
UNLEASHING A

REGENERATIVE REVOLUTION

FOR THE BUILT ENVIRONMENT

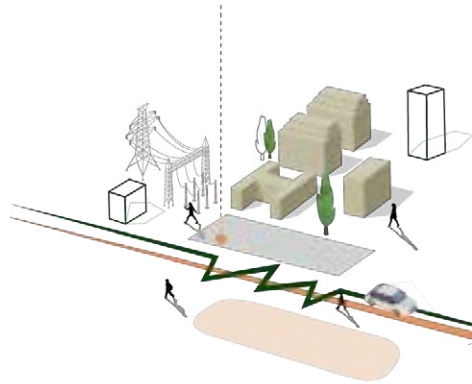
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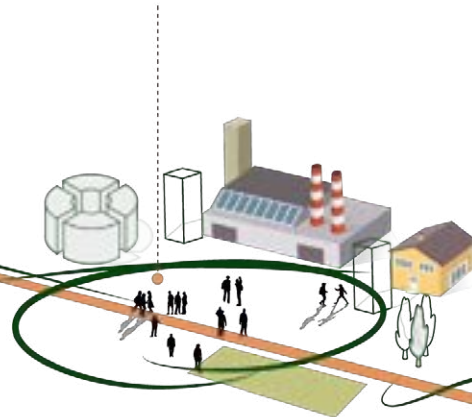
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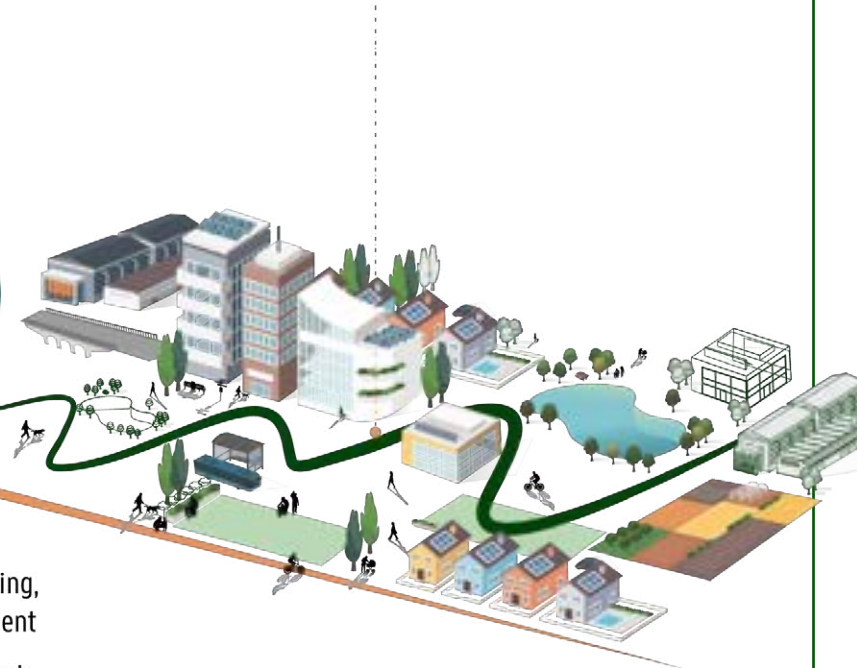
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Holcim is a member of Ellen MacArthur Foundation (EMF) Network. This report aims to build on EMF's "Building Prosperity" study, which provides many insights underpinning the regenerative built environment movement, particularly from Europe.

ENDORSEMENTS

“At Urban Partners, we believe in a holistic approach to urban sustainability, creating neighborhoods that are both better for the planet and lead to a higher quality of life for residents within. We are highly supportive of the regenerative approach set out in this report. As a sector, we must move away from optimizing short term financial returns towards a long-term, people-centric approach to neighbourhood development, taking into account the needs of a wide range of stakeholders and respecting the natural environment in which these urban spaces are built. This is how we can create real value for generations to come.” - **Mikkel Bülow-Lehnsby, Executive Chairperson and Co-founder Urban Partners**

“How do we get to the regenerative revolution outlined in this excellent paper? Above all, through collective action and courageous leadership, with the private sector leading from the front. And not just because it is the right thing to do, for people and planet, but also because the business opportunity is immense.” - **Paul Polman, business leader, campaigner and co-author “Net Positive”**

“The term regenerative can only be used meaningfully when describing living systems or creatures. In a built

environment context, therefore, it relates as much to the people and communities using the buildings as it does to the process of assembling them. A regenerative built environment, as this paper rightfully suggests, is one that is inherently local; made with safe, healthy, reusable and circular materials; pollution free and fully renewable; and of course also one that treats humans and all living species with grace, dignity and humility. This is the task ahead of us now and it begins at home.” - **Justin Adams OBE, (Ostara)**

“I’m always on the look out for ‘green shoots’ of regeneration in action, so was heartened to read the diverse examples from around the world—spanning from projects to initiatives—that the authors have assembled here. I hope this report will find readers beyond the already converted, and thus move the built environment industries towards the widespread transformation that it advocates for.” - **Sarah Ichioka, Director, Desire Lines and Co-author, ‘Flourish: Design Paradigms for Our Planetary Emergency’**

“We are stuck in a cycle of incremental gains that are failing to address the root causes of the nature crisis. We urgently need to be much bolder in our approach to nature recovery within both urban and rural places. This paper puts forward a notion of regenerative buildings and infrastructure that are fully integrated with nature, rooted in place, and themselves capable of restoring relationships

amongst ourselves, our communities, and the Earth. It provides a beacon of Hope and a call to action that the built environment industry will ignore at its own peril.” - **William McDonough, Founder, William McDonough + Partners**

“Embracing the principles outlined in this white paper is a leap towards building a thriving and sustainable future for our built environment. With its clear guidance, innovative ideas, and broad range of case studies, this document empowers stakeholders to champion regenerative practices and create lasting positive impact.” - **Artur Carulla, Partner and Sustainability Practice Lead, Allies and Morrison**

“The importance of nature and biodiversity in the built environment has been increasingly recognised as a driver for sustainable development. This paper proves that by placing people and nature at the centre of building and construction processes, companies can pave the way for a more resilient and sustainable future for our cities and communities. I would like to thank Holcim and SYSTEMIQ for giving IUCN the opportunity to provide insights to this paper, which perfectly fits the work that our Union has been carrying out with its Members and Commissions to support nature positive development in urban ecosystems.” - **Dr. Radhika Murti, Director of the IUCN Centre for Societal Transformation**

FOREWORD



Jeremy Oppenheim
Founding Partner,
Systemiq



Nollaig Forrest
Chief Sustainability Officer,
Holcim

Transforming our cities, neighbourhoods, and built places is essential for a thriving future where humans and nature coevolve.

This paper explores how to ignite a regenerative revolution in the built environment. This revolution aims for positive, life-enhancing outcomes for both people and nature, going beyond merely doing less harm.

Examples of regenerative built environment projects are emerging worldwide, quietly disrupting the status quo. Government authorities, businesses in the built environment industry, financial institutions, and real estate users are recognizing that better planning, design, construction, utilization, and repurposing of built structures can generate greater environmental, social, and economic benefits.

We showcase a range of these regenerative approaches throughout this report as an invitation to accelerate the pace and scale of their adoption. For this, we need a stronger, more cohesive movement to overcome barriers and use the power of example to mainstream a regenerative approach.

We believe a regenerative revolution in the built environment makes good business sense and has undeniable social, environmental, and climate benefits. This paper presents this case and calls for collective, coordinated action across industry, finance, and urban leaders. This agenda is timely, given the growing importance of urban leaders and the trust they can build with citizens at the local level.

Welcome to the dawn of a regenerative revolution.

EXECUTIVE SUMMARY

Today's built environment delivers the essentials for human life – housing, water, food, transport, energy, communications – on an astonishing scale. Over the past 50 years, the global stock of built structures has expanded massively, enabling vast numbers to migrate to towns and cities, where more than three-quarters of people now live.¹ The social impact has been remarkable: 78% of people are now adequately housed², compared to less than half in 1970,³ the number of people with access to safe sanitation has increased by 1.2 million per week for the past half century to include 67% of the world's population today.^{4,5i}

This immense contribution to human wellbeing and economic development is the collective achievement of the built environment sector: the public, private and professional organisations involved in designing, building, financing, operating and maintaining buildings and infrastructure worldwide.

The sector now has a huge opportunity, thanks to major new infrastructure needs. Some \$6 trillion, or 6-7% of

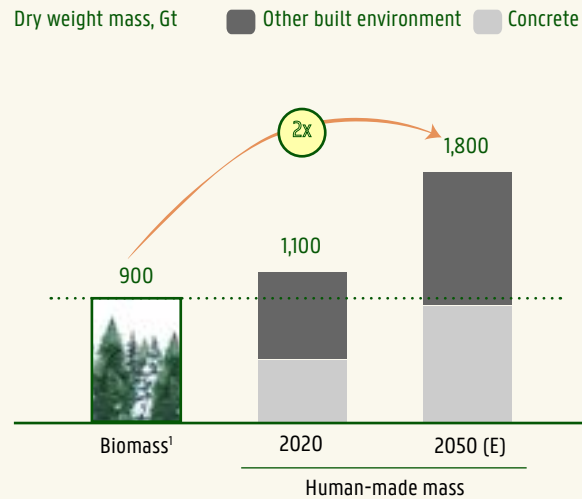
global GDP, must be invested in transport, energy, water and communications infrastructure every year until 2040 to meet the UN Sustainable Development Goals.⁶ And floorspace must double by 2050 to meet demand from continuing population and economic growth.⁷

The built environment sector needs a regenerative revolution to seize this opportunity successfully. Despite its recent achievements, stakeholders across the sector

recognise that its current business model, while delivering the buildings and infrastructure on which we all depend, can do more to avoid harm, and to deliver positive outcomes for nature, climate and people. Without fundamental change, by 2040 the sector's projected growth will have used the 225 GtCO₂eq global carbon budget that should last until 2050 if we are to limit warming to 1.5 degrees. Over this time period, the total mass of buildings and infrastructure worldwide will have grown to double the entire global biomass (Figure A).

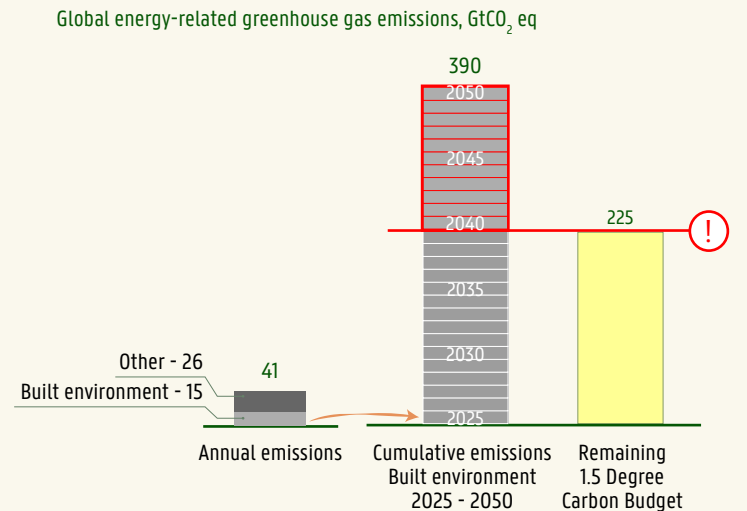
Figure A / Future impact of the built environment on carbon budget and material extraction^{8,9,10,11}

Human-made mass compared to biomass 2020 and 2050



1. Animals, trees, shrubs, and other biomass measured in dry mass

Carbon emissions from the built environment compared to the remaining global carbon budget to 2050



Note: Buildings account for 37% (=15 Gt CO₂eq) of the total greenhouse gas emissions in 2021. Assuming no action is taken this accounts for a total of 390 Gt CO₂eq *26 years) up to 2050. The built environment alone will therefore have exceeded the remaining 1.5 degree carbon budget of 225 Gt CO₂eq.

i 4.6 billion people or 67% of the total population have access to safely managed sanitation, compared to 1.3 billion or 36% in 1970

This white paper, developed by Systemiq with support from Holcim, presents as an alternative the more regenerative approach gradually emerging across the built environment sector. A growing number of projects around the world aim to be essentially positive for nature, while regenerating people's lives and livelihoods. Key stakeholders are working in new ways to achieve this regenerative effect, which goes well beyond sustainability.

Such projects are still far from the norm. And the true meaning of 'regenerative' for the built environment could be better understood. But there are now sufficient examples to support a working definition of a regenerative business model for the built environment sector with **four distinctive characteristics**.



EVOLVING OVER TIME

Regenerative approaches do not aim to deliver outcomes by strict time deadlines. Rather they are designed to include feedback loops giving them the flexibility to adapt continuously to their ever-changing economic, social and environmental circumstances. Home.Earth's model in Copenhagen is designed to give residents a stake in their housing complexes by distributing 15% of profits to tenants, giving them a real stake in the property and potentially leading to lower churn.

ROOTED IN PLACE

Urban environments that regenerate lives and livelihoods deepen the sense of connection between people and the places in which they live, work and play. They are informed by an intimate understanding of the local history, ecology, and culture so they reflect the unique essence of their place. In the Nairobi informal settlement of Kibera, community-led initiatives rooted in the area have improved 125,000 lives at much lower cost than the conventional "raze and replace" approach to developing informal settlements.

PEOPLE CENTRIC

The ultimate purpose of built structures is to meet the needs of their users for shelter, security, comfort, creativity, connectivity, or enterprise. Putting the needs and wishes of users at the centre of the planning and design process can create structures that uplift and improve human beings' daily experiences. The Phoenix neighbourhood in Sussex, UK has won planning permission for the largest timber constructed residential scheme in the country primarily on the basis of its extensive and elaborate community engagement and consultation efforts.

INTEGRATED WITH NATURE

Restoring the connections between people and their natural surroundings regenerates their health and wellbeing. Regenerative places originate from living systems thinking, which respects planetary boundaries and favours nature-based solutions. "Sponge cities" in Hainan, China, draw on the natural properties of their coastal environment to integrate flood accommodation zones, wetlands, parks and coastal habitats in a single "sponge system". This nature-based solution boosts local climate resilience and avoids the need for hard coastal defences.

The likely benefits of scaling a regenerative way of working across the sector are significant and wide ranging. Doing so could maintain or improve sector productivity and risk-adjusted returns to investors while creating new social, environmental and economic value for all sector stakeholders. The opportunities for private businesses with regenerative practices are likely to grow exponentially. Wider economic gains include more local and regional economic activity. Governments will win from higher tax contributions and lower costs for public services. And users of the built environment will enjoy, among many other benefits, the better physical and mental health that comes from closer connection to nature and other people.¹²

These potential benefits will not appear automatically. Capturing them requires coordinated change from multiple actors: industry, governments, investors, local authorities, architects, urban planners and many others. But there are many hopeful signs that the tide is slowly turning towards more regenerative approaches to the built environment, as the sector's key stakeholders embrace exciting changes:

Government authorities are slowly changing their planning requirements, regulations and procurement.

The role of the public sector in regenerating cities and neighbourhoods makes this trend particularly significant. The strong leadership that cities and their mayors are

increasingly showing on climate, nature and social value is often manifested through urban plans and built environment projects. Local government authorities and municipalities are beginning to adopt more regenerative nature-positive practices. And a few pioneering public sector procurement frameworks are now evaluating quality and performance according to 'whole life value' and resilience.

The built environment industry is innovating along the length of its value chain.

It is embracing a new era of technology accelerated by digitalisation in spatial planning, community collaboration, asset and material optimisation, material passports and digital twinning. These technologies are revealing previously hidden sources of value. At the same time, modern material science is developing lighter, stronger, re-useable, more climate-, health- and nature-friendly alternatives at pace. Forward-thinking firms are also adopting formal innovations that favour regeneration. These include circular business models that reduce demand for new raw materials, radical collaborations with partners across the sector and new forms of performance contracting that target ambitious regenerative outcomes.

Financial institutions are developing new financing models.



As major capital providers and institutional investors compete for investment opportunities arising from the net-zero, nature-positive transition, they are

incorporating into core evaluation tools new metrics for impact, risk and return. These identify and aim to measure longer-term, broader sources of value. Place-based impact investment blends different sources of finance (private, public, impact, carbon market, etc) and directs capital towards neighbourhood renewal and sustainable development at the local level. Developers with more distributive profit-sharing models are emerging and new financial products are being designed to finance and incentivise regenerative built assets.

Users are getting their voice heard through more regenerative corporate commitments and citizen empowerment.

Ambitious corporates are targeting regenerative, socially positive outcomes from their buildings, just as they are from their supply chains. Around the world, communities are organising themselves to increase local resilience and self-sufficiency while sharing common resources. These two trends mean more people are connecting and convening in the places where they live and influencing the corporate and public sector decisions about local infrastructure and public spaces that affect them.

Fig.B / Map of regenerative project approaches emerging around the world

 DEEP DIVE CASE EXAMPLES  EMERGING SIGNS EXAMPLES

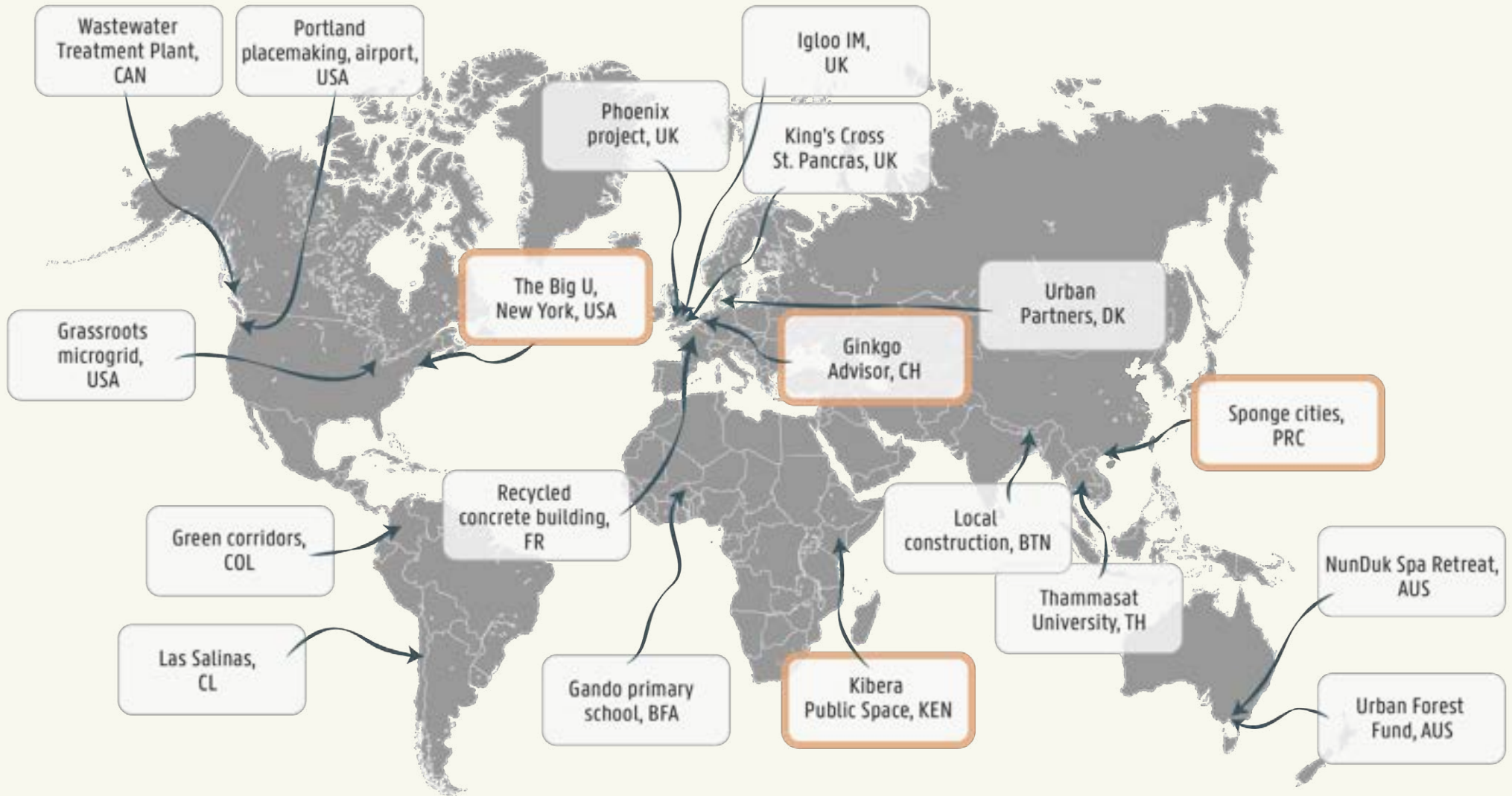


Figure C / Cross-sector initiatives to scale the adoption of regenerative built environment

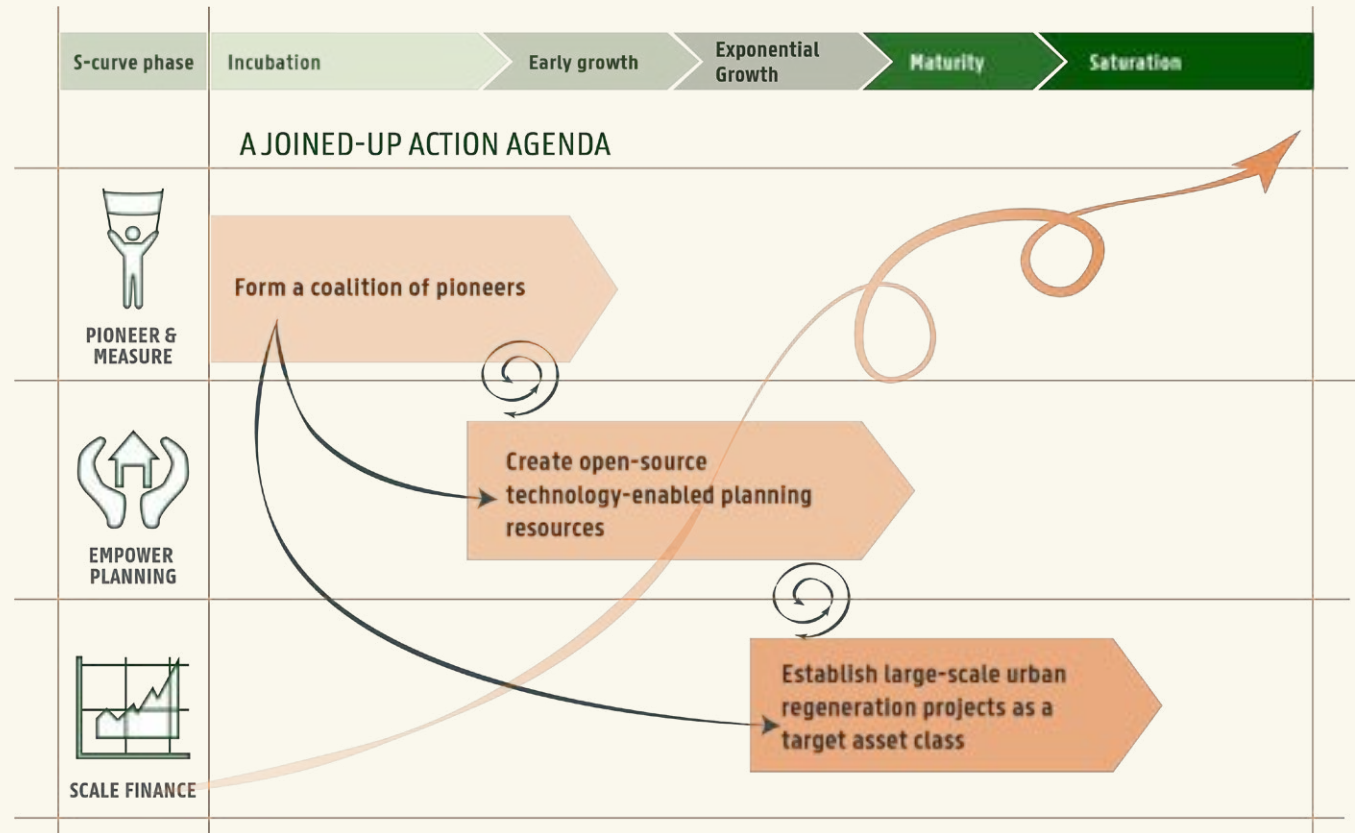
By multiplying these hopeful signs into a regenerative revolution, the built environment sector can complete the crucial housing, infrastructure, climate adaptation, digital and energy transitions in line with global sustainable development goals. But that revolution has only just begun. Accelerating its momentum will require multiple stakeholders to step up and show industry leadership, craft enlightened public policy and target longer-term and broad value creation.

This paper proposes **three cross-cutting initiatives** to propel the regenerative revolution:

Form a coalition of pioneers to experiment with regenerative frameworks and metrics on live built environment projects, and capture all types of value created.

Create open-source, technology-enabled planning resources that cities, local municipalities and planning authorities can use to model and map positive built environment outcomes for people and nature in the places where they operate.

Establish large-scale urban regeneration projects as a target asset class for public and private finance, to attract more investors seeking to create broader financial, environmental and socio-economic value.



Each initiative is intended to trigger cumulative, complementary actions, as public authorities, industry players, financiers and end users gain confidence in the benefits of a regenerative approach. All three build on important work taking place across the built environment sector today, and in Chapter 4 we list key organisations that are engaged in relevant initiatives already. Engaging with these organisations as partners is crucial to making the three initiatives succeed, which is what's needed to create a tipping point beyond which the sector can

become systemically regenerative (Figure C).

There is so much to be gained together over the next decade. We have the opportunity to reinvent the built environment sector, to create a system that incentivises and rewards regenerative approaches to our built environment needs. We invite every organisation and individual excited by this prospect to join the conversation and take action.

1

THE CASE FOR CHANGE

The built environment sector faces unprecedented opportunities over the coming decades. Infrastructure projects alone require more than \$6 trillion investment (6-7% of GDP)¹³ a year. But a revolution is needed in the way the sector operates if it is to seize these opportunities. Stakeholders across the sector recognise that its current business model, while delivering benefits on which we all depend, can also substantially harm nature, climate and people in the process. Over the past decade, many have introduced changes aimed at making the built environment more sustainable. But these are not enough, given the scale of the sector's expected growth over the next 30 years. This challenge demands more fundamental change.



WHAT NEXT?

1.1

THE SIGNIFICANCE OF THE BUILT ENVIRONMENT SECTOR

The built environment sector makes an immense contribution to societies the world over. It delivers and maintains the buildings, services and infrastructure that provide shelter and accommodation for human activities, from work to leisure, shopping, entertainment and culture.

The scale and complexity of the sector is impressive. It comprises a vast array of professional, public and private bodies which together represent the demand for, supply and use of built assets. Figure 4 highlights its four stakeholder groups, which include the built environment industry. This group contains all those businesses involved in the process of designing, building, operating and maintaining buildings and infrastructure worldwide in its four subsectors. The size of the 'user' group, representing the sector's total end users, is limitless, given that every individual and organisation needs buildings, energy and infrastructure to function.

The built environment industry has a strong track record. Over the past 50 years, as the global population has

doubled, the proportion in adequate housing has grown from 50%¹⁴ to 78%¹⁵ and the proportion with access to safe sanitation has risen from 36% to 67%¹⁶. In the course of delivering these achievements, the built environment industry has also become critical to global prosperity. The sector now contributes an estimated 12% of global GDP (USD 10.8 trillion) and employs more than 240 million people worldwide.¹⁷

12%

of global GDP
(USD 10.8 trillion)

240M

people employed
worldwide

Figure 4 / Stakeholders in the built environment sector

GOVERNMENTS

- National government
- Local planning authorities
- Cities, towns and civil society

FINANCE

- Public capital
- Private capital
- Investors
- Lenders
- Insurers

BUILT ENVIRONMENT INDUSTRY

- Includes four principal subsectors

USERS

- Energy companies
- Transport and infrastructure operators
- Technology industries
- Citizens
- Residents
- Community groups

OWNERS / DEVELOPERS

- Property / infra companies
- House builders
- Developers
- REITs

DESIGNERS

- Planners
- Architects
- Engineers
- Landscape designers
- Interior designers

CONTRACTORS

- Construction and deconstruction firms
- Supply chain
- Product manufacturers
- Building materials
- Solution providers

OPERATORS

- Property managers
- Facilities managers
- Agents and valuers

1.2

THE SCALE OF THE OPPORTUNITIES AHEAD

Over the next three decades, huge new opportunities will face the industry (see Table 1). First, there is the growing demand for housing, driven by long-running economic and demographic trends. The global building stock is projected to double in size¹⁸, partly because of the expected 65% increase in the global middle class between 2020 and 2030, driven primarily by economic growth in emerging economies.¹⁹ Changing demographics also mean demand for housing units is outpacing population growth, another trend expected to fuel future demand for more homes.²⁰

At the same time, massive demand for new infrastructure will come from global transitions already under way, three in particular: the energy transition, adaptation to climate change, and the digital transformation. The world is depending on the built environment industry to complete these vital projects. To give an idea of the value at stake, an estimated \$6 trillion (6-7% of GDP) of transport, energy, water and communications infrastructure needs to be invested annually to meet the UN Sustainable Development Goals.²¹

Table 1 / Global drivers of extraordinary demand for built structures^{22,23,24,25,26,27,28,29,30}

MIDDLE CLASS GROWTH

- Surge of middle-class population by **65%** between 2020-2030, of which a large share in emerging economies, especially in China.
- Demand for an extra **2 billion** new homes over the next 80 years as the growth in the number of households outpaces population growth.

CLIMATE ADAPTATION

- Increasing need for adaptation finance in developing countries, of which 25% is needed to build infrastructure resilience in energy and transport sectors.
- In Africa, currently only 3% of adaptation finance is directed towards buildings and infrastructure.

ENERGY TRANSITION

- Increasing annual clean energy investment in the net zero pathway from 1.2 trillion to almost USD 5.0 trillion by 2030, of which 20% is used for energy infrastructure.
- Retrofits of buildings requires \$230 billion per annum to be borne mostly by the private sector.
- Concrete production represents 11% of energy transition materials until 2050.

DIGITAL TRANSFORMATION

- Growing data center demand: data center build out in the US is forecasted at 10% per annum at least until 2030.
- Growing smart-buildings segment with an expected rate of 10-13% per annum by 2025.
- Broadband: delivering universal broadband requires USD 418 billion in infrastructure.



1.3

THE BUILT ENVIRONMENT SECTOR NEEDS TO AIM BEYOND SUSTAINABILITY

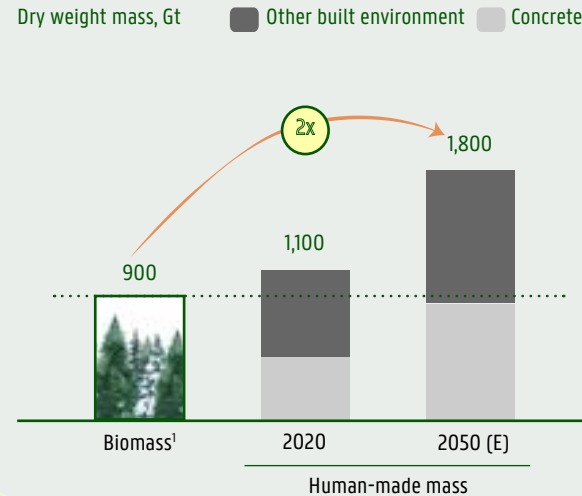
A fundamental change is needed in the way the sector constructs and operates built assets if it is to seize these opportunities successfully. For as well as delivering the major improvements in human wellbeing summarised above, the sector's current way of working risks causing significant adverse environmental and social impacts.

Today, the built environment contributes 37% (15 GtCO₂e) of all global greenhouse gas (GHG) emissions.³¹ Without changes to methods of production and utilisation, by 2040 it will have used the whole of the 225 GtCO₂e global carbon budget that should last until 2050 if we are to limit warming to 1.5 degrees.³²

Modern urban settlements also use land that could otherwise be left for nature and biodiversity. Nature would benefit if existing structures were used more effectively. Between 2011 and 2020, an estimated 15 million new homes were built³³ while around 30 million stood empty³⁴ and 35% of existing buildings were under-occupied.³⁵ At the current rate of expansion, another 1.2 million km² of land – an area the size of Peru – will

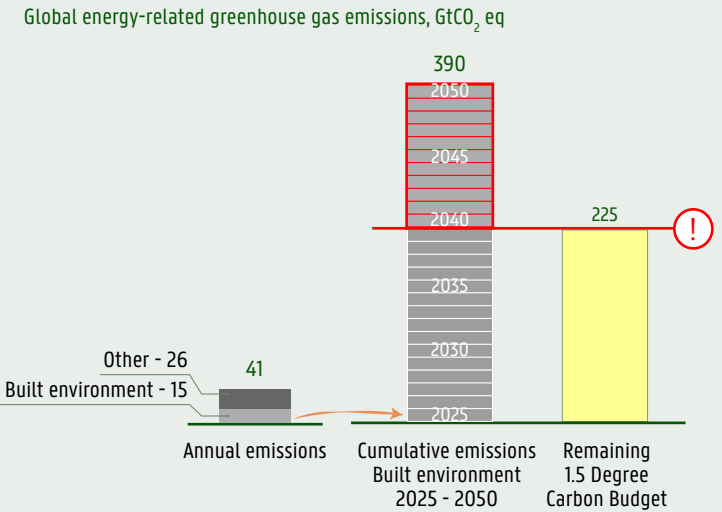
Figure 6 / Future impact of the built environment on carbon budget and material extraction^{41,42,43,44}

Human-made mass compared to biomass 2020 and 2050



1. Animals, trees, shrubs, and other biomass measured in dry mass

Carbon emissions from the built environment compared to the remaining global carbon budget to 2050



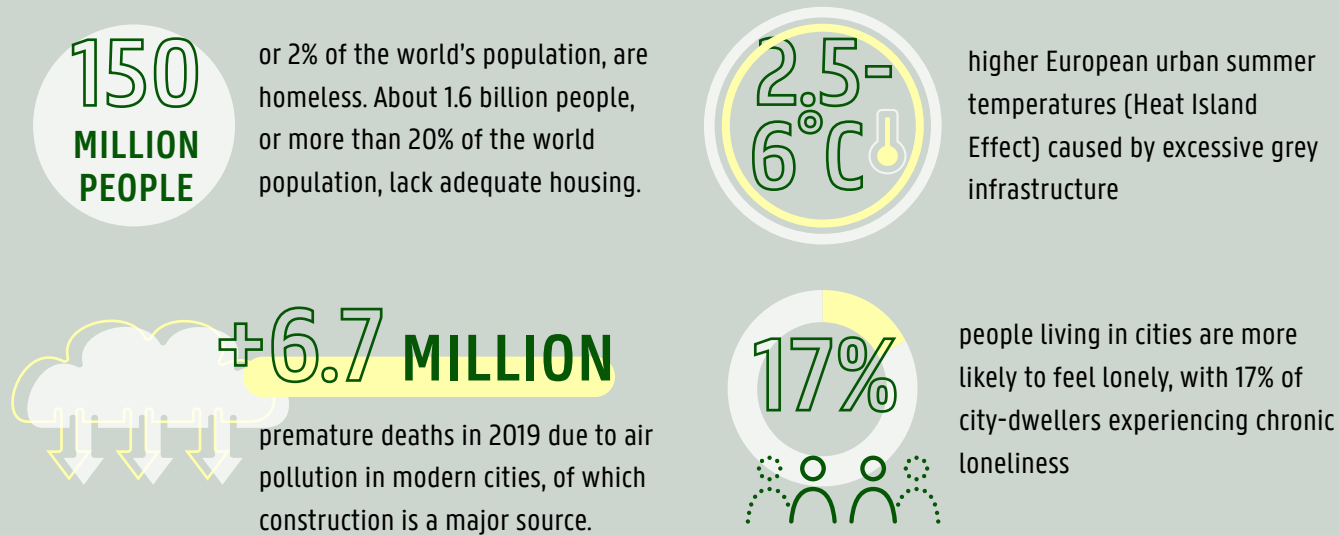
Note: Buildings account for 37% (=15 Gt CO₂e) of the total greenhouse gas emissions in 2021. Assuming no action is taken this accounts for a total of 390 Gt CO₂e * 26 years) up to 2050. The built environment alone will therefore have exceeded the remaining 1.5 degree carbon budget of 225 Gt CO₂e.

be converted from natural to urban uses by 2030. A total of 23,578 species assessed under IUCN Red List of threatened species are impacted by building and infrastructure, nearly half of them are at extinction risk. Hence, in order to bend the curve of biodiversity loss by 2030 and engage toward full recovery of nature by 2050 to achieve a nature positive development in line with Kunming Montreal Global Biodiversity Framework, integrating biodiversity considerations when planning, designing and implementing building and infrastructure is of utmost importance.

Much-needed growth in built structures means demand

for new materials will also double between 2020 and 2050.³⁶ But the built environment sector already accounts for 50% of raw material extraction worldwide. By 2050, man-made mass will be double the entire organic biomass (see Figure 6).

It doesn't have to be this way. Compact and balanced neighbourhoods can use more recycled building content, introduce more intense use of buildings, lifespan extension and other circular economy measures, and reduce building material stocks by 25 per cent by 2060. This can lead to a 30 per cent decrease in energy demand and a 50 per cent decrease in GHG emissions compared to historical trends.³⁷

Figure 7 / Societal impacts related to the built environment ^{45,46,47,48}

From a social perspective, the output of the built environment sector and its methods pose a range of urban and societal challenges – many of which will become increasingly costly to tackle (see Figure 7).

Again, we know that these adverse societal impacts can be avoided and indeed reversed if the right approach is taken. The Human Development Index, capturing overall health and wellbeing, is shown to rise across all income groups when a Sustainability Transition scenario is applied to built environment growth pathways forecast to 2060.³⁸

The urgent need to address the adverse environmental and social impacts has prompted a number of initiatives, both sector-wide and from individual companies, to make the sector more sustainable.

To date, these have predominantly focused on reducing carbon emissions. By June 2023, 20% of the major global corporations in the sector had joined the Race to Zero, a global campaign rallying non-state organisations to halve global emissions by 2030.³⁹ Many governments, states and cities are enforcing new standards and

building codes to improve the environmental efficiency of buildings and construction. C40, the global network of city mayors formed to confront the climate crisis, has dedicated one programme to helping cities around the world create and implement climate action plans and another to delivering green and thriving neighbourhoods. Global investment in energy efficiency and clean technologies has grown. But this investment still falls far short of the \$600bn needed each year for the sector to achieve net zero.⁴⁰ And, despite all these sustainability initiatives, greenhouse gas emissions from buildings are still increasing. Most urbanisation in the global South occurs in informal settlements, often as self build structures with no planning or infrastructure. This also requires radical new approaches to succeed longer-term.

The sector's business model needs a more fundamental change. It must move beyond causing some harm alongside its benefits, to being restorative and regenerative, with an entirely positive impact on people and the planet.

Taking a regenerative approach across the whole cycle of designing, building, operating and decommissioning built assets and urban places is increasingly recognised in the sector as a people-centred, planet-positive and feasible alternative, one that goes well beyond sustainability. The next chapter examines what this regenerative alternative means in theory and practice.

2

A REGENERATIVE APPROACH CAN CREATE SUPERIOR VALUE

What does taking a regenerative approach to the built environment really mean? And how is it different from the sector's current way of working?

This chapter puts forward a new, more regenerative business model for the built environment sector, showing how this way of working can create more social, environmental and economic value for all the sector's stakeholders.

2.1

DEFINING A REGENERATIVE APPROACH

A regenerative economic activity is essentially positive for nature, climate and human society; it builds capacity for further positive consequences to evolve. Today, the idea that activity in the built environment sector can be regenerative is steadily gaining ground in business and public policy-making.

To take a regenerative approach means taking a living systems perspective. This recognises that humans, like all other living forms, are inextricably connected to each other and the environment around them in a complex

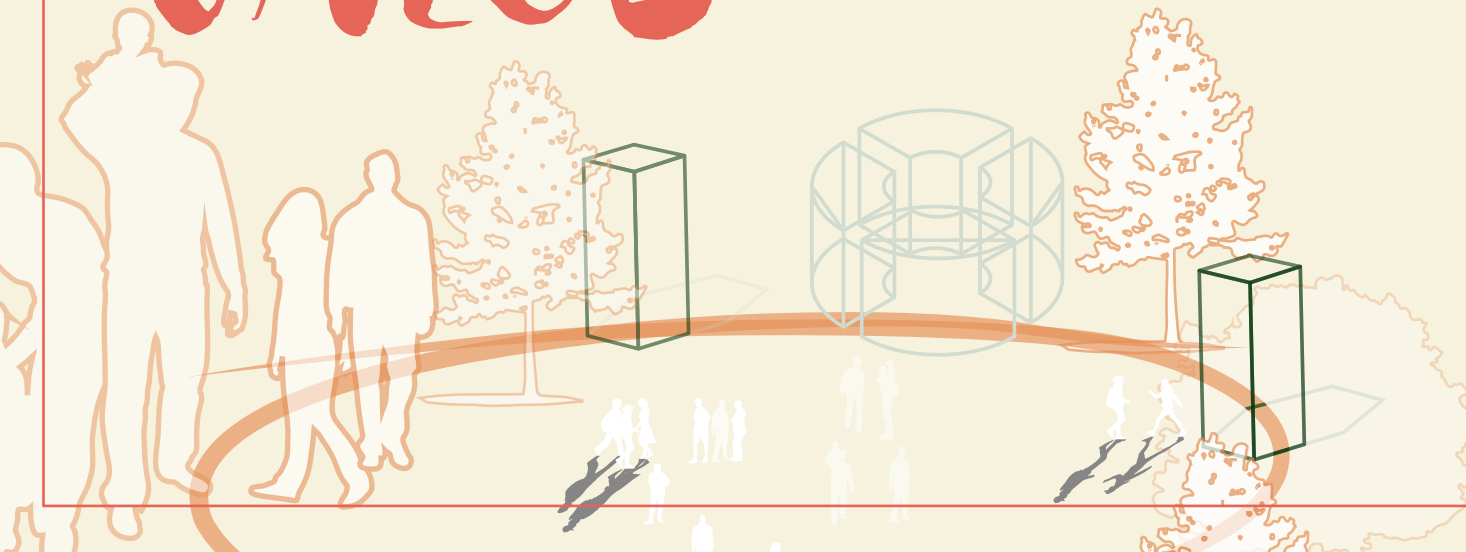
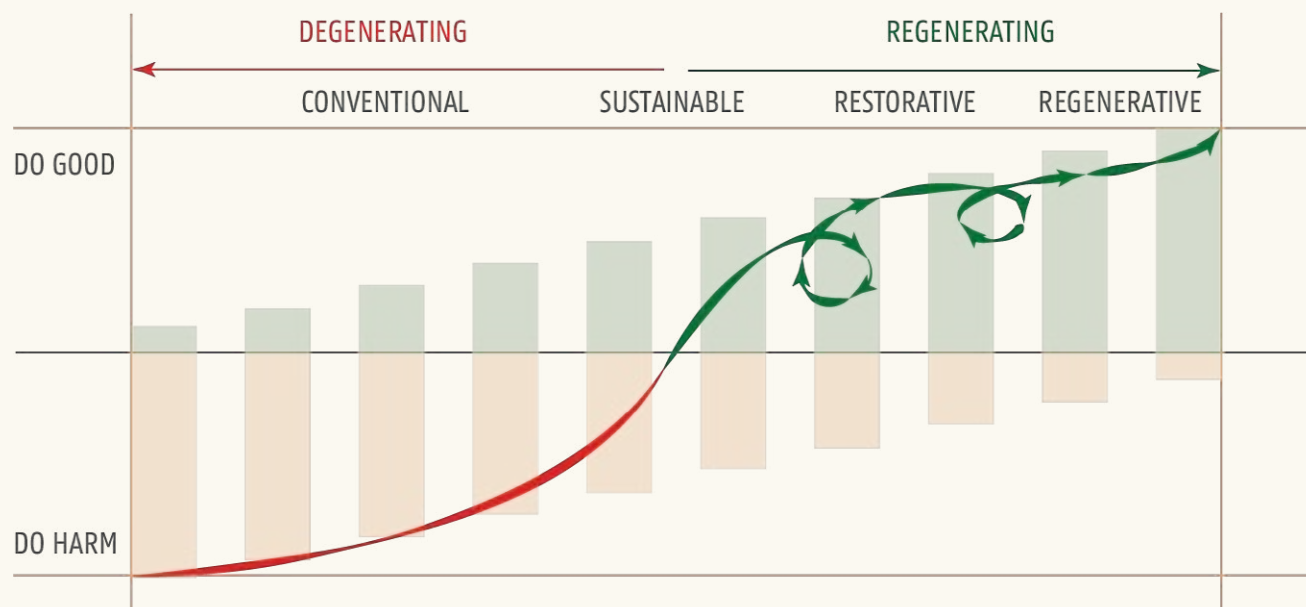


Figure 8 / A regenerative way of working goes well beyond 'do no harm'⁴⁹

Regenerative practice includes, but goes beyond doing no harm and aims to simultaneously restore and regenerate the capacity of both our natural and social systems to continually self-renew and evolve (see Figure 8).

Adapted from Brown et al., 2021 and 'Waging peace through commerce by design', McDonough + Partners, 2020

web of relationships and systems, all of which are interdependent. We are constantly evolving in response to changes in that web, in ways that can be better explained by system dynamics and evolution theory than more linear approaches to understanding social development. Acknowledging this fact is at the core of regenerative practice.

Conventional approaches to 'fixing' the unintended consequences of economic activity aim to do less harm. But without fundamentally changing the process producing the harm, they continue to be harmful. The earliest green building ratings and certifications fell into this category. As the architect and pioneer of circular design William McDonough puts it:

"Being less bad is not being good. It's being less bad. ... Fossil-based eco-efficiency, however AI-enabled, is still in the territory of less bad. On the other hand, buildings and sites that are 100% renewably powered, embedding passive design and humanistic principles, and built regeneratively and adaptive to change (e.g. office buildings that can become housing) – these buildings can be both smart and wise. If we start with the right values and embrace natural wisdom as well as the latest "smart" technology, then we have the potential to create wise and smart buildings and resilient communities.

Regenerative practice goes beyond doing no harm and aims to renew and restore the capacity of both our natural and social systems to continually self-renew and evolve (see Figure 8). Rather than being limited to delivering a particular outcome by a particular deadline, it establishes an ongoing process, capable of generating a continuous stream of benefits over time.

2.2

SHIFTING TO A REGENERATIVE BUSINESS MODEL

The goal of the business model which still guides most built environment decisions today is to create short-term financial value. It has the following characteristics:

⊖ NATURE EXTRACTIVE.

The model treats the environment as a limitless supply of natural resources that can be extracted and exploited for the purposes of construction.

⊖ DONE TO PEOPLE.

Its product, a built asset, is made available to the people who will use it, assuming they will enjoy its use, even though they have had little or no voice in defining its purpose, design or delivery.

⊖ PLACE AGNOSTIC.

The place where the asset has been built has little or no influence on its design aesthetic, function or form.

⊖ TIME-BOUND.

The production process is considered complete when the product (the built asset) has been delivered to its owners, who may or may not be the ultimate end users.

community and belonging. It aims to strengthen relationships between the different stakeholders in the built environment and to reintegrate people with their places and natural environment.

The defining characteristics of this more regenerative business model are the inverse of those of the conventional business model.



EVOLVING OVER TIME

Built assets are part of the continuously changing and evolving urban metabolism. Time-bound structures therefore tend to become rapidly unfit for their changed environment. In contrast, regenerative structures and places become resilient to change when the capacity to adapt to continuously dynamic economic, social and environmental circumstances is factored into their design, construction and operation.

ROOTED IN PLACE

Each place where a built asset is located has its unique essence and potential. This means that the asset's function and design must be informed by an intimate understanding of the local history, ecology, and culture, and deploy locally available resources, whether these are reclaimed through local recycling loops or naturally present.

PEOPLE CENTRIC

The production and utilisation of built structures starts with their ultimate purpose, which is to support and regenerate the lives and livelihoods of people using them. This means the people affected by the structures should be closely involved in their design, construction and ongoing maintenance, to ensure they improve their own health, wellbeing and quality of life.

INTEGRATED WITH NATURE

The model respects planetary boundaries while retaining and restoring species and ecosystems. All stages of the real estate lifecycle and their results enable people to connect closely with nature and with each other through ongoing use, because the built environment and nature are fully integrated.

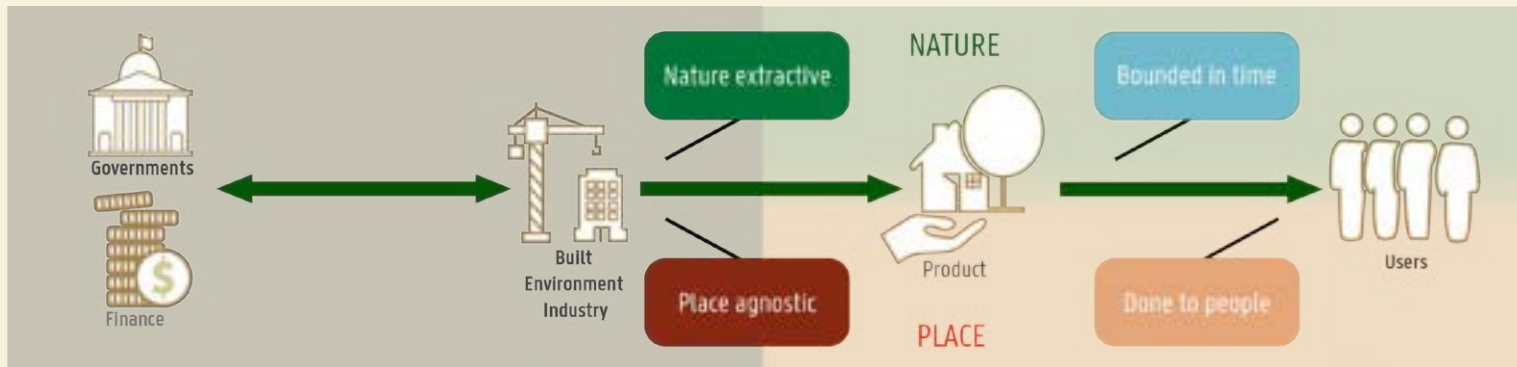
A more **regenerative business model** takes long-term value creation for multiple stakeholders as its overarching goal. This goal includes creating financial value for those financial institutions and built environment businesses with an interest in the built asset's financial performance. But it goes much further, including also creating environmental and social value in the form of natural capital, human health and wellbeing, and a strong sense of

Figure 9 / A new business model emerges that enables ongoing broad value creation (simplified and illustrative)

BAU BUSINESS MODEL

OVERARCHING GOAL:

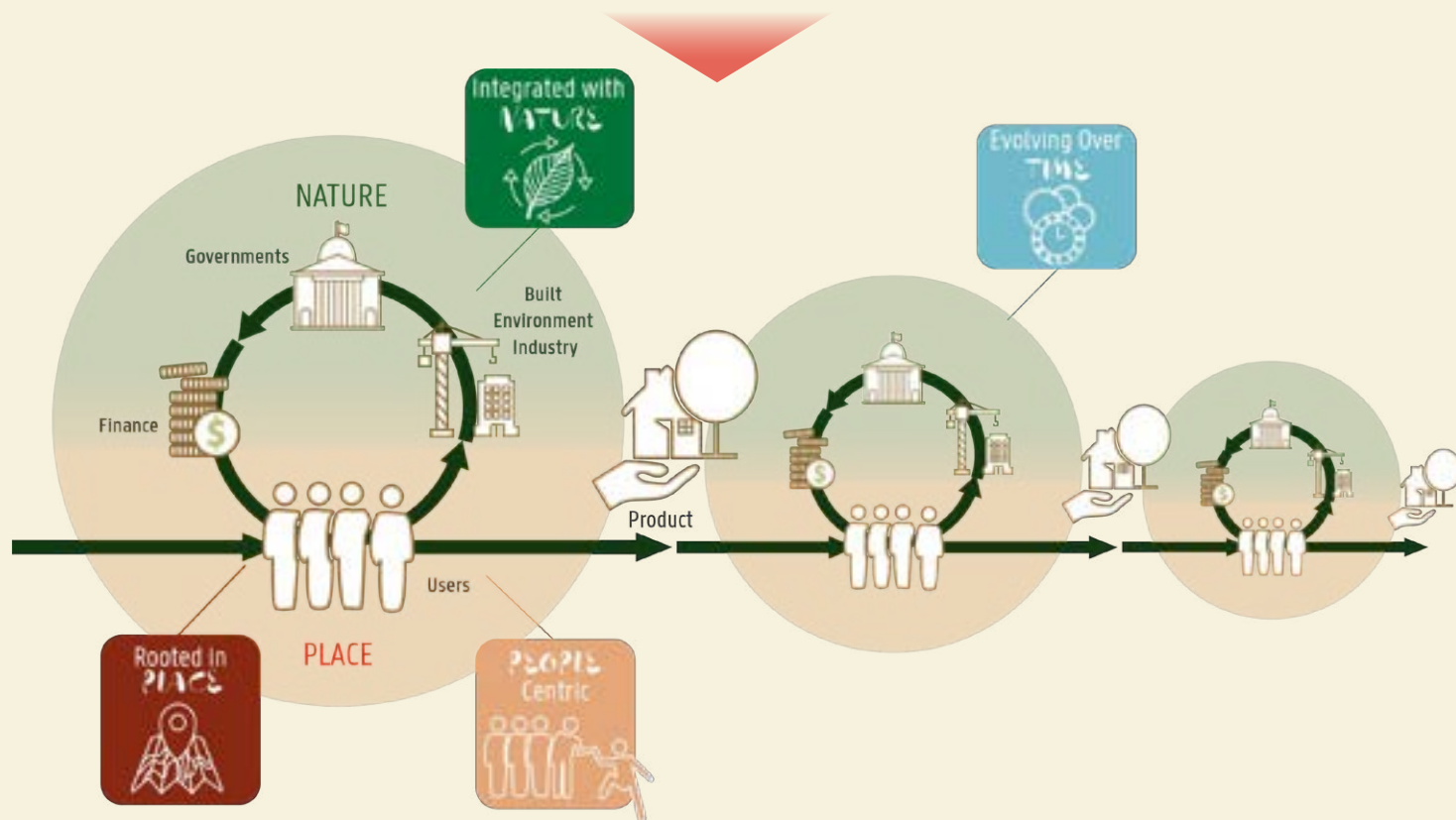
SHORT TERM PROFIT CREATION



REGENERATIVE BUSINESS MODEL

OVERARCHING GOAL:

ONGOING BROAD VALUE CREATION



In theory, the built environment sector will become systemically regenerative when all its stakeholders embrace this more regenerative way of working as their business model (see Figure 9). In practice, making that shift will not be easy. It calls for systematic, co-ordinated changes from multiple actors: governments, investors, the built environment industry and, ultimately, all the citizens and organisations that use the built environment.

In interviews with regenerative practitioners and built environment professionals, we heard about the principal barriers they face:

A. **Low awareness** of what a regenerative approach to built environment projects entails, and inconsistent interpretations of how it differs from the more familiar goal of sustainability.

B. A strong desire by all stakeholders to align around a single set of **metrics** that can be consistently quantified or benchmarked to validate the 'regenerative' nature of built environment projects. Yet the place-specific and evolving nature of regenerating places does not lend itself to one set of metrics or KPIs.

C. Long-standing **vested interests** driving decisions and behaviours towards non-regenerative outcomes, creating inertia in business models and incentivising the status quo.

D. Lack of capacity among regional and local **planning** authorities to create truly integrated local economic development plans that optimise for place-based environmental and socio-economic wellbeing factors.

E. Limited access to **capital and finance** that seeks regenerative outcomes. This barrier has arisen partly because the true environmental and social costs of non-regenerative approaches are externalised and not attributable to the sector's fragmented stakeholders, while the corresponding value to all stakeholders of regenerative approaches are not identified.

Chapter 4 proposes three initiatives that aim to tackle these challenges head on, in order to accelerate and scale the sector's comprehensive adoption of a more regenerative approach. The value at stake for sector stakeholders is extensive in both reach and scale.

2.3

THE REGENERATIVE APPROACH CAN CREATE SUPERIOR VALUE

Early adopters of a more regenerative approach are already collaborating to deliver projects that are more integrated with nature, rooted in place, people-centric and evolving over time. Despite the barriers, their experience is providing evidence that regenerative built environment approaches can be adopted and, most importantly, that they can create higher and lasting social, environmental and economic value than conventional projects while maintaining or improving industry productivity and risk-adjusted returns to investors.

Table 1 details these additional forms of value, matching them to their main beneficiary stakeholder group and the relevant case study on the following pages.

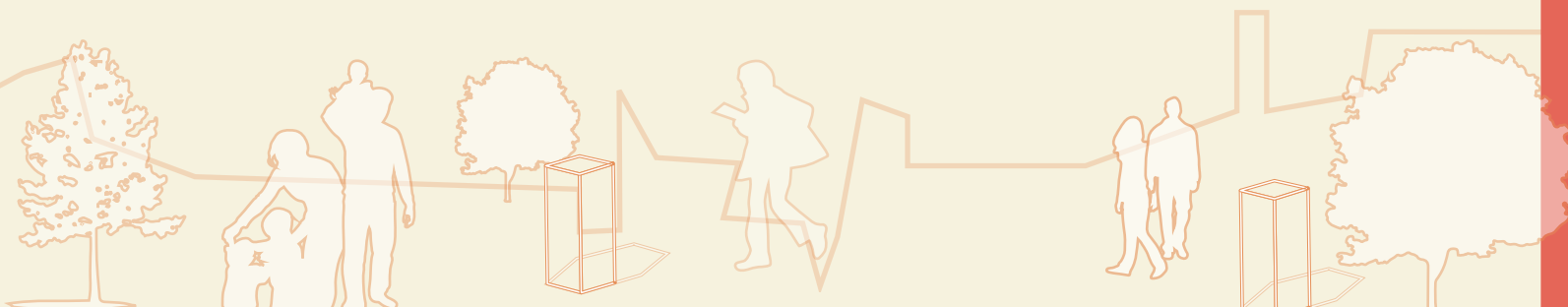



Table 2 – Value creation from regenerative built environment

GOVERNMENT

A more regenerative approach to development and local investment results in more local economic activity. A thriving local economy in turn drives higher income to the local government authority and lowers its costs.

Examples of value that can be created:

- Higher number of local jobs created
- Higher tax collection from local business community
- Reduced local government spending and investment on local problem-solving (e.g., flood prevention, crime reduction, healthcare, pollution control, etc).


 See case study example:
Hammarby Sjöstad, Stockholm, Sweden

FINANCIAL INSTITUTIONS

A more regenerative approach to real estate investment results in higher long-term financial returns for its providers of capital.

Examples of value that can be created:

- Higher capital from real estate assets due to thriving local economy
- Higher rental values due to lower churn in tenants
- Faster sales and rental income generation due to attractiveness of place to prospective users/occupiers
- Reduced exposure to climate and nature-related financial risks, which avoids future liabilities of stranded assets and lowers business costs.


 See case study example:
Ginkgo Advisor

BUILT ENVIRONMENT INDUSTRY

A more regenerative approach to real estate development and management results in faster planning permits and reduced risk across the value chain.

Examples of value that can be created:

- Higher property values for homes located near parks or green spaces and in tree-lined streets
- Community buy-in and co-development reduces time and cost of obtaining planning consents and avoids litigation costs
- Thriving local economy sustains and enhances project viability and encourages inward investment
- Quality of places created increases their desirability to current and future residents and businesses, and speeds up sales/letting times
- Reputation of the industry is enhanced, giving it more profile and voice with investors and regulators.


 See case study example:
Sponge Cities, China

USERS

Involving end users in investment, design and development decisions results in users enjoying higher quality of life, health and wellbeing outcomes.

Examples of value that can be created:

- Access to affordable housing and other basic services
- Reduced rates of physical and mental health conditions
- Improved worker productivity from mitigating effects of 'urban heat island' effect
- Opportunities to develop and enhance skills and generate income
- Thriving natural environment enhances quality of life and improves resilience to environmental stress factors
- Stronger sense of belonging builds pride of place and reduces crime and anti-social behaviours.

 See case study example:
Kibera Public Space Project, Nairobi Kenya

The four case studies on the following pages have been selected to illustrate the breadth and variety of regenerative approaches emerging already. They are not comprehensively regenerative: a single scheme could not possibly demonstrate every characteristic of regeneration in practice. However, all of them display some of the

four characteristics that underpin the more regenerative business model described in Section 2.2 above.

Each case study highlights how the project has generated specific kinds of additional value for a particular stakeholder group. But, as can be seen, most of them

have delivered multiple co-benefits to other stakeholder groups as well. They are all creating high and lasting social, environmental and economic value, while maintaining or improving sector productivity and risk-adjusted returns to investors.



GROWING SOCIAL &
PHYSICAL RESILIENCY

Image Source: ESCR by BIG

CASE STUDY

THE BIG U, NEW YORK CITY

In 2012 Hurricane Sandy (the largest Atlantic hurricane on record at that time) hit the East coast of America, causing catastrophic storm surges and flooding in coastal areas of New York and New Jersey. Thousands of buildings were devastated, including commercial offices the financial district, infrastructure within a ten-mile radius, as well as the homes of at least 95,000 low-income, elderly and disabled city residents.

To redevelop the area and protect it from future flooding, storms and other impacts of a changing climate, BIG (Bjarke Ingels Group), One Architecture and the City of New York, proposed a 10-mile protective ribbon – the BIG U – that

uses raised berms and other measures to create public spaces along the water's edge.

The result is an innovative urban resilience program that includes Holcim's coastal protection materials for outer structural strength. It is nature-based and provides community-desired amenities, restoring people's connection with nature.

In 2014 the project won an award from the Holcim Foundation for Sustainable Construction, which enabled further engagement with local communities.



PEOPLE

Rooted in the concept of “social infrastructure,” one of the key principles of the BIG U was that the design should be community-driven. The project team asked the people who lived there what they lacked most, and they all put open green space as their number one choice. The outreach process lasted sixteen weeks, with feedback from the community through tools like an Open House being used to inform the planning process. Proposed solutions for each of the ten compartments were designed in close consultation with the associated communities and a number of local, municipal, State and Federal stakeholders. Each proposal has a benefit-cost ratio greater than one. The Big U really shows the power of design in building coalitions.

TIME

Another key principle was that different component parts of the project should be able to be built incrementally over time. Advice was sought early on about potential park stewardship models with funding mechanisms that could enhance the long-term operating budget while addressing issues of equity. The project and ultimate spaces act as a dynamic process, “growing social and physical resiliency” and enabling planners to adapt to emergent developments such as global climate change and new legislation. The project itself was designed to withstand sea-level rise levels projected for the year 2100.

PLACE

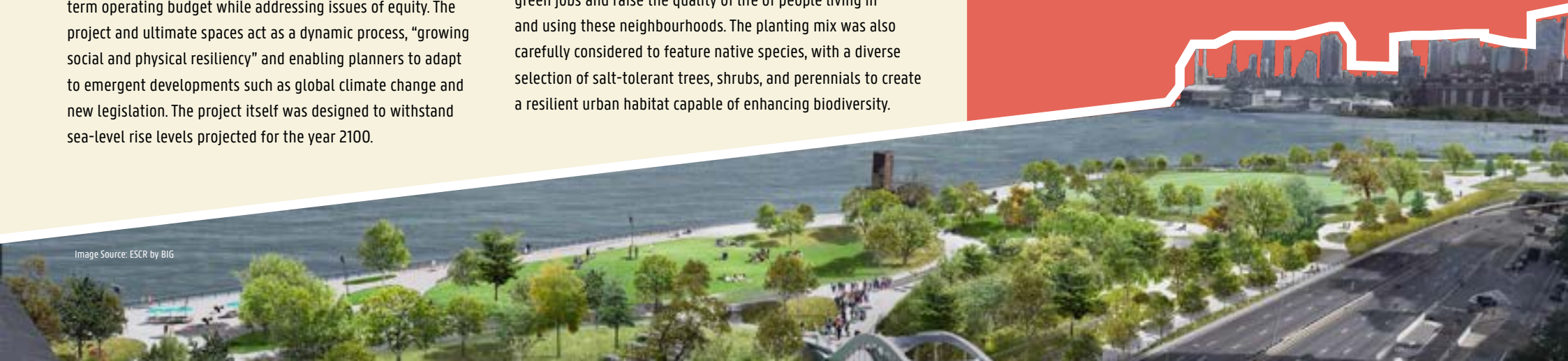
The BIG U project team undertook extensive research into both the history of the Tri-State Area and the unique culture of small, compartmentalised sections of the communities living and working in Lower Manhattan. The design solution for the Big-U broke up the 10-mile ribbon into ten discrete compartments – separate but contiguous regions of the waterfront and their associated communities. Each of these was considered separately from the perspective of placemaking, but also as a whole in terms of the overall quality of urban and social fabric across the city.

NATURE

Instead of taking a technocratic design approach to flood defense by installing an engineered floodwall, the Big U adopted largely nature-based solutions in the form of parks, bio-swales, rain gardens, and street plantings. Not only will these absorb and clean stormwater, cool the city, reduce air pollution, store carbon, and buffer noise, but they will also enhance recreational activities, improve mental health, provide green jobs and raise the quality of life of people living in and using these neighbourhoods. The planting mix was also carefully considered to feature native species, with a diverse selection of salt-tolerant trees, shrubs, and perennials to create a resilient urban habitat capable of enhancing biodiversity.

ADDITIONAL VALUE CREATED

- Total investment of the Big-U scheme is estimated at \$1.5 billion. This should be compared with the 44 human lives and \$19 billion in damages and lost economic activity caused by Superstorm Sandy in 2012.
- New York City increased flood resilience for future decades while creating new space for community planning, like bike paths.
- The scheme, although still ongoing, has already created significantly more and better green and open spaces for public enjoyment, and improved Manhattan residents and visitors health and wellbeing
- The project has also provided better access to housing, jobs and education, lower insurance rates, and further possibilities for economic growth in the city



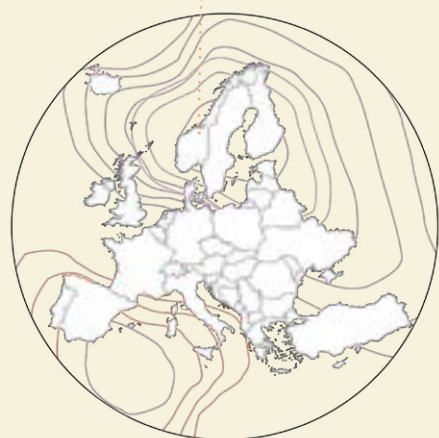


REMIEDIATING BROWNFIELD SITES

Image Source: Ginkgo | Porto Freixo

CASE STUDY

GINKGO ADVISOR^{50,51}



Established in 2010 in partnership with Edmond de Rothschild, Ginkgo Advisor has become a leading investment franchise dedicated to the remediation of brownfield sites and redevelopment of obsolete tertiary assets in Europe. Its investment philosophy is to “sustainably rebuild the city on the city”. It is highlighted here for its innovative approach to space utilisation and avoiding urban sprawl.

Now near to closing its third fund in 12 years, Ginkgo has cleaned up dozens of hectares of brownfields and contaminated sites, redeveloping them and “returning them to the city” by constructing hundreds of homes, offices and commercial premises. Its investment strategy involves acquiring well-located but environmentally impaired sites, remediating the land using innovative and environmentally conscious techniques, and redeveloping the sites to return them to economic and social use.

PEOPLE

Ginkgo is improving public health by reducing people's exposure to the harmful chemicals and poor-quality air associated with former industrial sites. It increases people's wellbeing by creating compact and well-connected mixed-use neighbourhoods.

TIME

Ginkgo strives to continuously improve its social and environmental impact through exploration and new partnerships. While focused primarily at the outset on the benefits of removing pollution and providing good places to live, the Ginkgo team is now looking to optimise its integration with, and impact on, the wider urban system, working with renowned architects as well as specialists in urban planning. Beyond their own operations, they explore possibilities to inspire other investors and developers with their approaches.

PLACE

Ginkgo's approach transforms derelict industrial land into vibrant and attractive neighbourhoods. It cooperates closely with local authorities to avoid urban sprawl, traffic congestion and pollution and bring distinctive, cohesive communities back to life. It aims to preserve and celebrate the most remarkable buildings and architectural features that are part of a site's identity, honouring the history of the places where it invests.

NATURE

Investing in disused urban sites avoids the need for building on greenfield sites, which in turn avoids the destruction of wildlife habitat and the fragmentation of remaining natural areas. Ginkgo also substantially increases the area of green space in the sites it redevelops. Materials from any demolition that takes place are reused wherever possible – for example, Ginkgo's redevelopment of a former power station in Porto, Portugal will directly reuse more than 85% of the demolition materials produced at the start of the project.

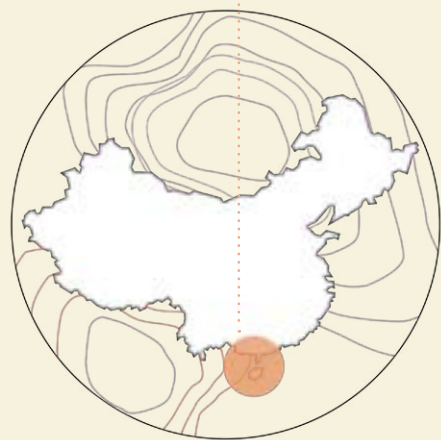
ADDITIONAL VALUE CREATED

- Project returns above three times the equity invested (over 12% IRR)
- Through its two funds closed to date, Ginkgo Advisor has achieved improved profitability by selecting central-urban sites with strong transport links and potential as mixed-use neighbourhoods
- By focusing on medium-sized cities in Europe's south-west (e.g. Lyon, Porto), Ginkgo's redevelopments are making a crucial contribution to creating a poly-centric, diverse Europe that extends beyond its capitals.
- By leveraging the EU's EIB-EIF funds for urban development and nature-based solutions, and by bringing in national development banks and institutional investors as well as private investors, Ginkgo is pioneering a financing structure that could be scaled by more actors for bigger achievements.



CASE STUDY

SPONGE CITIES ⁵²



A Sponge City uses features of the natural landscape to catch, store and clean water. Turenscape, a landscape architecture firm from Beijing, has implemented the concept throughout China. Its work on China's Hainan Island has transformed a former waste dump into the Meishe River National Wetland Park that now covers 14,000 square meters and can treat 5,000-8,000 tonnes of domestic sewage a day.



PEOPLE

Turenscape collaborated with local stakeholders to build consensus among leaders and citizens about the need to break through the inertia of grey infrastructure and gain local agreement to integrate flood accommodation zones, wetlands, parks and coastal habitats into a holistic, nature-based sponge system. The resulting plan created new public spaces for recreation and relaxation, fostering community cohesion and pride in the revitalised landscape.

TIME

Natural symbiotic solutions, such as those used in sponge cities, evolve naturally. The wetland park is now home to numerous species of plants and waterfowl that were not previously present. It uses the regenerative abilities of local ecological systems in resisting floods, regulating run-off and adapting to extreme climatic events. The plan drew on new as well as old techniques, from using recycled materials to reviving ancient pond-and-dike systems.

PLACE

Turenscape's approach reflected the knowledge and skills of ancient cultures. They developed forms of aquaculture and water management well adapted to the floods and droughts of their environment in the monsoon regions of China.

NATURE

The sponge system was planned to integrate the Meishe river with all its surrounding tributaries, wetlands and potential green spaces, and to separate storm water from sewage flows. Concrete flood walls and locks were removed. The blocked river was reconnected to the ocean so that tides could once again enter the city. Wetlands and shallow river margins were reconstructed so that mangroves could be restored.

ADDITIONAL VALUE CREATED

- Hainan Island is now more resilient to monsoon floods, the river water is clean again, mangroves are re-established, fish and birds have returned, and tens of thousands of people have visited the new landscape. The nature-based solutions showcased in this project are being replicated elsewhere.

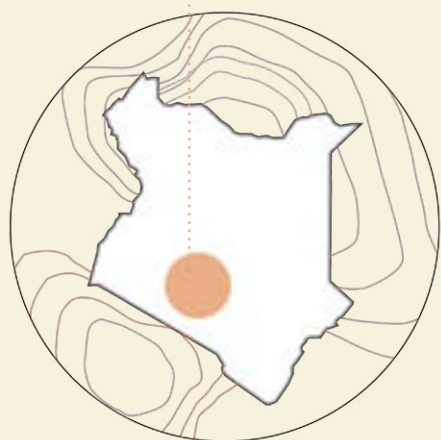




COMMUNITY CATALYSTS FOR
SOCIO-ECONOMIC RESILIENCE

KENYA

Image source: Kounkuey Design Initiative



Kibera is the largest urban informal settlement in Africa. Located in the south-west of Nairobi, it has 600,000 to 1 million inhabitants. Originally a patch of forest allotted to returning Nubian soldiers by the British colonial government, the settlement is prone to flooding from the neighbouring Ngong river and lacks waste collection, sanitation and other services. Given that so much building and infrastructure globally will take place within informal settlements this case study is particularly important to demonstrate how these can be regenerated to improve lives, livelihoods and natural living systems.

Among the many third-sector and government bodies trying to improve conditions in the settlement, the Kibera Public

CASE STUDY

KIBERA PUBLIC SPACE PROJECT

Space Project (KPSP) stands out for creating a network of community-managed public spaces. KPSP was started by the non-profit Kounkuey Design Initiative (KDI), which has so far coordinated 11 projects. These include sustainable drainage infrastructure, community buildings, spaces for small businesses and recreation, as well as facilities for sanitation and laundry. For instance, the initiative has overseen the installation of 520 meters of flood protection and 840 meters of drainage infrastructure. Several projects generate income: for example, in the form of sales from cooperatives, rent from kiosks, and fees from sanitation centres, offices and community centers. These income streams help to pay for the maintenance of project sites.

PEOPLE

'Raze and replace' has been the conventional route to upgrading impoverished urban areas in Kenya, but this often leaves communities displaced and disheartened. The KPSP takes the contrasting approach of 'asking, listening, collaborating and repeating' in a completely collaborative process that is led and managed by residents.

TIME

KDI sees building local capacity through each project as the key to maintaining them and being able to replicate them. Projects often involve local women and young people, helping them to generate income to maintain the sites while building their skills and enabling residents to create formal community leadership bodies.

PLACE

Meaning 'to know intimately', the name 'Kounkuey' reflects an approach that centres on local populations and their needs. It sees community-led design as key to rooting projects in place and gaining local support for them. At least 90% of the construction teams working on the projects are recruited locally and projects use local and natural construction materials wherever possible.

NATURE

KDI seeks to use natural or reused materials such as bamboo or recycled plastic waste and has used natural materials like bioswales to deal with flooding. Many of the projects include productive gardens: some as large as an urban farm, others as simple as vegetables grown in a recycled bathtub.

ADDITIONAL VALUE CREATED

- The main beneficiaries of added value from the KPSP initiative are the Kibera residents (users). So far, it has improved access to services and provided flood protection for more than 125,000 of them.
- It has also enabled them to gain valuable skills and created income-generating opportunities for some of the more disadvantaged groups, especially among local women and young people.
- Bringing Kibera residents out of poverty and giving them access to sanitation and other basic services has a knock-on value for the wider economy, as they are less prone to sickness and ill-health and more self-sufficient.
- Better flood protection and drainage will have substantial economic benefits through protecting crops and livelihoods.
- KPSP's people-centric approach to upgrading informal settlements is rippling out from Kibera; similar initiatives have sprung up across Nairobi and beyond.

Image source: Kounkuey Design Initiative



3

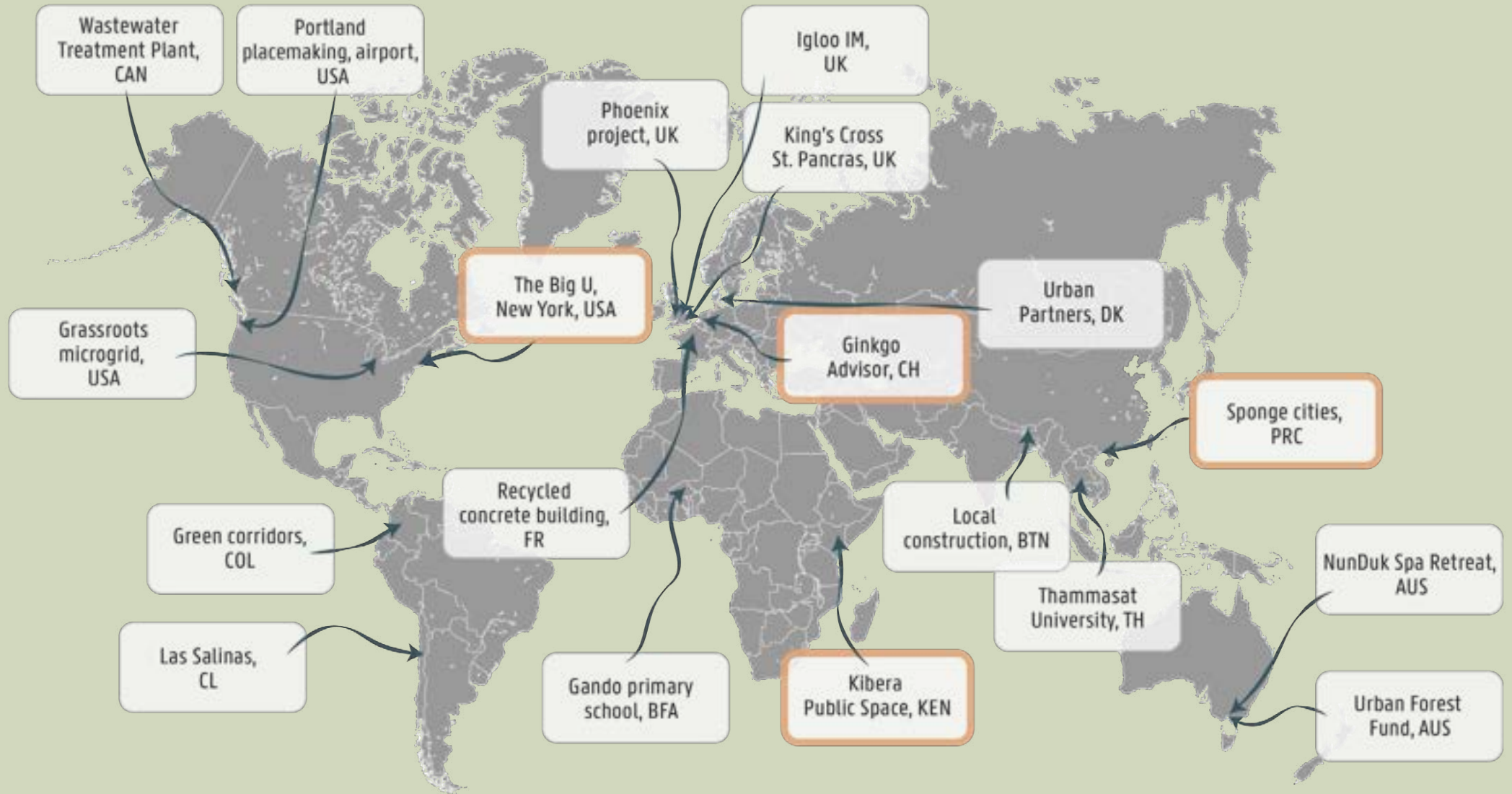
HOPEFUL SIGNS THAT THE TIDE IS TURNING

The growing number of projects around the world adopting regenerative practices are not the only hopeful signs of a shift in direction across the built environment sector (Figure 10). Exciting innovations among all the sector's key stakeholders suggest the tide is turning towards a more regenerative built environment:

- Governments are changing their planning requirements, regulations and procurement
- Financial institutions are developing new financing models
- The built environment industry is innovating along the whole length of its value chain
- Users are getting their voice heard – through changes in private sector client demand and citizen empowerment

Fig.3 / Map of regenerative project approaches emerging around the world

DEEP DIVE CASE EXAMPLES
 EMERGING SIGNS EXAMPLES



3.1

GOVERNMENTS – PLANNING, REGULATION AND PROCUREMENT

Regional, city and local governments have a crucial influence on the built environment sector for three reasons: their role in developing spatial plans that support economic, social and environmental goals across urban areas; their regulatory powers; and the scale of their investment and procurement affecting the built environment.

PLANNING

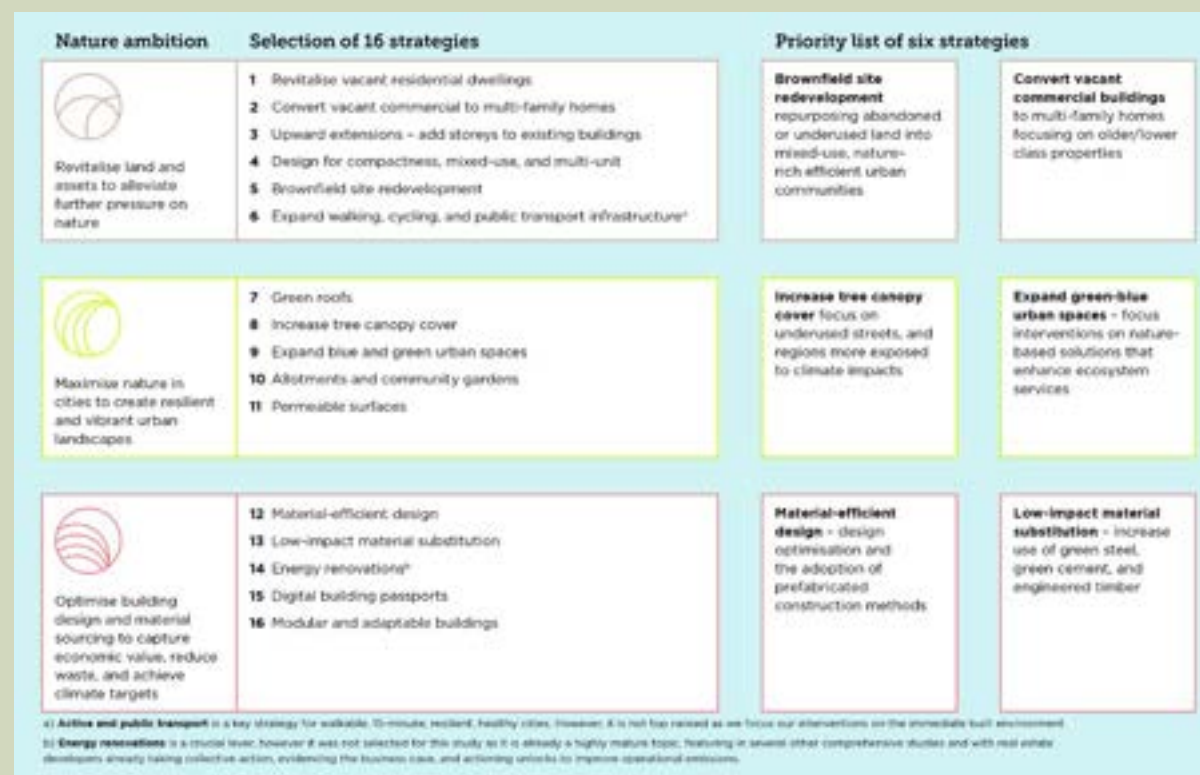
Public bodies increasingly take the lead in regenerating whole cities and neighbourhoods. Regional and national government bodies in developed economies are channelling international public finance towards urban renewal and regeneration schemes. For example, every year, the European Investment Bank dedicates 20-30% of its lending to build resilient cities for future generations, construct social and affordable housing and provide sustainable urban services.

As well as incentivising the local authorities and municipalities involved to step up and play their part, city governments increasingly work with private sector players

Figure 11 / Built environment levers for nature-positive outcomes (Image Source: Ellen MacArthur Foundation)

GUIDE OF BEST PRACTICES TOWARDS NATURE POSITIVE URBAN PLANNING AND DESIGN

3 NATURE-POSITIVE AMBITIONS, 16 STRATEGIES, 6 PRIORITIES



The Ellen MacArthur Foundation (EMF) has produced an important guide on the significant benefits of unlocking nature-positive, circular built environment practices across Europe. This report prioritises six levers amongst sixteen analysed, based on their potential to concurrently drive economic and nature-positive gains, as well as realise wider environmental and social outcomes.

These built environment levers reflect several of the key characteristics of a more regenerative business model: aiming to integrate with nature, putting people's needs and wellbeing first, improving local places, and evolving over time.

to leverage private sector finance and resources towards “city-wide” social, environmental and economic targets. For instance, there is a growing emphasis on reintegrating green and blue infrastructure into dense and highly populated cities, and a focus on avoiding further urban sprawl by planning to redevelop brownfield sites before encroaching on new ground.

As the link between nature and climate goals becomes increasingly well understood, examples of city-wide planning and urban greening decisions aimed at reintegrating nature into the existing urban fabric, and reconnecting people to natural spaces while improving climate resilience are growing in number.

CASE EXAMPLE

THAILAND

THAMMASAT
UNIVERSITY

Asia's largest urban rooftop farm, measuring 22,000-square-meters, at Thailand's Thammasat University incorporates modern landscape architecture with agriculture. It is inspired by traditional rice terraces of Northern Thailand. The cascading farm levels allow rainwater to be absorbed and stored to grow crops, while the green roof also filters rainwater naturally before it leaves

the site and reaches residential water sources and marine ecosystems. The roof has become a green public space, urban organic farm and outdoor classroom rolled into one. It is enabled by Holcim Elevate's UltraPly™ TPO thermoplastic membrane, which offers excellent durability, UV resistance and waterproofing.



CASE EXAMPLE

COLUMBIA

GREEN
CORRIDORS

Concern about air pollution and rising heat in Medellín, Colombia, prompted the city's government to plan a “Green Corridors” programme. Since 2016, the city has planted more than 30 green corridors that connect existing green spaces in and around the city. The \$16.3 million initiative is credited with reducing average temperatures in the city by 2°C in its first three years, improving air quality and bringing back wildlife.



Urban greening is the focus of the Biophilic Cities Network, which supports the growing number of cities making biophilic design part of their planning framework and practice. Cities as diverse and far apart as Colombo, Curridabat, Barcelona and Toronto belong to the network and are sharing policies to produce more vibrant, nature-filled cities.

REGULATION

Regulations aimed at creating a more regenerative built environment are still relatively rare, since recent environmental regulation has focused mostly on energy efficiency and carbon performance. That said, there are some examples of more ambitious policy and regulations aimed at encouraging the built environment sector to move beyond doing less harm and reintegrate nature into the urban fabric.

CASE EXAMPLE

USA

PORTLAND
PLACEMAKING

The city of Portland's placemaking initiative has engaged thousands of volunteers on more than 100 projects in and around the city. Portland Trails helps to shape the local physical and social

landscape by creating space and opportunities for people to participate in creating the public places they want. Portland Trails has been so successful that the approach is now deeply integrated with the official city regulatory and planning process, which advocates for all development to feature plans that support vibrant, walkable and connected neighbourhoods.



In the UK, the Public Services (Social Value) Act 2012 requires all public sector commissioning to factor economic, social and environmental wellbeing into all contracts relating (but not limited) to construction and facilities management.

CASE EXAMPLE

BHUTAN

LOCAL CONSTRUCTION

The Royal Government of Bhutan is considering setting the goal of creating a domestic, bio-based construction industry, which would entail regulations restricting the use of imported construction materials. It would aim to preserve the country's relationship with nature through prioritising the use of locally and responsibly-sourced timber and bio-based materials while building local capability and protecting Bhutan's rich cultural heritage.



CASE EXAMPLE

UNITED KINGDOM

KING'S CROSS ST. PANCRAS

The King's Cross Regeneration Program entails the transformation of a 27-hectare area in central London on former rail land. One of the largest regeneration projects in Europe, the thoughtful revitalisation of the place has attracted leading corporate tenants and has turned a disused area of London into a new vibrant urban space. The design preserved the district's industrial architectural heritage, including three large gasholders built in 1867, that now house 145 residential apartments. The external walls are clad with 180 precast Ductal® ultra-high performance concrete panels from Holcim.



INVESTMENT & PROCUREMENT

Governments are increasingly recognising their purchasing power and procurement as powerful engines of environmental, social and economic value creation. Through their ownership of land, public bodies can demand higher thresholds of performance from firms bidding to develop that land, and some are pushing for more regenerative outcomes in this way.

Similarly, public bodies recognise the substantial leverage they can deploy through their own procurement of products and services. In the 12 months to September 2021, public sector authorities in the UK alone spent a record £29 billion with construction suppliers, 15% more than in the previous year. Among OECD countries, 69% are already able to measure the results of introducing green public procurement policies and strategies.

Scape UK is a non-profit whose entire business is devoted to providing public sector commissioners with procurement frameworks for consultancy, civil engineering, construction and utilities that “deliver their essential projects compliantly and collaboratively, with community at their heart”.⁵³ This type of centralised single framework for bulk procurement of public sector spending is able to ‘bake in’ more regenerative outcomes (in this case, social value) from the outset – bringing consistency and certainty to the process.⁵⁴

CASE EXAMPLE

UNITED KINGDOM

SUSTAINABLE CONSTRUCTION PROCUREMENT

The 2012 London Olympics had an ambition to be the “greenest Games of modern times”. The focus for both national and local government bodies was to use the event to accelerate the regeneration of East London, and specifically to drive ambitious environmental and social outcomes through sustainable procurement practices. As part of its legacy, the Olympic Delivery Authority published a sustainable procurement guide⁵⁵ to help procurers in central government and the wider public sector manage construction procurement in a way that achieved positive improvements for people,

nature and place. This long-sighted approach to the Olympic Games 2012 delivered economic growth to the area three times greater than expected before the games, almost 40% growth in local employment, and more than GBP 400 million of investment.⁵⁶ Furthermore, the 2012 Olympic games contributed not only to economic growth but also to nature regeneration. For instance, the construction of Queen Elizabeth Olympic Park established a 45-ha habitat patch and reached different biodiversity goals, such as the support to specific species, the restoration of wetlands and the enhanced connectivity between the Lee River Valley and the rest of the city.⁵⁷



3.2

THE BUILT ENVIRONMENT INDUSTRY - INNOVATION ALONG THE VALUE CHAIN

The built environment industry has traditionally had extremely small R&D budgets and a cautious approach to innovation. That said, some of the innovations now gaining traction in the industry, notably in digital tools,

materials science and business practices, have enormous potential to support regenerative outcomes for people and planet.

DIGITAL INNOVATION

Generative AI has the potential to transform the process of urban development and spatial planning. For instance, Aretian has developed complex modelling and digital-twin-enabled algorithms to inform urban spatial designs, asset utilisation plans, optimal density ranges and building types, and master-planning decisions. This cutting-edge technology enables interconnected decision-making that can maximise the socio-economic and environmental benefits of multiple built environment projects and deliver previously untapped value. Generative AI could unlock an estimated \$110 –180 billion or more in value for the real estate industry.⁵⁸

Digital tools are also transforming stakeholder engagement programmes, enhancing their reach and accessibility. Maptionnaire's web-based mapping tool allows users to create interactive surveys and gather geospatial data from communities. Similarly, the digital platform Involve equips organisations and governments to involve citizens in decision-making by providing online forums, surveys, collaborative document editing and event management tools.

MODERN MATERIALS SCIENCE

Meanwhile, science is rapidly producing lighter, stronger, re-useable, more climate, health- and nature-friendly materials. Alcem, a Berlin-based software company, offers concrete optimisation software that enables continuous analysis of quality-relevant data from chemistry, mineralogy and particle-size distribution to optimise cement and concrete production and feed recycled materials back into the manufacturing process.⁵⁹

CASE EXAMPLE

FRANCE

RECYCLED CONCRETE BUILDING

Holcim and Seqens, a leading provider of social housing in France, have partnered to build Recygénie, the world's first fully recycled concrete building. All of the material components (cement, aggregates and water) are made of recycled materials. Built with this unique recycled concrete solution, Recygénie represents a breakthrough in circular construction. Overall, the use of this 100% recycled material will save more than 6,000 tons of natural resources, and enable the construction of over 70 social housing units just outside Paris.



Increasingly, natural materials and nature-based solutions are being scaled to meet growing demand in development, construction and adaptation. Strong by Form is a leading bio-composite technology company that creates lightweight structural solutions by fusing timber with other materials to form advanced composites.

CASE EXAMPLE

USA

PORTLAND AIRPORT

Portland airport's new roof, spanning 35,000 square meters, was treated as a unique opportunity to reflect the identity of the city of Portland. Innovative sourcing and design strategies were used to source wood sustainably from local forests. As a result, more than 90% of timber used in the roof came from regenerative forest within 600 kilometres of the airport, much of it managed by indigenous communities.⁶⁰



BUSINESS PRACTICE INNOVATION

Several forward-thinking firms in the construction sector are now recognising the commercial opportunities of a more sustainable economy. Some

are changing their business models to embrace the practice of circularity, for example by introducing 'X-as-a-service' products or material recovery practices. The Building Deconstruction Institute in Washington has trained thousands of construction professionals in various aspects of the reuse industry including deconstruction, re-manufacturing, creating reclaimed value-added products, designing for disassembly, and running a reuse store.

Some firms are forming new collaborations to agree innovative performance contracts with KPIs that include ambitious, long-term regenerative outcomes. For instance, Delta Development at its Park 2020 scheme in Netherlands (designed by William McDonough + Partners) was one of the world's first commercial real estate development firms to adopt the 'C2C Cradle to Cradle philosophy. In all its projects it aims to adopt the William McDonough + Partners design principles of 'design for next use'; 'design for disassembly'; 'design buildings as material banks'.

In Kenya, developer/designer BuildX Studio led feasibility teamwork that revealed a potential mass market in East Africa for timber buildings. The project collaborated with a range of new partners to win political buy-in, supporting policy changes and public backing for the new market, as well as to coordinate the supply of sustainable timber for building at scale. It established the region's first cross-laminated timber (CLT) processing factory and has constructed CLT buildings across Kenya.⁶¹

CASE EXAMPLE

BURKINA FASO

GANDO PRIMARY SCHOOL

The Gando Primary School was built to expand the sparse network of schools in the province of Boulgou, in the east of Burkina Faso. It addressed two problems facing many educational buildings in the area: poor lighting and poor ventilation. Traditional building techniques and modern engineering methods were combined to produce the best building solution while simplifying construction and future maintenance. The project's success is credited to the active participation of the local population in the construction process. It was led by the internationally renowned architect Diébédo Francis Kéré, who was raised in Gando. His practice Kéré Architecture is "driven by a commitment to understanding the particular needs of a given context...we fine-tune our way of building for each of our projects, using local knowledge and resources as our tools."



3.3

FINANCIAL INSTITUTIONS -
NEW FINANCING MODELS

Major capital providers and institutional investors now recognise the potential for attractive investment opportunities in the energy and nature-positive transitions. To facilitate such opportunities, they are developing novel financing models based on new metrics for tracking social and environmental impact alongside financial risk and return. Existing models for capturing financial value from social infrastructure projects are being adapted for regenerative developments, generally by the public entities co-ordinating these developments. One such model is tax increment finance, in which a public entity relies on future increases in land taxes from a developed area to raise debt to fund the necessary improvements. These will raise the value of land in the area, increasing the taxes it generates, allowing the public entity both to repay the debt and spend more on community and environmental improvements.

Finding more ways to capture and share new value created by regenerative approaches is key to scaling them across the built environment sector. Public-private risk sharing, distributive profit-sharing and new assets are three approaches attracting interest.

PUBLIC-PRIVATE RISK
SHARING VEHICLES

It has become commonplace for governments to give financial support to construction projects that can deliver significant public benefits. New vehicles are now emerging specifically for urban regeneration and infrastructure finance. One such is Denmark's Public Asset Corporation, which evolved from the Copenhagen City & Port Development Corporation, a publicly owned privately managed institution that leverages public assets through land value capture and public-private partnerships. City & Port also leases and sells land to private investors at market prices. The money raised has served the community and reduced road traffic emissions by funding a city-wide metro system.



CASE EXAMPLE

UNITED KINGDOM

GREATER
MANCHESTER
ENVIRONMENT
FUND

Manchester City Combined Authority, England, launched the Greater Manchester Environment Fund⁶² in partnership with two environmental non-profits to help finance the city's ambitious urban regeneration plans. The fund provides a mechanism for collecting and distributing funds for natural environment projects in the region. It aggregates or blends funding from national and municipal governments, donors and private investors, while helping developers to design investable projects and giving them the technical assistance they may need to access the blended finance available. Innovative financial models include pilots for 'habitat banking' and a carbon mitigation facility that can accredit and sell carbon credits to corporates while restoring green capital. It has connected project developers to more than £5Mn of private investment, over £15Mn of national funding and £2.6Mn local public funding.



CASE EXAMPLE

AUSTRALIA

URBAN FOREST
FUND

In 2017, the City of Melbourne launched a novel Urban Forest Fund to increase green cover on the 75 per cent of land in the city which is privately owned. The fund aims to incentivise enough private investment to realise the city's goal of \$10m of private-public funding for "greening above and beyond existing council capital works investment". Residents, business owners and developers can apply to the fund for a 'habitat grant' of up to \$500,000 for greening private land. Each grant is matched by public funding, dollar-for-dollar. The scheme has provided \$1.7m so far to around 12 projects.⁶³



DISTRIBUTIVE PROFIT-SHARING

To overcome growing inequalities and concerns about financial exclusion, some built environment businesses are developing more distributive business models, where the returns on investment flow to a wider group of beneficiaries than in conventional models. Residential

developer Home.Earth is set up as an 'evergreen' real estate company, meaning it will own its assets in perpetuity, so it is able to optimise investment decisions for long-term performance across design, maintenance, technology and more. This approach ultimately yields a better financial return for investors, enabling Home.Earth to direct 15% of the profits from its projects back to residents, which reduces conflicts between renters and owners and keeps occupancy rates high. The project's financial performance so far is in line with its target 10-14% IRR over 10 years.⁶⁴

Similarly, Denmark's co-ownership scheme for wind farms has accelerated their uptake across the country because communities where turbines are located get a share in the profits. Renewable wind power now generates 54% of all electricity in Denmark compared to 10% in 2001, when the scheme started.⁶⁵

NEW ASSET CLASSES

Financial innovators are packaging new products that attract investors who want to maximise social and environmental impact in particular locations as well as financial returns. Funds raised from these place-based impact assets are directed to local regeneration, clean energy, affordable housing and nature restoration projects that deliver neighbourhood renewal and sustainable development at a local level.

CASE EXAMPLE

UNITED KINGDOM

IGLOO IM

For instance, igloo Investment Management (IM) is a subsidiary of igloo, a developer of sustainable mixed-use neighbourhoods for communities in the UK. igloo IM manages third-party funds in the real estate, sustainable development and urban regeneration sectors as well as investments in some of its parent company's development projects. igloo IM aims to become the UK's leading manager of "urban, active and non-core investment strategies", where 'active' means expecting "to create returns, rather than merely extract returns" and 'non-core investments' are projects "in emerging areas, edge-of-city districts and locations with the potential to be special rather than with nowhere left to go". Through their Footprint methodology, they have embedded regenerative design and development principles into place-making by embracing the unique fabric and identity of each of the places they invest in, thereby helping to realise potential, unlock long-term value and build social capital.



CASE EXAMPLE

DENMARK

URBAN PARTNERS

Urban Partners invests in real estate solutions that are entirely designed for the specific needs of customers and end users. They take pride in all their assets being different and unique precisely because they address different problems. With €20bn assets under management, they are making cities greener and more liveable. They have a particular focus on decarbonising solutions and addressing societal challenges. Urban Partners' latest fund has raised €3.65bn, making it the largest-ever European value-add real estate fund. It attributes this success to having proven the commercial upside of being a change-maker.



to implement a regenerative development process. NunDuk aims to reverse ecological degradation caused by salt incursion into Lake Wellington and to be entirely water, energy and waste self-sufficient. Its initial vision was to become a master-planned regional community, but it amended this goal to a smaller, tourism-based development in response to political, financial and practical considerations. The project is co-creating a relationship of mutual benefit with the landscape and its environment. It has been awarded an enabling infrastructure grant from Regional Development Victoria's Tourism Infrastructure Program – Flagship projects.

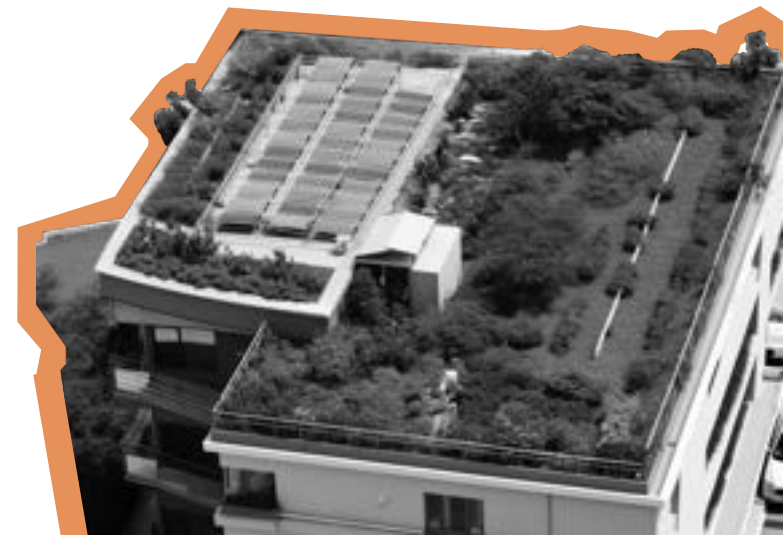


CASE EXAMPLE

AUSTRALIA

NUNDUK SPA
RETREAT

NunDuk Spa Retreat is a luxury development on Lake Wellington, approximately 200 km east of Melbourne, Australia. It was one of the first projects in Australia



3.4

USERS – CORPORATE COMMITMENTS AND CITIZEN EMPOWERMENT

A small number of private corporations are now seriously challenging themselves to become more regenerative businesses. Some are applying a regenerative approach to the buildings they commission or procure.ⁱⁱ Meanwhile, wider citizen empowerment is giving end users of built structures a bigger say in – and, in some cases, ultimate control over – their design and operation.

CORPORATE COMMITMENTS

Although most businesses have recently focused on becoming more sustainable,ⁱⁱⁱ some corporates recognise the need to go beyond ‘doing less harm’ and are taking a more regenerative approach to all their business decisions – real estate included.

For instance, carpet manufacturer Interface has piloted a “Factory as a Forest” project in Australia, where the factory provides positive ecosystem services to its surrounding area, such as clean air and energy, potable water, carbon sequestration and nutrient cycling. Drawing on insights from this pilot, Interface has partnered with Biomimicry 3.8 to design changes to its US factory outside Atlanta, Georgia that make this factory function more like a high-performing ecosystem.

Clothing brand Patagonia’s sustainable building principles also incorporate aspects of regenerative thinking. They favour the reuse of existing buildings over new builds and require on-site landscaping to incorporate functioning native ecosystems and promote biodiversity. They also try to include areas for agriculture and outdoor activity on their sites, as well as considering regional water issues including water scarcity, drought, natural weather patterns and the effects of climate change on water supply.



CASE EXAMPLE

CHILE

LAS SALINAS, VIÑA DEL MAR

The owner of this contaminated industrial site, previously home to a power station, is Empresas Copec, one of Chile’s largest energy companies. Located within a declining tourist destination, the firm turned around heavy local opposition to the site’s redevelopment by co-creating a ‘story of place’ with a wide variety of community interest groups. The vision for the redevelopment is rooted in local history.

More than 40% of the area is destined for public use, and it will include better facilities for pedestrian transport, culture and sports, along with an extensive system of green areas and infrastructure connecting the coast with the upper sector of Viña del Mar. The benefits of this collaborative process included a reduction in approval time and cost, avoiding years of likely legal delays. Construction is expected to begin in 2024.



ii Movers Coalition for cement and concrete have committed to net zero cement and concrete forming at least 10% by volume of their annual cement and concrete procurement (Orsted, General Motors, Vattenfall and ETEX) have all signed up*

iii Private companies are increasingly committing to science-based targets for climate (SBTi) and nature (SBTN) and reduced water usage (WASH). Members of the World Economic Forum’s First Movers Coalition for cement and concrete have committed to net zero cement and concrete forming

CITIZEN EMPOWERMENT

Around the world, more and more people are collaborating in the places where they live to influence decisions about local infrastructure and the public spaces they experience. A growing body of research shows that involving local communities in the planning and design of local projects creates more long-term value – not only for citizens, climate and nature, but also for the private sector. Planning applications are less contested, prospective tenants and residents are easier to convert into actual occupants, and end users are often happier with the results, reducing rework and repair costs.

CASE EXAMPLE

UNITED KINGDOM

PHOENIX PROJECT

The Phoenix project brought forward by Human Nature, a campaigning development company, has gained planning approval for a 685-home timber neighbourhood in the South Downs National Park. Approval was readily given because Human Nature had won the support of the local community. The company demonstrated the project's short- and long-term value to local residents, partly by hosting a series of inspiring events, consultations and workshops at their local office.⁶⁷ The design of

this new neighbourhood factors in wide-ranging regenerative aspects including a community canteen, workspace and makers' studios, many of them housed in repurposed industrial structures. Shared courtyards, parks, green corridors and rooftop gardens will enable social interaction, promote communal living and provide habitats for local wildlife.



Progressive cities and municipalities are themselves finding new and innovative ways to engage their citizens in co-designing projects, recognising the value this can bring to all stakeholders. Barcelona provides an open source digital platform, Decidim, to make it easy for citizens to participate in planning decisions on projects affecting them, from the design of a small public space to the allocation of project budgets.



CASE EXAMPLE

USA

GRASSROOTS MICROGRID, DETROIT

Grassroots Microgrid in Detroit, USA, is a community-driven neighbourhood planning project and recipient of the Holcim Awards Gold 2017 for North America. The project showcases how environmental regeneration goes hand in hand with building stronger, more engaged and more resilient communities that both nurture and are nurtured by their corner of the city. The design framework addresses infrastructure (energy, water, food, water and mobility) and renewable systems (workforce development, empowerment, education, culture and economic development). The components of the project include solar power generation, rainwater collection and urban farming. These all make the neighbourhood more attractive for renters and potential home-owners, accelerating urban recovery.



CASE EXAMPLE

CANADA

IONA ISLAND WASTEWATER TREATMENT PLANT, VANCOUVER

The Iona Island Wastewater Treatment Plant was built in 1963 and today serves approximately 750,000 residents in the Vancouver Area. Metro Vancouver, the regional municipality, recognised the potential of refurbishing the plant to regenerate ecosystems and cultural relationships. One new aim for the refurbished plant is to “Save the Orca Whales”. Unusually for an infrastructure project, extensive community engagement and consultation at the outset produced a vision of ecological restoration for diverse and sensitive ecosystems that would also build climate resilience, integrate the wastewater treatment plant and the Iona Island Regional Park as a whole, and increase park visitors' connection to nature.



Many communities are organising themselves to increase local resilience and share common resources. For instance, hundreds of local Doughnut Economics Action Labs groups and networks have sprung up around the world. Similarly, the Transition Network is a movement of community-led groups working for a low-carbon, socially just future with resilient communities, more active participation in society, and a caring culture focused on supporting each other. These self-organised communities are using participatory methods to take control of setting up local renewable energy projects, re-localising food systems and creating community and green spaces.

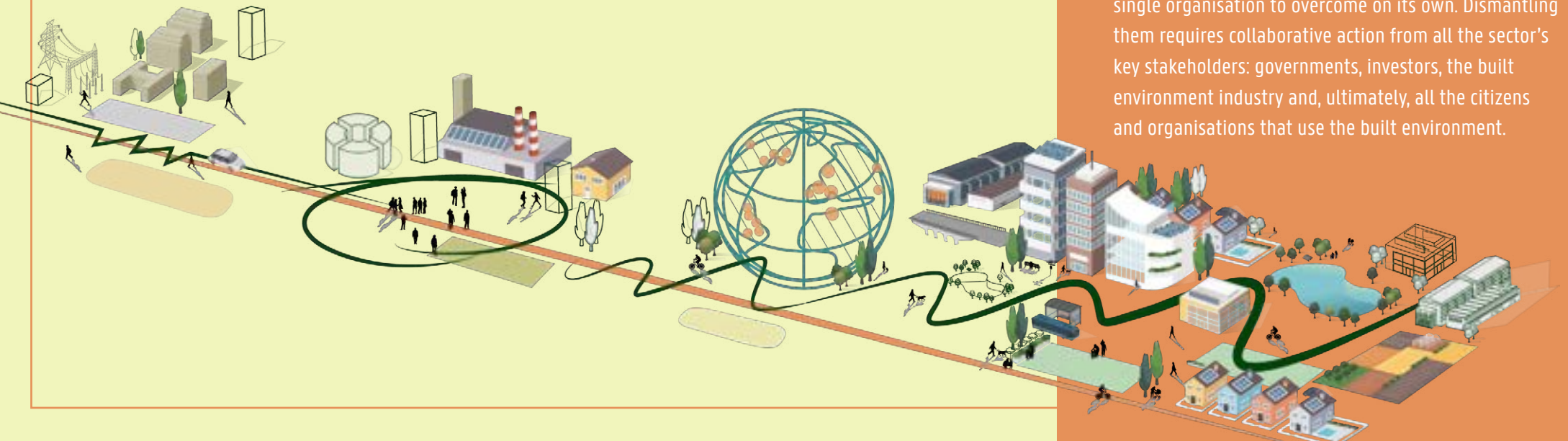
All the examples in this chapter and the cases in Chapter 2 are signs of growing momentum in the built environment sector for putting regenerative theory into practice. How to build that momentum is the subject of Chapter 4.

4

UNLEASHING A REGENERATIVE REVOLUTION




Chapters 2 and 3 show that a regeneration revolution has quietly started in the built environment sector. There are hopeful signs of regenerative practices gaining ground among key built environment stakeholders. But regenerative practice is still very much the exception rather than the rule. This chapter focuses on what can be done to unleash that regeneration revolution across the sector, so it becomes fundamental to solving today's pressing environmental and social problems.

Early adopters of a more regenerative approach are encountering consistent barriers – the principal ones having been introduced in Chapter 2 already. Being systemic in nature, these barriers are difficult for any single organisation to overcome on its own. Dismantling them requires collaborative action from all the sector's key stakeholders: governments, investors, the built environment industry and, ultimately, all the citizens and organisations that use the built environment.



We propose three initiatives to tackle these barriers, and rapidly scale the adoption of regenerative built environment practices across the sector. Each initiative combines cross-sector collaboration with building on existing sector initiatives. They are intended to trigger further conversations among the relevant actors identified and other interested participants.

Figure 11 / Cross-sector initiatives to scale the adoption of regenerative environment

		Key system barriers addressed				
A JOINED-UP ACTION AGENDA		Low Awareness	Metrics	Vested Interest	Planning	Capital & finance
I	 <p>PIONEER & MEASURE</p> <p>Form a coalition of pioneers to experiment with regenerative frameworks and metrics on live built environment projects, and capture all types of value created</p>	●	●	●	●	●
II	 <p>EMPOWER PLANNING</p> <p>Create open-source technology enabled planning resources that cities, local municipalities and planning authorities can use to model & map positive built environment outcomes for people & nature in the places that they operate in</p>	●	●	●	●	●
III	 <p>SCALE FINANCE</p> <p>Establish large-scale urban regeneration projects as a target asset class for public and private finance, to attract more investors seeking to create broader financial, environmental and socio-economic value</p>	●	●	●	●	●

PIONEER & MEASURE
 Form a coalition of pioneers to experiment with regenerative frameworks and metrics on live built environment projects, and capture all types of value created.

PRACTICAL EXECUTION

This regenerative built environment Pioneers Coalition would bring together the most ambitious pioneers from across each of the four main stakeholder groups: cities or local government authorities; private-sector built environment businesses (ideally representatives from different sub-sectors); financial institutions; and users of built assets in the form of corporations that have a very significant built environment footprint (eg, real estate occupiers or energy generators or tech giants). Each pioneer would need to commit to piloting and experimenting with regenerative built environment approaches on real built projects (both existing and new buildings and infrastructure). Most importantly, they would commit to sharing lessons

learned and finding new ways of capturing the additional value created for their own businesses, local communities, nature, and the places where the built projects are located. The work of the Pioneers Coalition should build on and further develop ongoing efforts to put financial values on natural capital and social impact.

KEY TASKS FOR PARTNERS IN THE REGENERATIVE BUILT ENVIRONMENT PIONEERS COALITION

- Establish a set of shared regenerative built environment principles (based on the model put forward in this paper)
- Agree on a series of metrics and outcomes for measuring both the impact / outcomes generated and value created
- Adopt both the principles and the metrics in at least one live built environment project and commit to measuring the value created for different beneficiaries
- Participate in regular coalition meetings to share learnings and experiences, knowledge and toolkits

Over time and as confidence builds, the Pioneers Coalition may wish to consider establishing local, place-based regenerative built environment coalitions that draw on the lessons being learned but work at a more community- and place-based scale.

EXISTING INITIATIVES TO BUILD UPON

- Ellen MacArthur Foundation's Landmark 'Building Prosperity'
- International Living Building Institute (custodian of the Living Building Challenge standard)
- C40 Green and Thriving Neighbourhoods programme
- 'World Resources Institute ROSS Centre for Cities'
- LSE Cities (and other university / academia platforms)
- UKGBC Regenerative Places programme (home retrofit led)
- Capitals Coalition
- Science-Based Targets Nature target for Cities (SBTN)

The Pioneers Coalition would benefit from the involvement of some of the leading practitioners in this field – several of whom were interviewed for this paper – through some form of advisory council. The Pioneers Coalition needs to convene a group of these regenerative thinkers and doers to support, challenge and critique the ongoing work, ensure rigour is applied in the shared frameworks and tools, and build their credibility.

REGENERATIVE THOUGHT LEADERS TO ENGAGE WITH

- Regenesis Group
- The Really Regenerative Centre CIC
- Sarah Ichioka & Michael Pawlyn
- William McDonough + Partners
- Green Living Projects
- Dark Matter Labs

EMPOWER PLANNING

Create open-source technology-enabled planning resources that cities, local municipalities and planning authorities can use to model and map positive built environment outcomes for people and nature in the places where they operate.

built environment design, underpinned by big data, productivity in cities can as much as double when combined with city-wide economic development strategies. There is real potential in city planners and local government authorities openly sharing tools and technologies that would allow them to adopt such progressive, technology-enabled urban planning and zoning strategies. Potential open-access resources and platforms that are readily available to subnational governments and urban professionals include the Making Nature's City Toolkit and the IUCN Urban Nature Indexes.

KEY TASKS TO ESTABLISH OPEN-SOURCE, TECHNOLOGY-ENABLED PLANNING RESOURCES

- Tap into the start-up / innovator / VC community to identify and evaluate technology platforms with potential to transform the urban planning discipline through data and AI-enabled algorithms (among others).
- Create common tools, resources and case studies for city representatives, planning departments (national, regional, local), and urban planners to use for regenerative planning purposes.
- Engage with a wide network of urban planning aggregator platforms to showcase such tools, resources and case studies and raise awareness of

the potential of urban planning for more regenerative outcomes to create value for people, place and nature.

EXISTING INITIATIVES TO BUILD UPON

- Ellen MacArthur Foundation's Landmark 'Building Prosperity'
- C40
- Apolitical
- Global Covenant of Mayors for Climate & Energy (GCoM)
- NetZeroCarbon Cities Alliance
- URBACT
- URBED
- Nordic Neighborhood Lab

PRACTICAL EXECUTION

Throughout the extensive interviews conducted for this work, interviewees repeatedly identified urban planning and zoning as critical to scaling more regenerative built environment approaches. As Chapter 3 highlighted, there are now several emerging data-based innovations and tools that can help to map the unique potential of particular places. But many urban planners and urban authorities don't know of their potential – or even their existence.

CityScience shows that with good urban planning and

SCALE FINANCE

Position large-scale urban regeneration projects as a target asset class for public and private finance, to attract more investors seeking to create broader financial, environmental and socio-economic value.

There are two opportunities here. One is to adapt conventional real estate ESG evaluation criteria to include regenerative and systemic risk; the other is to position integrated, city- or neighbourhood-wide urban regeneration projects, like many of those cited in this paper, as a new asset class for targeted investment. At present, such projects rarely qualify for inclusion in conventional real estate or infrastructure investment funds. Both measures would raise the amount of capital available for regenerative built projects and target the finance raised at assets that demonstrate real regenerative performance.

- Engage with mainstream real estate investment and fund managers to encourage them to adopt new fund strategies targeted at large-scale urban regeneration and neighbourhood renewal projects.

EXISTING INITIATIVES TO BUILD UPON

- Ellen MacArthur Foundation's Landmark 'Building Prosperity'
- Leaders of the Urban Future (LOTUF)
- EBRD Green Cities Action Plan programme
- European Investment Bank Circular Cities Advisory hub

KEY TASKS FOR THIS INITIATIVE WOULD BE:

- Make the case for investment in regenerative urban projects – in particular their potential to generate stable returns for investors (ie land price, IRR) as well as creating considerable societal and economic value.
- Engage public institutions, regional development banks and providers of regeneration funds to encourage them to allocate more funding to large-scale urban regeneration and neighbourhood renewal projects.
- Engage with ESG professionals in institutional investors to educate them about, and raise their awareness of, the potential for regenerative built environment projects to satisfy ESG investment criteria.

PRACTICAL EXECUTION

ESG goals have become increasingly important to real estate investors over recent years. On the whole, however, investors are not yet applying granular criteria to real estate assets when evaluating their environmental and social performance. For instance, they may simply require built assets to have green building certificates; this misses the potential of such assets to improve urban spaces, revitalise neighbourhoods and avoid urban sprawl when they take a more broadly regenerative approach. It also overlooks the risk that assets which do not take an explicitly regenerative approach may degrade society and the environment.

Endnotes

EXECUTIVE SUMMARY

- 1 European Commission Joint Research Centre. (2019). [Atlas of the Human Planet](#).
- 2 [UN Habitat](#)
- 3 OECD. (2021). How Was Life? New Perspectives on Well-being and Global Inequality since 1820. Volume II, [chapter 9](#).
- 4 Bartram, J., Brocklehurst, C., Fisher, M. B., Luyendijk, R., Hossain, R., Wardlaw, T., & Gordon, B. (2014). [Global monitoring of water supply and sanitation](#): history, methods and future challenges. International journal of environmental research and public health, 11(8), 8137–8165.
- 5 United Nations. [Water and sanitation - united nations sustainable development](#). United Nations.
- 6 Oxford Economics and Global Infrastructure Hub. (2018). [Global Infrastructure Outlook](#).
- 7 International Energy Agency. (2021). [Net-Zero by 2050: A Roadmap for the Global Energy Sector](#).
- 8 Global human-made mass exceeds all living biomass, 2020, [Elhacham et.al](#)
- 9 Global Alliance for Sustainable Buildings and Construction (2022) [2022 Global Status Report for Buildings and Construction](#)
- 10 MCC (2024), [That's how fast the carbon clock is ticking](#)
- 11 IEA (2022), [Global Energy Review: CO2 Emissions in 2021](#)
- 12 Systemiq & NREP. (2021). [Better Finance, Better Built Environment](#).

CHAPTERS

- 13 UNOPS (2022). [Inclusive Infrastructure for Climate Action](#)
- 14 OECD (2021), [How Was Life? Volume II: New Perspectives on](#)

[Well-being and Global Inequality since 1820](#), OECD Publishing, Paris

- 15 UN-Habitat. (n.d.) [Housing rights](#).
- 16 OECD (2021), [How Was Life? Volume II: New Perspectives on Well-being and Global Inequality since 1820](#), OECD Publishing, Paris
- 17 UNEP (n.d.) [Sustainable Buildings](#)
- 18 International Energy Agency. (2021, May). [Net Zero by 2050: A Roadmap for the Global Energy Sector](#).
- 19 ESPAS. (2018). ESPAS - Global Trends to 2030. [Europa.eu](#)
- 20 World Economic Forum. (2018, March). [The world needs to build more than two billion new homes over the next 80 years](#).
- 21 UNOPS (2022). [Inclusive Infrastructure for Climate Action](#)
- 22 ESPAS. (2019). ESPAS - Global Trends to 2030. [Europa.eu](#)
- 23 World Economic Forum. (2018, March). [The world needs to build more than two billion new homes over the next 80 years](#).
- 24 IEA (2021) [Net Zero by 2050: A Roadmap for the global Sector](#)
- 25 Systemiq & NREP (2021) [Better Finance, Better Built Environment](#)
- 26 ETC (2023) [Material and Resource Requirements for the Energy Transition](#)
- 27 GCA (2021) [State and Trends in Global Climate Finance 2023](#)
- 28 Measured by power consumption forecast - McKinsey & Company (2023) [Why invest in the data center economy](#)
- 29 McKinsey & Company Global Infrastructure Initiative. (July 2021). [‘Seizing the decarbonization opportunity in construction’, Voices on Infrastructure, Preparing for energy transition in infrastructure](#).
- 30 Oughton, E., Amaglobeli, D., & Moszoro, M. (2023). [Estimating Digital Infrastructure Investment Needs to Achieve Universal Broadband](#). IMF Working Papers, 2023(027), A001.
- 31 Analysis by the Energy Transitions Committee based on Global Alliance for Sustainable Buildings and Construction. (2022). [2022 Global Status Report for Buildings and Construction](#).

- 32 Linde, L., Nilsson Lewis, A. and Sanchez, F. (2022). [Towards a sustainable global construction and buildings value chain. Policy brief. Leadership Group for Industry Transition, Stockholm](#).
- 33 European Mortgage Federation et al. (2022). [Hypostat 2021: A review of Europe's Mortgage and Housing Markets](#).
- 34 Eurostat, “Archive.”
- 35 Eurostat, “Archive”
- 36 UNEP (2024) [Global Resources Outlook](#)
- 37 UNEP (2024), [Global Resources Outlook 2024: Summary for Policy-makers by the International Resource Panel](#). Nairobi, Kenya.
- 38 European Environment Agency. (2017). [Perspectives on transitions to sustainability](#).
- 39 UNFCCC Climate Champions. (n.d.). [Race to Zero](#).
- 40 International Energy Agency. (2023, July 10). Smart grids. IEA. <https://www.iea.org/energy-system/electricity/smart-grids>
- 41 Elhacham, E., Ben-Uri, L., Grozovski, J., Bar-On, Y. M., & Milo, R. (2020). [Global human-made mass exceeds all living biomass](#). Nature, 588(7838), 442-444.
- 42 Global Alliance for Sustainable Buildings and Construction (2022) [2022 Global Status Report for Buildings and Construction](#)
- 43 MCC (2024), [That's how fast the carbon clock is ticking](#)
- 44 IEA (2022), [Global Energy Review: CO2 Emissions in 2021](#)
- 45 Gitnux (2023). [Global Homelessness Statistics: Market Report & Data](#).
- 46 WHO (2021) [Air quality, energy and health](#).
- 47 Intergovernmental Panel on Climate Change. (2022). [Climate Change 2022: Mitigation of Climate Change](#). Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, Eds.). Cambridge University Press.
- 48 [Loneliness Survey](#) commissioned by the charity Eden Project Communities as part of its Big Lunch initiative. Dec 2022.
- 49 Brown, Martin & Battisti, Carlo & Vanner, Ann & Vula, Blerta &

- Sonetti, Giulia & Šulc, Ivan & Weinstein, Zvi. (2021). [RESTORD 2030 A Regenerative Guide for Educators Students and Practitioners EDITORS.](#)
- 50 Ginkgo Advisor. (2023). Ginkgo Workbook . [Ginkgo Advisor.](#)
- 51 Grand Lyon. (2022). Ancien site industriel ACI : lancement du projet urbain. [Grand Lyon.](#)
- 52 Turenscape (2022). The Sponge City: Planning, Design and Political Design, in Architecture and the Climate Emergency. [Turenscape.](#)
- 53 SCAPE | The Public Sector Procurement Specialists. (n.d.). [Scape.](#)
- 54 Widiaryanto, Pungky et al. (2023). Indonesia New Capital City (IKN) [Nusantara Net Zero Strategy 2045.](#)
- 55 UK Department for Environment, Food & Rural Affairs. (2013). [London 2012 legacy: Sustainable procurement for construction projects.](#)
- 56 Regensis. (2019). Three Case Studies. [Regensis.](#)
- 57 [Sports and urban biodiversity](#) | IUCN Library System
- 58 McKinsey & Company. (2023). [Generative AI can change real estate, but the industry must change to reap the benefits.](#)
- 59 Alcemy - AI-based software for the decarbonization of the cement and concrete industry. [Alcemy.tech.](#)
- 60 ZGF, Port of Portland, [PDX Airport Main Terminal Expansion - Work - ZGF.](#)
- 61 Virtual Pavilion. (2024). [Pioneering a Mass Timber Market in East Africa.](#)
- 62 Planning Advisory Service. [Generating investment for Natural Capital in Greater Manchester](#)
- 63 Urban Nature Atlas. (2021). [Urban Forest Fund \(UFF\)](#)
- 64 Home Earth. (2024). Retrieved from <https://www.home.earth/>
- 65 Martin, B. (2017). [Communal ownership drives Denmark's wind revolution. Green Economy Coalition.](#)
- 66 First movers Coalition. [initiatives.weforum.org](https://www.firstmoverscoalition.org/)
- 67 The Phoenix Lewes. <https://www.phoenixlewes.com/>