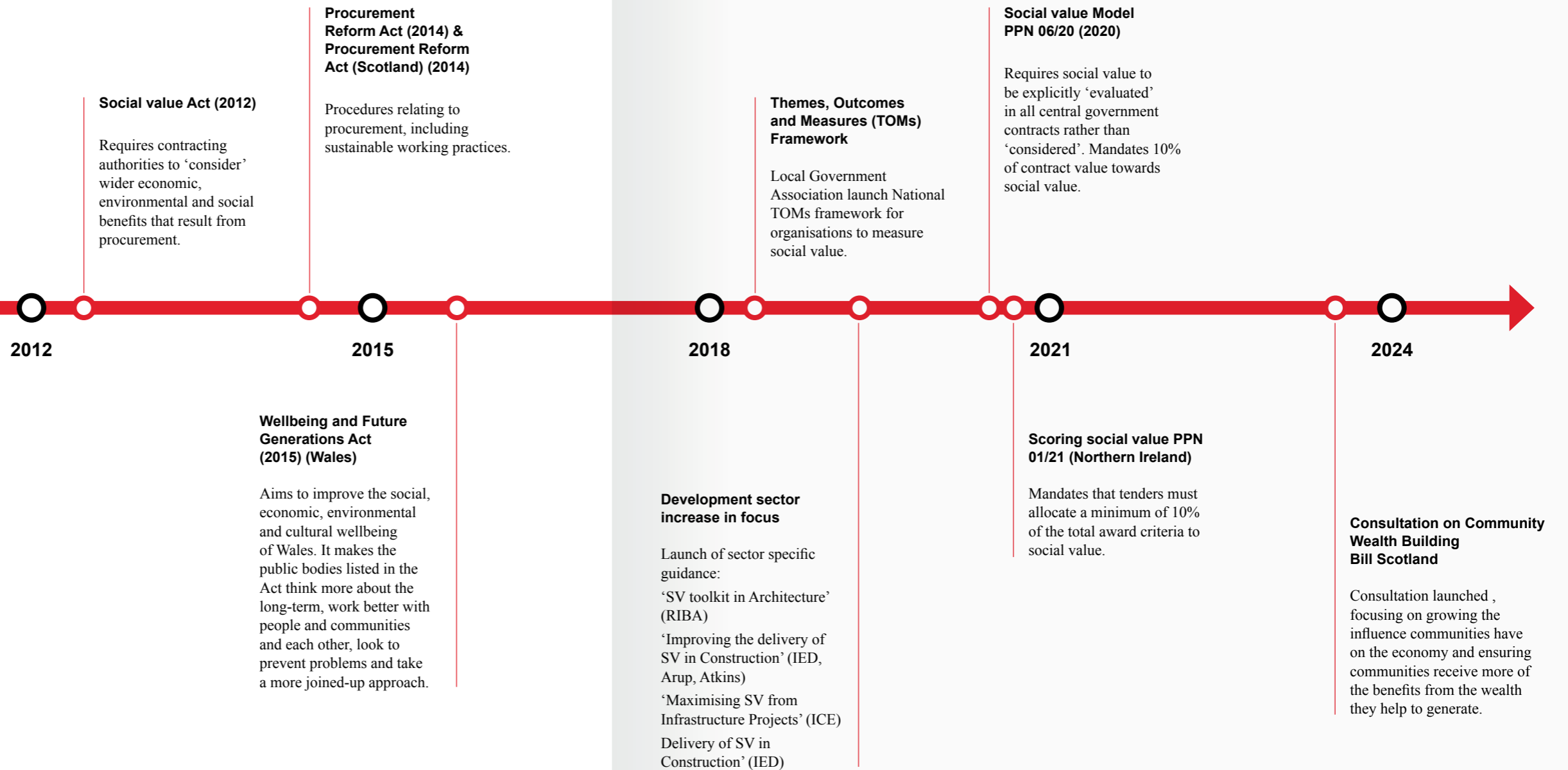
Additional social value

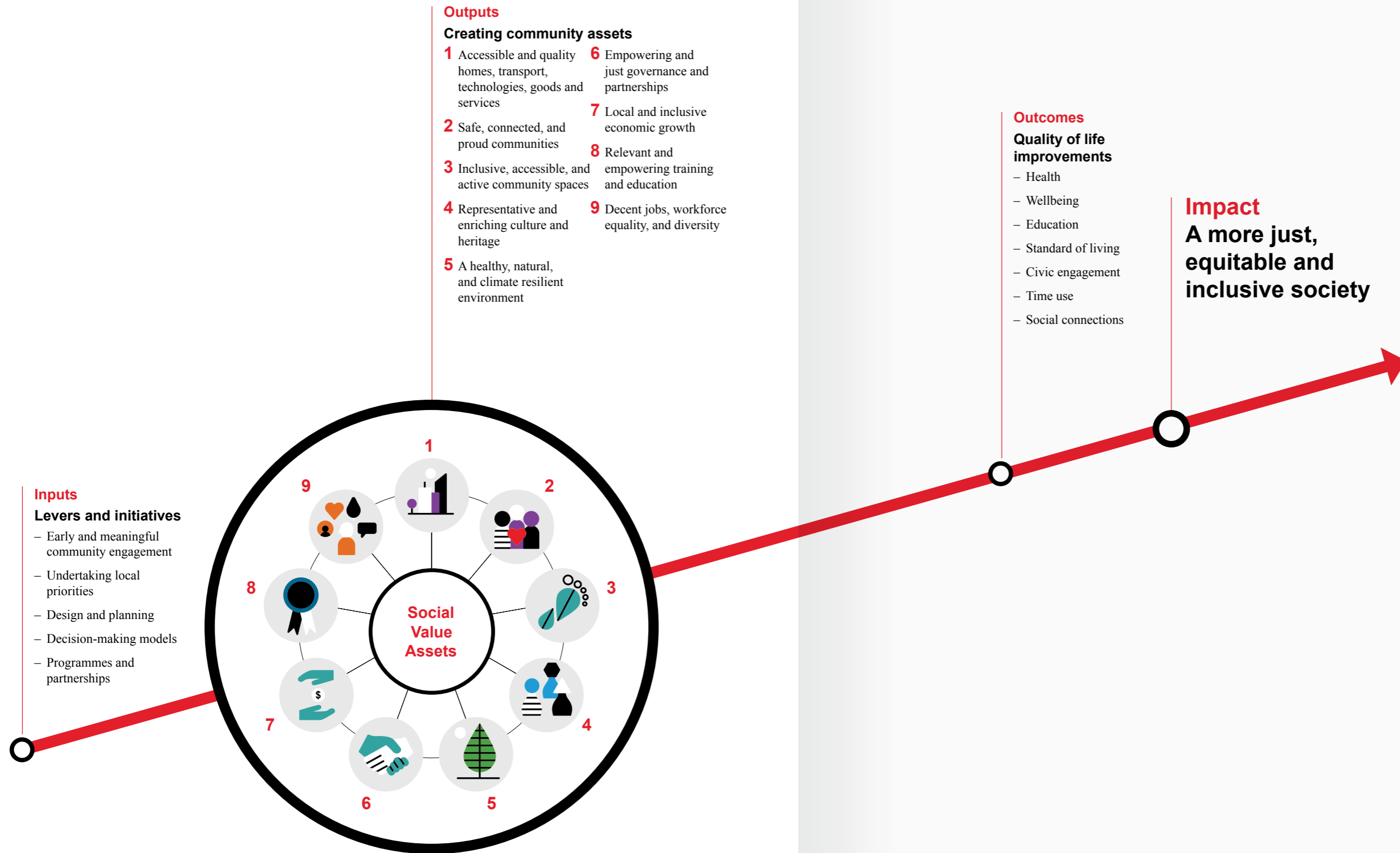
This is social value created by the project client, delivery partners and supply chain which is unrelated to the project scope, but addresses community needs.

Social value

Overview: UK policy development

Social value in the UK is driven in part by legislation, but also by the growing understanding of its long-term value to both stakeholders and communities.





Social value

Overview: Inputs, outputs, outcomes and impact

Social value

Overview: Project cycle

1 Strategic brief

- Social value needs analysis, baseline study, vision and strategy
- Work with stakeholders to identify priority areas for delivery
- Translate the vision into objectives and outcomes that place social value at the heart of the project

2 Options selection & investment case

- Embed social value into the business case
- Challenge assumptions, undertake impact assessments, and evaluate options against the project’s social value vision, objectives and outcomes

3 Procurement of design & delivery teams

- Include social value requirements in procurement processes with appropriate weighting, clear objectives but also opportunities for innovation
- Monitor and manage social value commitments
- Work with design and delivery teams to develop project plans for social value capturing opportunities and developing metrics in partnership with stakeholders

4 Design development

- Incorporate social value outcomes into design briefs
- Maximise social value through participatory engagement and co-design
- Assess projects using performance frameworks such as BREEAM and LEED

5 Planning approvals

- Social impact statement in planning application, section 106 and other agreements
- Long-term community participation

6 Construction

- Ensure social value specified and evaluated in procurement
- Monitor and manage social value commitments by supply chain
- Work with contractors and suppliers to generate local benefits, includes jobs and training
- Help local organisations access supply opportunities

7 Operation

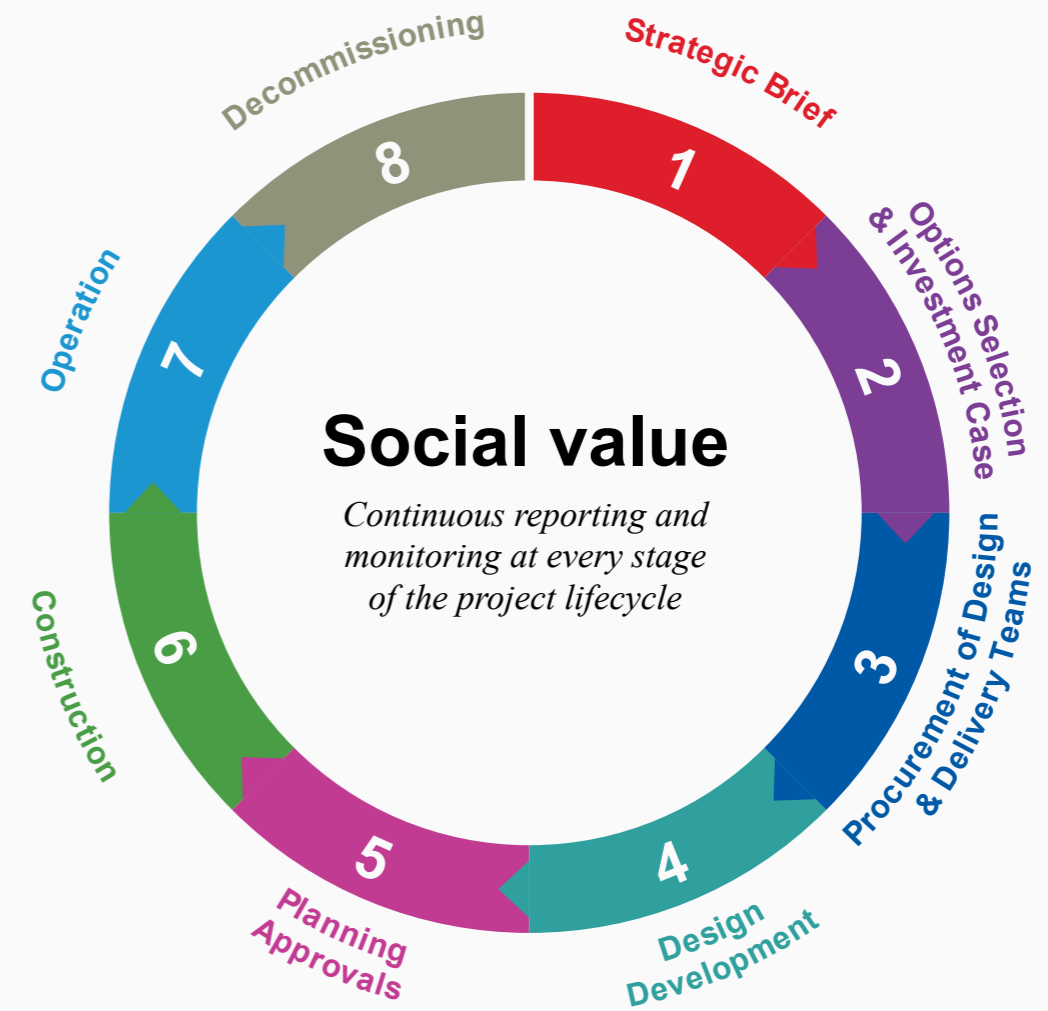
- Deliver employment and supply chain opportunities
- Explore community ownership and governance
- Ensure access for local groups and schools

8 Decommissioning

- Legacy uses of site/asset, including potential for community ownership

Outcomes based approach throughout the project lifecycle

Source: Institute for Civil Engineers
Maximising social value from infrastructure projects



A strategic approach to realising community benefits from assets

Building on preliminary work on recreation, Arup developed an ‘Urban Partnership Strategy’ providing a framework for Yorkshire Water to maximise the social and environmental value of its urban assets.

Our team conducted preliminary research to alternative land uses and organisations running initiatives to address social challenges in urban areas.

We brought together a group of Yorkshire Water managers already engaged in community-led social and environmental projects, previously working in isolation. They saw the advantages of knowledge sharing and opportunities that would be delivered by working collaboratively.

Together we set out the project’s aims and objectives as well as highlighting the Yorkshire and Humber region’s urban drivers for change – issues of health and wellbeing, diversity and inclusion, urban densification, ageing populations and a shortage of access to urban green space.

The framework that we delivered allows managers to select the right site, the right partners and the right interventions to achieve meaningful and impactful outcomes. It provides a pathway towards taking an informed partnership approach to managing its urban land assets, delivering services with real benefits for the region’s local communities and natural environment.

This project was highly commended for its innovative approach at the Management Consultancy Association’s 2019 awards in the ‘Environmental and social value’ category.

Working with residents to shape an estate redevelopment scheme

Arup provided multi-disciplinary services for this regeneration project at the Ebury Bridge Estate in Pimlico. The basis of the project was to ensure extensive engagement with residents about the details of the emerging scenarios for change.

Arup's engagement methods included focus groups, drop-in sessions, exhibitions, newsletters and providing information online. Through talking to residents, we identified priorities that could influence the final design of the project, as well as defining additional services that local people wanted to see delivered. Priorities which emerged included: high quality and well-designed housing, the importance of communal gardens, projects to support community cohesion and integration, and ensuring better access to goods, services and community spaces.

A number of initiatives were used to put the priority elements into practice. These included: the construction of meanwhile use buildings for affordable workspace and community use, community-led governance, working towards BREEAM Communities Outstanding certification.

Developing a long-term Compact for delivering social value

A multidisciplinary team, including engineers, sustainability consultants, transport planners and economists have been working with Stanhope Mitsui British Library (SMBL) Developments, the joint venture working on an extension of the British Library, in London's Kings Cross.

The scheme includes more space for the Library, a headquarters for the Alan Turing Institute, the UK national centre for data science and artificial intelligence, as well as enhancements to local public spaces.

To articulate the overall social impact that the extension would have on the people living in the local area, Arup developed a social value framework to capture the various education, training, outreach, and human-centred design considerations that were being brought forward as part of the plan, and to quantify and monetise these.

We worked with SMBL to identify where the extension could do more to support the needs of people in the local area, worked with multiple stakeholders to deliver a coherent set of social value activities that met the community's needs and could be delivered across the design, construction and occupation of the new space.

Together with SMBL, we developed a new and innovative mechanism known as a Compact; a way through which future occupiers of the commercial space would be encouraged to actively deliver and support activities in the local area, aligned to the social value framework.

A five-year evaluation programme, working with local communities

Together with partners at the London Borough of Bexley, Royal Borough of Greenwich, Greater London Authority and Transport for London, Peabody Housing Association are driving forward the regeneration of Thamesmead, a large housing development in South East London.

Peabody's plan aims to improve the lived experience, create growth and regeneration, improve the quality and use of the landscape, make great culture part of everyday life, and support people to be happier, healthier, and wealthier.

Working with The Social Innovation Partnership, Arup began a five-year evaluation programme in 2019, to measure the impact the project has on local life, including residents' experience of living in the area, Thamesmead's landscape, its culture and arts offering, community involvement and cohesion, and regeneration activities more broadly.

As well as focus groups, and interviews with individuals and community organisations, we have worked with Thamesmead-based community researchers, who have been trained in evaluation and primary research, and have undertaken econometric evaluation, to understand what the project has delivered above and beyond what would have happened with no interventions.

Our findings feed into a set of annual recommendations to directly change the way in which Peabody deliver programmes and services in Thamesmead, as well as potentially influencing other projects.

Using a major redevelopment to promote inclusive growth and better health

Leeds Teaching Hospitals NHS Trust's 'Hospitals of the Future' project is a development of two new hospitals within a single new building on the site of Leeds General Infirmary, providing specialist adult care alongside a specialist children's hospital and centralised maternity facilities.

Working collaboratively with the Trust, Arup's social value team developed, organised, and delivered a social value plan to support the project. The plan includes school engagement, work experience and fundraising for the Leeds Hospital Charity. The Arup team engaged with the client and delivery partners to identify local community partners who would maximise the impact of the plan, particularly for school engagement.

These initiatives are targeted at areas surrounding the new hospitals' development-, as well as some of the city's most deprived neighbourhoods, so that the new development supports better health and wellbeing for the wider community, as well as directly for patients. An example of this was the Leeds Hospital Challenge, developed and led by Arup. In this half-day event, delivered by Arup, the hospitals and local social enterprise IVE, 18 young female students from one of the most deprived neighbourhoods in the city learnt about the 'Hospitals of the Future' project and careers in STEM. The Hospital Challenge received positive feedback from students and IVE, and Arup will host it annually as part of its contract.



Terri Wills is Arup's Global and UKIMEA Social Value Service Leader.

She talks about how her interest in social value has developed in a career spanning broadcasting and green buildings, about global differences in approach, and about going beyond legal requirements.

Q. What was the career journey that led you to social value?

I've always been really interested in how to effect positive change. I studied political theory at university, and that initially led me to focus on communications, working at the BBC to understand how factual programming can make a difference, which gave me the opportunity to work with the teams behind David Attenborough's climate and nature programming. Then I decided I wanted to be more involved in actually making change happen, so I started working in climate change, with the Clinton Foundation and C40 Cities, and then as chief executive of the World Green Building Council.

Social impact was something we always wrestled with in the climate world. I think maybe we sometimes took it for granted that social benefits would result from climate action, and used that as part of the case for action. But as the debate moved on, it became clearer that some climate action could have negative social impacts, and that needed addressing. So I became increasingly interested in this intersection between climate action, social value and social impact, and how we could bring them closer together.

That led me to have conversations with people at Arup, which resulted in my doing some work on social value, to explore how Arup could deepen our understanding, and raise both our ambition and our clients'. I prepared that as a freelancer, then Arup invited me to set up a new team, at the nexus of climate, social and economic opportunities and challenges.

Social value
Arup people: **Terri Wills**

Initially I was focusing on urban strategy for climate action, where the task is no longer to persuade people of the need for action, but to help cities move from targets to implementation – while integrating with their social and economic strategies too, and feeding through into individual policies and projects. But I have recently taken on a new role, as Global and UKIMEA social value Service Leader. Arup has been doing incredible work on social impact for decades, without necessarily using the term ‘social value’ or ‘social equity’; my role is to bring that together as a service, creating something that is more ambitious and cohesive, and shows the power of what Arup can achieve in making a difference to people’s quality of life through our client projects.

Q. What are the challenges in working globally on social value? Are there regional differences?

There are real differences between regions. A lot of the principles are the same – our focus on quality of life, community, consultation, co-design and co-creation. Those are principles that resonate globally. But we have different histories and contexts.

In the UK, for example, we have the social value Act, which is really positive, but has led to box-ticking in some quarters. In Canada, Australia and New Zealand, there’s a really strong focus on first nations and aboriginal peoples, recognising past errors and historic responsibilities. Indeed, there are first nations issues across the Americas, though in the USA, there’s more of a focus on race justice issues, and the discussion is about social equity rather than social value – though they tend

to be measured in similar ways. East Asia is different again: we are working quite a lot on Environmental, Social and Governance (ESG) projects, but there are different political and cultural contexts in different countries.

So there is a lot of commonality in how we are working with communities, and this gives us the opportunity to think how we promote social value across Arup. We have ambitious climate commitments, for example, on whole-life carbon assessment for built environment projects – what should the equivalent be for social value? We already do tremendous work through our Community Engagement programme, and have a strong Equality, Diversity and Inclusion policy – but what more can and should we be doing?


Q. What lies behind the growing focus on social value, in the UK and abroad?

In the UK, the new legislation has upped the game. In addition, local authorities and cities have a lot of power in negotiations over allowing planning permission for new developments. They are articulating and communicating the needs of communities, and working with developers to make sure these are reflected in plans and in delivery. And that’s driving change across the sector. But we are also seeing that the private sector wants to do more – and are seeking more and more ambitious ways of achieving social value on projects, as well as at a corporate level.


Globally, I think there’s a growing awareness about how the most vulnerable will be impacted not just by climate change but by climate transition too. People with resources can move

Introduction Opportunity Pillars **Approaches** Pathway Scaling up References

Ten Approaches

 **6. Green buildings and energy**

Buildings are one of the largest energy consumers in urban neighbourhoods. A green and thriving neighbourhood will need to minimise building emissions by adopting passive design principles, investing in high-efficiency neighbourhood-wide energy infrastructure and decarbonising energy supply.



A pathway to net zero, featuring the '15-minute city'

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away from problems or mitigate them, for example by being able to afford air-conditioning, but it's very different for disadvantaged people and communities. They may be facing increases in prices, loss of employment, the need to re-skill, and changes in travel patterns and costs. So there is a lot more thinking to be done about how we can bring together social action and climate action, in a way that doesn't assume that every climate action will have an automatically positive impact.

Q. Who should be defining what social value means?

I'm not sure whether communities care about precisely how social value is defined! They are more interested in whether they are consulted on what's important to them. That's why Arup's social value approach has identified quality of life as the outcome, but doesn't make assumptions about what aspect of quality of life communities want to see prioritised. For example, on the Ebury Estate regeneration project, the stats might have suggested that jobs or health were the main issues, but what people actually said is that they wanted balconies facing each other, to combat loneliness. So that's why we have a flexible framework that we can use to consult with communities to make sure we are directing interventions in the right way based on what they tell us will make the biggest difference in their lives.

Q. What projects have you enjoyed?

I really enjoyed a piece of work we undertook for the Greater London Authority's Future Neighbourhoods Programme, looking at how we can integrate community and social value with climate indicators, how communities could be engaged in making decisions about climate action, and at how community involvement can create social value. It's been great to be involved, as it chimes with some of my own concerns – about making the links between climate action and social impact.

I've also been heavily involved in 'Project Bruce', our work on road charging for Transport Infrastructure Ireland. They have a number of road tolling partnerships that are coming to an end, so are looking at the future of tolling and how it might change. We're working with them to understand the social equity aspects, assessing how different proposals might affect different groups, such as rural communities. We've done modelling and looked at different personas, and this will feed into a big consultation process in due course. Again, it's about making sure that the transition to a net zero future also delivers social value.

The Hydrogen Village trial will see a village of around 2,000 dwellings replacing natural gas with hydrogen for heating and cooking, to gather evidence on the role hydrogen could play in replacing natural gas across the UK.

Whitby, in Ellesmere Port, is one of two locations selected to submit proposals for the trial.

Cadent, the local gas network operator, is leading the programme. Helen Boyle, Cadent's Head of Regional Development, and Anne Parks, Associate in Arup's social value team, discuss how they have worked together on the plans.



Helen Boyle



Anne Parks

Q. How did the social value plan come about?

Helen

When we were pulling together the initial bid, we tendered for support on our Stakeholder Engagement strategy, and selected Arup to help us with that, and the social value work and Anne's involvement emerged from that. Once we were selected at Stage One, we kept working with them to develop our proposals for Stage Two, which are with the Department for Energy Security and Net Zero (DESNZ) now. And we are continuing to work together on social value delivery and supporting the team on the ground.

Q. Was the social value strategy something the Department asked for?

Helen

From right at very beginning, we've had a commitment to the people of Whitby. They will remain our customers and our people, whether or not the trial goes ahead in this area. The project's aim is to prove hydrogen's role in decarbonisation, but why wouldn't you also take the opportunity to actually do some really good stuff with the local community, to help improve lives and leave communities better off than when we arrived?

So, no, it wasn't specifically asked for. We just thought it was the right thing to do and it is. And actually since then what we found is that DESNZ have started to ask questions about some of these issues, without specifically referencing social value, and we can say that we have already started thinking about them.

Anne

The original tender was more stakeholder-orientated than social value, but Arup works closely across portfolios, and that team knew we had a strong social value offer in the North West and Yorkshire. So, they brought us in to meet with the team and then we put forward a proposal.

Q. How has the social value strategy evolved?

Anne

We always take a place-based approach, that's a starting point for us at Arup. Whitby village itself, where the trial will operate, is actually a relatively affluent area, but it's surrounded by some of the most deprived wards in Cheshire West and Chester local authority district, possibly in the North West. So, an immediate decision we made was to broaden the socio-economic baselining to include those surrounding areas, so that we could help do some of that levelling up.

We undertook that socio-economic baseline and then presented that back to the local authority. That was actually a really positive first workshop; I think we got them on board quite quickly because they realized that we did understand their area. And that enabled us to develop a social value framework that said to DESNZ, 'If you choose us, these are the areas we're going to focus on, and these are the overarching activities that we will deliver'.

Helen

In terms of engagement, really it was about getting in front of as many groups and people as possible, because we know that people trust the lines

of communication that they already have. We partnered with Cheshire West Voluntary Action, who are an umbrella group for voluntary sector organizations in the area.

Around 2,000 properties are within the trial area from the point of view of the hydrogen changeover, but the communications and engagement perspective doesn't end at that red line. We always had a comms and engagement plan that covered a much wider area than the trial will, speaking to anchor institutions and local employment centres such as the Cheshire Oaks designer outlet.

Anne

Wider engagement is also important because the Hydrogen Village concept is part of a much bigger strategy around hydrogen in the northwest, the HyNet initiative, which will address worklessness and health inequalities across the wider area. For example, we can't necessarily guarantee new

apprenticeships through the trial, but we can influence the development of hydrogen apprenticeship standards for when and if hydrogen becomes part of the energy mix, as well as publicising apprenticeship opportunities that already exist.

Helen

The final plan needed to make sure that it reflected Cadent's corporate priorities, which focus on easier warmth, fairer opportunities and a greener society, but also fitted with Cheshire West and Chester Council, and with British Gas because they are an important partner too. We identified four big themes:

- Tackle the climate emergency;
- Grow the local economy to delivery good jobs with fair wages for residents;
- Support children and young people to make the best start in life and achieve their full potential; and
- Enable more adults to live longer, healthier and happier lives.



Q. So how far has the plan had an impact locally to date?

Anne

Because of our engagement work, we already had an idea of who's doing what in the area. For example, the Pledge Partnership are coordinating a lot of the careers support to schools in the area and they already know all those schools. They've got those relationships, so we didn't need to remake them ourselves. So we used that network and that's also where we started to build the relationship with Cheshire West Voluntary Action (CWVA).

We decided to use CWVA to manage the Hydrogen Village Community Fund small grant scheme, which distributed £20,000 to ten local projects: they had that grants management experience, they knew where the funding need was. That's a key premise of social value delivery: collaboration. Don't reinvent the wheel, or think you know it all. Bring in the strength of the voluntary sector, which can get a bit ignored.

Helen

The other thing that has really engaged interest, particularly from schools and colleges, is the Hydrogen Experience Centre, which is a space that we've made available for communities to use, where you can see and use the hydrogen appliances.

Anne

There are so many positives about the Hydrogen Experience, and the way that it has regenerated a piece of derelict land as a meanwhile use right in the heart of the community. It's there as an education resource, but it's also provided a space for community organizations to hold

meetings and events. And I think there are opportunities that we haven't really had a chance to explore yet - for example, using the green space around the building for other community uses.

Helen

Also, many of the people that worked in the Experience Centre were local, so they have the local knowledge when local residents come in with queries and concerns.

But it's not just local people now. We've got international stakeholders coming into the Hydrogen Experience now. We've got gas engineers coming in because they want to understand what the future might look like. We've got some electrical engineers that want to understand it too.

Q. How will delivery work if Whitby is chosen?

Helen

We will be recruiting a social value specialist to work in the Hydrogen Experience, coordinating delivery on the ground with the wider project team. Though in fact the operational team already has the bit between their teeth, going out and talking to schools, colleges and local trades people; what we're now doing is ensuring that they are aligning to the strategy and that we're recording all the good things that they're doing.

Anne

There's also quite a lot of work planned with schools. We've done a lot with secondary schools, but not so much in primaries. So that's built into the next plan and particularly the transition between primary and secondary – helping them see and grasp the opportunities in climate transition careers.

There will also be a full impact measurement system. There are some baseline targets from Cadent's corporate Social Impact Strategy around percentage of employees from ethnic minorities, gender balance, living wage, local spend etc. My colleague Laura O'Leary has worked with the Supply Chain Sustainability School to adapt their monitoring tool to include social as well as environmental targets. Now that data can be recorded on a monthly or quarterly basis and reported to the project management team, which I think will bring it alive and ensure focus.

Q. What have some of the highlights been so far?

Helen

It's really hard to just pick one thing, but I was really pleased to see the impact report drawing all of the threads together for DESNZ. It's something we can be really proud of, which stands on its own regardless of what happens from here.

Anne

Actually, doing that report has helped us internally to think about what we mean by impact reporting as well. I also think the work Laura's done on the reporting tool is really interesting because it's shown the gaps in current reporting systems that don't look at social measures. We need to build on that in other projects.

Q. And how has the working relationship been?

Helen

I knew very little about social value at the outset. We were bringing Arup in as the experts and trusted them to help us consider and agree what to do, but also to embed those capabilities in our wider team. It's been really positive. We've relied on Arup to help us with the strategy and support us with the delivery, and that's what they've done.

Anne

I think what's really interesting for me has been learning about Cadent's culture. It's an incredibly hard-working environment; everyone really is invested and works incredibly hard to deliver. It was a great opportunity for my team to learn about the energy sector but also to apply our specialism to an emerging technology. That's been a real motivator for me.

Making a reality of whole-life social value

Every aspect of the built environment has an impact on society. Buildings and spaces frame our lives, and can enhance or constrain health, opportunity, pleasure, sociability and fulfilment. They can transform places and communities for good and ill. Arup's commitment to 'social usefulness' rests on understanding this, and ensuring that our projects create the best possible outcomes for individual people, for communities and for society at large.

Social value has risen in prominence as a concept in recent years, and Arup has been proud to work with partners on guides to social value in construction. The increasing prominence of social value has been driven by deeper interest in corporate ethics, a growing focus on injustice and inequality, and by a more subtle understanding of the action needed to respond to the climate crisis. Action to reach net zero has the potential to create socially just outcomes too, but this is not automatically the case. In fact, just as less developed countries and communities are more exposed to climate harms, they may also be most at risk from climate transition.

A socially just transition to net zero demands positive, considered and concerted action by governments, businesses and third sector organisations. But agreed definitions of social value can be elusive. At Arup, we believe social value can only be understood by reference to how communities view their quality of life, what they believe can improve it, and how they can work with others to achieve enduring and systemic change. We see social value as a comprehensive theory of change, rather than standardised set of interventions, and one that needs to be rooted in thorough engagement with local people, rather than assumptions about what people want or what might be 'good for them'.

Viewed this way, social value can represent a transformative way of thinking and operating, but we are still in the early days of its implementation. In the UK, the social value (Public Services) Act 2012 and subsequent government guidance have embedded social value in public sector procurement, but there is still a risk that it is seen as a box-ticking exercise in compliance, rather than a fundamental design principle for infrastructure and development projects. We see discussions about social value maturing in six specific ways:

1 From short-termism to long-term change

We can create a legacy of community infrastructure and social value that lasts much longer than a single project if, for example, we look at training for long-term employment opportunities rather than just jobs during construction.

2 From consultation to co-production

If the dialogue with local communities starts early and continues consistently, communities can play an active role in designing new places and infrastructure, rather than simply offering reactive feedback on proposals developed elsewhere.

3 From siloed programmes to systemic value creation

Through standing back from the detail of projects, and working with communities to consider what outcomes are needed rather than rushing to import generic programmes from elsewhere, we can build an infrastructure of social value that enables individual quality of life and a better society, building in long term resilience and sustainability.

4 From measuring outputs to assessing how people were affected

Taking this long-term view of outcomes can support assessment of the real differences to people's lives – for example, their health and wellbeing, standard of living and social interactions – rather than simply focusing on measuring the outputs that are intended to affect these.

5 From mitigating impacts to unlocking opportunities

Thinking about the potential of projects early and engaging with local communities can unlock unexpected opportunities and potential benefits, turning the project narrative on its head and creating long-term beneficial change.

6 From add-on to intrinsic

Social value is best achieved when it is considered and integrated at every stage of projects' life-cycle, rather than added on at a late stage and in a superficial manner.

We are already seeing a dramatic change in the way that many of our clients work. Major project contractors are working with communities to identify what they want to see tackled – whether that is unemployment, wellbeing, or something as simple as providing spaces for socialising – and putting in place long-term arrangements to do this. Developers are also designing social value commitments into leases, so that communities can see a long-term programme locked in from construction through to operations, going beyond important but short-term initiatives such as apprenticeships, to building wellbeing and capacity locally.

There is more work to do, particularly on measurement and evaluation. At the moment, measurement can focus on the outputs that are easiest to count, rather than building in systems from the outset that measure the change in what really matters to people and communities. But there is a growing understanding that responsible businesses are those that go beyond simple metrics to establish long-term action for a better society – more important than ever at this time of rapid and fundamental change in how we live together.

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Development without displacement

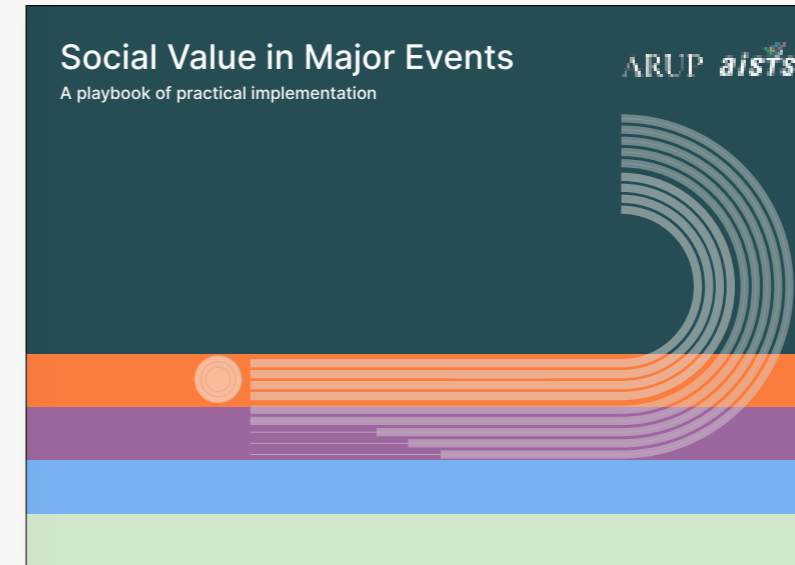
An examination of policies and tools around the world which are intended to mitigate or prevent the displacement impacts of transport-oriented development in cities.



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Maximising SV from infrastructure projects

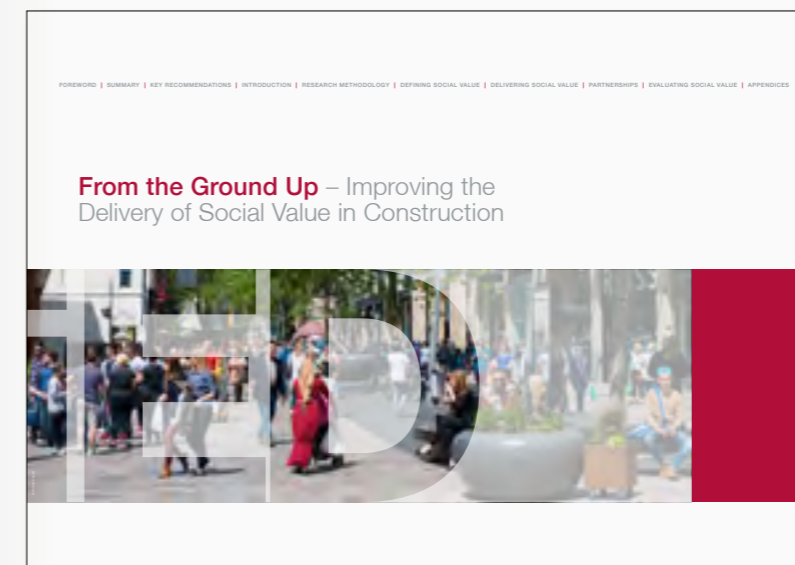
The research outlines an array of actionable recommendations to ensure infrastructure projects embed social value and deliver wide-ranging socio-economic benefits.



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Social value in Major Events

The playbook includes research from the International Academy of Sport Science and Technology (AISTS), applying academic evidence, case studies and presents recommendations for potential bidding and hosting cities when building social value legacy.



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Improving the delivery of social value in construction

The report makes a series of recommendations for change, designed to support those who procure social value and those who supply it, and ultimately help the UK achieve the social value outcomes it seeks.

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