



S Y S T E M I Q

# BETTER FINANCE, BETTER BUILT ENVIRONMENT

In partnership with



NREP



## ACKNOWLEDGMENTS

This report was developed by Systemiq in partnership with NREP to help unlock capital for a low-carbon, nature-positive, resilient and inclusive built environment, in support of the inaugural Leaders of the Urban Future event during New York Climate Week, 2022.

### ABOUT NREP

NREP is an urban investment and development company that exists to create sustainable, inclusive and effective cities. NREP was founded on the simple idea that real estate, the world's largest product category, was ready for change, and that by combining people, ideas, and capital it could improve urban ecosystems while generating significant value for customers and investors. NREP continues to work for driving systemic change at an industry level, improving the built environment and investing for positive planetary impact. For example, it is committed to lead and accelerate the way towards a carbon neutral sector, pledging to decarbonise its real estate portfolio well ahead of the IPCC's target date of net zero by 2050, and become carbon neutral already by 2028 – encompassing both operational and embodied carbon.

### ABOUT SYSTEMIQ

Systemiq was set up in 2016 to drive and accelerate the implementation of the Paris Agreement and the UN Sustainable Development Goals (SDGs) by transforming markets and business models in five key economic systems: (1) energy and infrastructure, (2) food and land use, (3) resources and material solutions, (4) sustainable finance, and (5) cities. It does this by advising industry leaders, influencing policy through research and deep stakeholder engagement, incubating disruptive business opportunities and mobilizing largescale capital across these systems to drive transformational change.

### DEVELOPING THIS PAPER

This paper was authored by Amy Paterson, Jennifer Ring, Eva Smaga, Isha Patel, Katherine Stodulka and Jeremy Oppenheim (Systemiq). We would also like to gratefully acknowledge the valuable contributions from individuals at NREP, 2150, Dream CA, Ivanhoé Cambridge, ATP, C40, NBIM, LaSalle Investment, NOVO Holdings, Allianz Real Estate, JLL, Goldbeck GmbH, Green Finance Institute, RethinkX, Hines, BlackRock, CPP Investment Board, Arup, UBS Private Wealth Management, Capricorn Investment Group, BioMason, Kite Insights, Oxford Properties, Pictet Group, APG Asset Management, New York City Government, EDGE Technology, RMI, World Business Council for Sustainable Development (WBCSD), Humane Works, Nabr, World Economic Forum (WEF, Kensa Heat Pumps, Arup, Gehl Institute, CPP Investment Board, International Finance Corporation, Actis, the Rockefeller Foundation/GEAPP, Sidewalk Labs / Captain Planet, PwC, Climate Bonds Initiative, Shell City Solutions, Jupiter Intelligence, and ULI. Nevertheless, the views provided represent the personal views of the individuals consulted, not those of the institutions listed above.

## ENDORSEMENTS

"The Better Finance, Better Built Environment report addresses some of the key challenges we, as real estate investors, currently face in redeploying capital to support the decarbonization of the built environment. It highlights the need to demonstrate value and create the financial incentives for reaching net zero. And this, coupled with encouraging players in the Built Environment to work more closely across their value chain, could have a significant impact in moving faster on the transition."

- **Nathalie Palladitcheff**, CEO of Ivanhoé Cambridge

"It is clear that decarbonizing the Built Environment becomes a bigger transition risk with every year that passes. This report offers tangible initiatives to unlock the capital – equity and debt - needed to invest in the transition. It aims to galvanize investors into action, which will be key in delivering the change that we need to see happen in the Built Environment."

- **Guy Grainger**, Global Head of Sustainability Services & ESG at JLL

"We need to radically transform our cities – but city governments can't do this alone. Transitioning the built environment at speed and scale urgently needs private finance to step up – both in terms of investment, and to support policymakers when they strengthen regulations that make it possible for markets move faster. I therefore welcome this new report, which offers a fresh perspective and clear opportunities for city stakeholders to come together and make headway on the barriers to scaling private capital for a better built environment."

- **Mark Watts**, Executive Director of C40

"Access to finance for tenants, landlords and developers is one of the major obstacles in getting the built environment to net zero and has been a priority for the Green Finance Institute's built environment programme. Therefore, I welcome this new report that reinforces the case for action to unlock private finance to meet this challenge. It offers a clear perspective on the steps needed – from structuring new financial products to piloting innovative partnerships between city governments and the private sector."

- **Rhian-Mari Thomas**, CEO of the Green Finance Institute

"Cities have historically been a leading driver of the climate crisis - but it doesn't have to be this way. We are at a moment where, with enough courage and partnership, we can make our cities regenerative, resilient and inclusive, and a force for a more stable and equitable world. But only if we move fast, and move together. This new report makes clear the vital role of private finance in this transition, and the immense investment opportunities it presents. The author's practical and concrete recommendations are set against a timely rallying cry for collaboration and ambition. I urge leaders in business, finance and government to listen, and act."

- **Paul Polman**, business leader, campaigner, co-author 'Net Positive'

"Solving the challenge of the built environment transition is the business opportunity of our generation. I hope the contributors of this paper will forge a new community, capable of learning from each other and coming together to accelerate the transition and take action towards deep decarbonization of the built environment. We all have a choice not to be part of the problem anymore but part of the solution, and bold collectives can make a real and lasting change to our systems."

- **Mikkel Bülow-Lehnsby**, Chairman and Co-founder of NREP

## EXECUTIVE SUMMARY

Cities are the engine of the world economy. Home to more than half the population, they represent 80% of global GDP. By 2050, close to 7 billion people will live in urban areas, much of which is still to be built. This translates into one of the biggest investment opportunities of the next decade (at least \$2.5 trillion a year).

Conservative estimates suggest that business opportunities related to more sustainable cities could be worth over \$3.7 trillion annually for the private sector by 2030, with the potential to generate almost 170 million jobs and tackle major public health costs including those linked to air pollution. But only if capital is deployed into a new type of built environment – one which is low-carbon, nature-positive, circular, resilient and inclusive.

The built environment today accounts for 40% of global greenhouse emissions. A combination of market and planning failures has led to: (i) sprawl or poor use of urban space; (ii) bias to make up-front construction costs as cheap as possible; and (iii) under-investment in lifecycle performance (including resilience to extreme weather events). This is true for almost all classes of building – and is also true across most geographies, even if the specifics vary from one context to the next.

**“ Transforming the design, build and operation of urban systems is one of the biggest levers we have to drive climate action, protect biodiversity, reduce inequality and deliver sustainable growth. And it represents one of the biggest investment opportunities of this decade. ”**

- Jeremy Oppenheim, Founder of Systemiq

Under any population growth scenario, a business-as-usual approach to the design, build and operation of the built environment will accelerate climate change and associated investor risk as urbanisation drives higher energy consumption, greater infrastructure needs, increased carbon emissions and financial instability linked to climate-related risks. It will also lead to deeper inequality as cities struggle to deal with the environmental and social challenges of extreme heat, flooding, waste management, air pollution and access to services.

But there is a better version of the built environment available – one in which the interests of key stakeholders (developers, financiers, end-users, governments) are better aligned to invest in more liveable, more attractive, net zero cities.

The prize is clear. Real estate is the biggest asset class on earth; buildings represent \$6 trillion in investment each year. Estimates to transition the existing building stock to be greener and more efficient suggest a further \$600 billion will be needed annually. Cities in emerging markets alone could attract \$30 trillion in cumulative climate-related investments by 2030. Private finance stands to capture much of this value – likely making up 80-90% of total investment in the transition, meaning investors have an intrinsic interest to help transform the design, build and operation of the built environment.

Of course, the broader financial system is already helping drive economy-wide shifts to net zero, especially in the energy and mobility sectors. Here, smart capital is moving towards companies and technologies whose business models are based on clean, resource-efficient solutions. But there are still barriers which lock in traditional models of capital allocation and prevent trillions of dollars from flowing into transitioning the built environment. This paper identifies nine critical transitions which can help.



## THIS PAPER

To unlock the investment opportunities inherent in a better built environment, every part of the urban system must be transformed. Through consultation with Private Finance Institutions (PFIs) and city stakeholders, we identified nine critical transitions across three pillars of the urban system (design, build and operate) which can accelerate the transformation and unlock capital. Each transition includes levers where private finance can play a central role to align interests and crowd capital into better urban outcomes.

The good news is that many of the solutions underpinning these transitions are already emerging or in place. Yet progress is still too slow and investment falls far short of what is required. Central to the challenge are market, information and regulatory barriers to deploying capital at scale. In parallel, asset owners and end-users, governments, and developers struggle to access the investment needed to transition.

Policymakers undeniably have a crucial role to play in creating the enabling environment for better urban systems. But waiting for perfect policies will leave money on the table and take too long to ensure cities are a part of the climate solution, not the problem.

**To address these collective challenges, collective action is needed.** By coming together, private finance institutions have the power to accelerate transformation of urban systems and unlock capital for a more resilient, net zero built environment that one organization cannot achieve alone. This paper outlines a series of high-impact opportunities for action. Many of these initiatives intentionally build on existing efforts. But to succeed at scale, city stakeholders from across the value chain must move beyond siloed approaches towards building lasting partnerships and aligning incentives to create a better built environment.

### LONDON KINGS CROSS RE-DEVELOPMENT: 2001 VS. 2021



*Photographs: Andrew Holt / Alamy Stock Photo; Photo London UK*

A defunct, elevated railway was transformed into a public park, creating a range of benefits – a public amenity, tax contributions to the city, a boost to small businesses in the neighborhood, increase in nearby property values.

# THE NEED FOR A BETTER BUILT ENVIRONMENT TO DELIVER ON CLIMATE, NATURE, AND PEOPLE

The built environment is the foundation upon which the urban system operates, entailing the use of land and space, and the materials, construction and operation of buildings. Today it accounts for up to 40% of global emissions, the vast majority coming from construction and operation<sup>1</sup>. Left unchecked, these figures will continue to grow. Operation-related emissions from buildings are set to increase by ~30% between now and 2030<sup>2</sup>. Meanwhile, a rising global population, urbanization, and growing infrastructure development needs will significantly drive-up demand for materials – for instance, global cement production is set to grow by up to a quarter by 2050<sup>3</sup>.

**Population growth is not the only challenge.** Growth in urban land consumption is outpacing population growth by as much as 50%<sup>4</sup>. This inefficient land use threatens biodiversity hotspots and land required to feed a growing global population. The urban built environment is also not fit for purpose from a health or inclusion perspective. Urban air pollution resulted in 2 million premature deaths in 2019<sup>5</sup>, with an associated health cost of more than \$2.5 trillion, equivalent to 2% of global GDP<sup>6</sup>.

## HOMES FOR ALL - DORTHEAVEJ RESIDENCE / BJARKE INGELS GROUP



Photograph: Rasmus Hjortshøj – COAST. 2018. Arch Daily.

Award winning affordable housing in Copenhagen designed by Bjarke Ingels Group (BIG). The development is based on modular construction and pre-fabricated elements.

1 R. Esau, M. Jungclauss, V. Olgyay, A. Rempher. 2021. [Reducing Embodied Carbon in Buildings: Low-Cost, High-Value Opportunities](#), RMI and Climate Champions. 2021. [Race to Zero hits breakthrough built environment targets](#), Race to Zero  
2 IEA. 2021. [Net Zero by 2050, A Roadmap for the Global Energy Sector](#)  
3 IEA. 2018. [Technology Roadmap: Low-carbon transition in the Cement Industry](#)

4 World Bank. 2020. [Urban Development Overview](#)  
5 V. A. Southerland, M. Brauer, A. Moheggh, M. S. Hammer, A. van Donkelaar, R. V. Martin, J. S. Apte, S. C. Anenberg, 2022. [Global urban temporal trends in fine particulate matter \(PM2.5\) and attributable health burdens: estimates from global datasets](#), The Lancet Planetary Health  
6 World Bank. 2022. [The Global Health Cost of PM2.5 Air Pollution A Case for Action Beyond 2021](#)



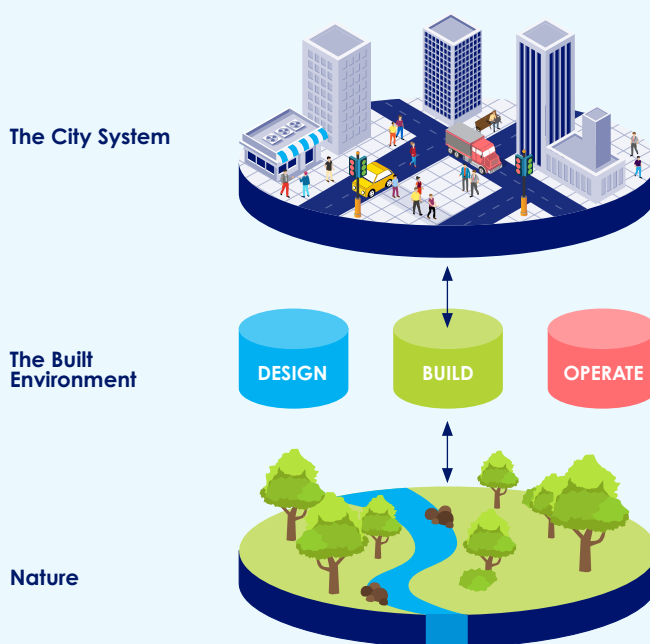
Global annual losses from disasters affecting the urban built environment now exceed \$250 billion<sup>7</sup> and will increase by another 25% by 2030<sup>8</sup>. Climate change-related losses drain public coffers – especially in poorer countries – and risk pushing an additional 100 million urban residents back into poverty by 2030<sup>9</sup>.

**These issues are compounded by an outdated and misaligned economic and policy environment.** Despite some moves in the right direction, e.g., the EU taxonomy, among others, there is still no systematic carbon pricing at the global or even local scales, no global standard on emissions targets from the sector, and no single measurement system or reporting standard for evaluating and disclosing the environmental impact of the asset base.

**Investment in the built environment – particularly buildings (~\$6 trillion annually) – represents the largest category of investment in the global economy<sup>10</sup>.**

Population growth and urbanization in the Global South will drive further increases in this investment. Total building floor area is expected to increase by 75% by 2050 – equivalent to adding the surface of the city of Paris every week – with 80% of this growth in emerging markets and developing economies<sup>11</sup>. At the same time, given the long lifetime of buildings, around half of the existing stock will still be standing in 2050. This confluence of massive new construction and long asset lifetimes means we now face a once-in-a-lifetime opportunity to dramatically redirect the trajectory of the urban built environment to a far more sustainable path.

## THE BUILT ENVIRONMENT INTERACTS WITH OTHER COMPLEX SYSTEMS



**Other aspects of the urban system** with which the **BE interacts**, including **transport and utilities**, various **economic sectors**, **governments**, and the **people who live and work in cities**.

The BE is the **fabric of city systems** underpinned by **3 pillars** – design, build and operate. It entails the **use of land and space**, and the **materials, construction and operation of buildings**.

**Natural structures** unique to each city including **flora and fauna, air, soil, and water**, including parks and waterways.

7 This figure is a low estimates and it only accounts for disaster impacts, and underestimates the economic consequences of inadequate resilience because: a) damages and losses from other hazards are not included (e.g. conflict, pollution, congestion, epidemics, accidents, building collapses, and terrorism) and b) the assessment does not include economic impacts on the informal economy.

8 World Bank. 2016. [Investing in Urban Resilience Can Save the World's Cities Billions Each Year and Keep Millions out of Poverty](#) and UN Habitat. 2021. [Adapting Cities for Climate Resilience](#)

9 World Bank. 2020. [Catalyzing private sector investment in climate smart cities](#)

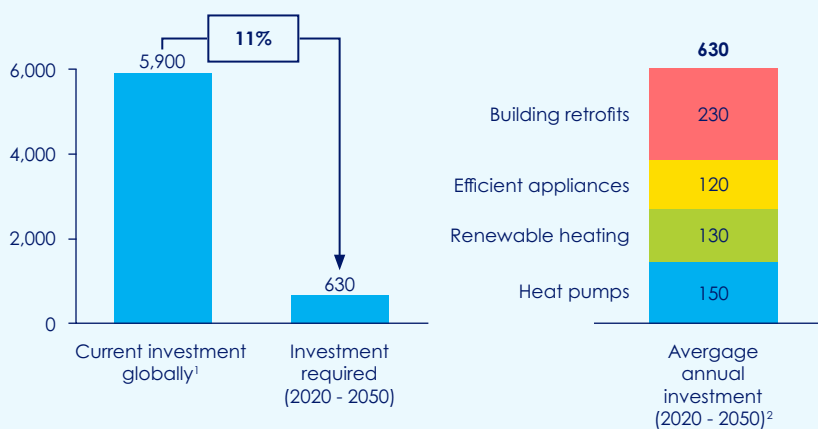
10 Climate Policy Initiative. 2021. [Tracking Incremental Energy Efficiency Investments in Certified Green Buildings](#). Figure relates to total global investment in buildings construction and renovation for 2019/20. Other sources capturing the value of investment of the Built Environment including infrastructure estimate global investment at \$12tn - Emerging SYSTEMIQ analysis for the ETC (2022), derived from [PWT 10.0](#) | [Penn World Table](#) | [Groningen Growth and Development Centre](#) | [University of Groningen \(rug.nl\)](#) – includes residential and non-residential structures

11 IEA. 2021. [Net Zero by 2050, A Roadmap for the Global Energy Sector](#)

**Detailed estimates of the total investment required by 2050 to get the built environment on a net-zero path are not readily available.** However, for buildings, an investment need of \$630bn per year to transition the existing building stock to net zero has been identified<sup>12</sup>.

## \$630BN TO ENSURE 85% OF COMMERCIAL AND RESIDENTIAL PROPERTIES ARE ZERO-CARBON BY 2050

**GLOBAL ANNUAL INVESTMENT - BUILDINGS**  
USD billion per annum



- Estimates do not cover cost of ensuring construction of new builds is zero carbon – unlikely to cost materially more in the long-run.
- Estimates significantly more uncertain than other sectors.
- Whatever the precise estimates, it is clear policymakers and financial institutions need to focus as much on investment in buildings as industry and transport.

1. Climate Policy Initiative, 2021, Tracking Incremental Energy Efficiency Investments in Certified Green Buildings. Figures are for 2019/2020.  
2. IIGCC, Climate Investment Roadmap, 2022 - Figure 22: Retrofits and heat pumps drive investments needs in buildings in the IEA NZE 2050 scenario

**This investment requirement represents a particularly compelling opportunity for the private finance community.** After power, the buildings sector leads in terms of annual investment needed to finance the transition of existing assets. While robust estimates of the investment opportunity from building new stock to net zero specifications are lacking today, this is also expected to be significant. Meanwhile, private finance has an outsized role to play compared with its public counterpart to transition this space: private investment in the building sector transition could make up 90% of total financing<sup>13</sup>.

This translates to an annual investment of roughly \$570 billion<sup>14</sup> from private finance to decarbonise the existing building stock by 2050 – with potential for a proportion of this investment to be delivered through reallocating existing capital.

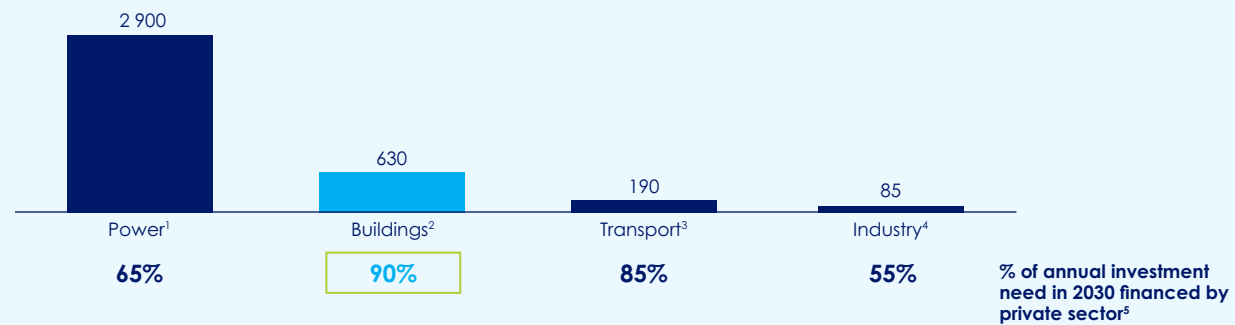
12 Emerging analysis by the Energy Transition Commission and IIGCC. 2022. [Climate Investment Roadmap](#). Note: Estimates do not cover costs of ensuring construction of new builds is zero carbon, as this is unlikely to cost materially more in the long run given trends towards stricter building codes, maturing supply chains and technology, and growth in the skilled workforce  
13 UNFCCC Race to Zero. 2021. [Net Zero Financing Roadmaps](#). Private sector investment includes corporations, commercial FIs, infrastructure funds, institutional investors, households (assumed backed by private lenders) and is based on financing by source for estimated annual investment in 2030.

14 Assumption based on \$630bn annual investment gap outlined for the sector in general, and estimates that private finance will plug 80-90% of the total investment gap to transition the sector



## AFTER POWER, THE BUILDINGS SECTOR IS ESTIMATED TO REQUIRE THE MOST CAPITAL INVESTMENT FOR THE TRANSITION TO NET ZERO

GLOBAL AVERAGE ANNUAL INVESTMENT NEED TO FINANCE THE TRANSITION 2020 – 2050  
USD billion per annum



1. IEA World Energy Investment 2021 Note: Fossil fuel power does not include investment in the supply which is around US\$700bn
2. Penn World Tables – Capital detail database (investment in residential and non-residential structures), IGCC Climate Investment Roadmap 2022, Emerging SYSTEMIQ analysis for the ETC.
3. Mission Possible Partnership Aviation Sector Transition Strategy, Global Maritime Forum Aggregate Investment for the Decarbonization of Shipping, Penn World Tables – Capital detail database
4. Bloomberg NEF –Energy Transition Investment Trends 2022
5. UNFCCC Race to Zero 2021, Net Zero Financing Roadmaps. Private sector investment includes corporations, commercial FIs, infrastructure funds, institutional investors, households (assumed backed by private lenders)

**In spite of the clear need and opportunity to mobilize private capital for a net zero and inclusive built environment, the vast majority of investment continues to flow to high carbon assets.** In recent years, annual investment in building energy efficiency represented just 2% of total investment in buildings<sup>15</sup>. This trend is also echoed in public spending. While some countries are leveraging municipal and public procurement requirements to accelerate the shift towards net zero alignment (for instance in the UK<sup>16</sup>), examples are few and far between.

**Although underinvested today, there are clear economic benefits from shifting investment towards more efficient, better designed buildings.** Greener buildings offer lower total cost of ownership, e.g., LEED buildings and retrofits have demonstrated operational cost savings of 20%<sup>17</sup> and 10% respectively<sup>18</sup>.

More sustainable buildings improve rental rates and asset values, with rental premiums of 12% observed for energy-efficient offices in London<sup>19</sup>, and sale price premiums of up to 26% in the US commercial sector<sup>20</sup>. Green spaces in cities also raise asset values and property tax revenues while reducing cooling and healthcare costs (i.e. through improving air quality). At the same time, investment in making assets resilient and net-zero aligned today can futureproof portfolios against devaluations from intensifying climate risk (e.g. increased flooding) and transition risk (e.g. declining market attractiveness or regulatory shifts). Mechanisms that bring forward these economic benefits therefore have a key role to play in accelerating and scaling the reallocation of private capital towards net zero.

**“ Private finance players have already embarked on the journey, but slowly and with different levels of commitment. For instance, some are turning to offsetting rather than pursuing more investment to decarbonise their portfolios. ”**

15 IEA. 2019. [Energy End Use and Efficiency](#).  
16 The UK Government launched its Net Zero Carbon Procurement policy Procurement - Policy Note back in June 21 (PPN 06/21) . This required organisations tendering into government & related bodies to annually measure carbon footprint and also to carry out target setting to reach net zero carbon by 2050, and to disclose this.

17 Fowler, Rauch, Henderson & Kora. 2011. [Re-Assessing Green Building Performance: A Post Occupancy Evaluation of 22 GSA Buildings](#)  
18 US Green Building Council. N.d. [Benefits of Green Building](#)  
19 Knight Frank. 2021. [The Sustainability Series](#)  
20 IEA. N.d. [Multiple benefits of energy efficiency. Asset Values](#)

Despite the central role of private finance, existing initiatives have to date largely focused on mobilizing public finance mechanisms, the leading example being the mayoral network C40 and its Cities Finance Facility. Similarly, the EIB City Climate Finance Gap Fund, the International Municipal Investment Fund and the ICLEI Transformative Actions Program support city governments in developing concepts into feasible and investable climate-positive projects. Although there are relevant private finance initiatives, for example, the UN-convened Net Zero Asset Owners Alliance, and the Net Zero Asset Managers Initiative, these only cover real estate as one of several asset classes, and are focused primarily on target setting and accountability of individual financial institutions.

**There is growing recognition that the situation is too urgent for the community to wait for stronger market signals from public finance and policymakers before acting.** This raises the question: what are the recognizable investment opportunities – or solutions – that will deliver the outcomes needed, and how can the private finance community take the lead in accelerating them?

# THE STATE OF PLAY OF SOLUTIONS TO DELIVER A BETTER BUILT ENVIRONMENT

**There is consensus within the private finance community that the solutions needed to deliver a sustainable and resilient urban built environment for the most part already exist.** Unlike with some other sectors (for example, the food and agriculture sector, which is confronted with the wicked issue of how to grow food in a more sustainable way without compromising yields and prices to feed a growing population), there do not seem to be fundamental technological barriers or resource scarcity issues inhibiting accelerated action in this space. If done right, the next generation of buildings and urban infrastructure can be net zero, resilient and inclusive, without encountering challenging trade-offs.

**These solutions can be grouped into nine buckets across three pillars of the built environment:**

## 9 EMERGING TRANSITIONS TOWARDS A LOW-CARBON, RESILIENT, NATURE-POSITIVE AND INCLUSIVE BUILT ENVIRONMENT

	Embodied Carbon*	OperationalCarbon**
<b>DESIGN</b>	<b>BUILD</b>	<b>OPERATE</b>
<b>01</b> Build visibility and preparedness for climate risks with a focus on climate intelligence and building resilience	<b>04</b> Reduce emissions intensity of new building materials, with a focus on cement and steel	<b>07</b> Decarbonise heating and cooling supply with a focus on local low-carbon infrastructures and technologies
<b>02</b> Optimise the use of land, spaces and services to reduce mobility and new buildings requirements	<b>05</b> More efficient use of materials and building components with a focus on circularity and material-efficient design principles	<b>08</b> Optimise operational resource use including both hardware and software solutions
<b>03</b> Scale urban nature-based solutions with a focus on urban green spaces and infrastructure	<b>06</b> Increase use of alternative, environmentally-friendly building materials, with a focus on timber and novel ways of building	<b>09</b> Increase use of renewable energy in buildings with a focus on distributed renewable energy

1. Embodied carbon is the carbon dioxide (CO<sub>2</sub>) emissions associated with materials and construction processes throughout the whole lifecycle of a building or infrastructure.

2. Operational carbon describes the emissions during the in-use operation of a building.



With the total building floor area expected to increase substantially in emerging markets, the transitions outlined under the build pillar will be particularly key, especially #4 and #6. Getting the design and operate transitions right first time in these geographies will also be crucial, if costly retrofits are to be avoided in the future. These same regions are also highly exposed to climate hazards, making transition #1 particularly relevant, with building resilience and adaptation among the top priorities for many governments in emerging markets. In advanced economies, data shows that around half of the existing building stock will still be standing in 2050, highlighting the importance of ensuring this stock is energy-efficient through retrofitting and scaled use of efficient appliances (#8) and the implementation of low-carbon heating and cooling solutions (#7). Indeed, the latest IIGCC report found that North America and Europe represent 63% (~\$2 trillion) of the global funding gap identified for these two transitions. Asia Pacific represents the third market where these operation-related transitions will be the most needed, especially retrofitting.

**Unlike other sectors (e.g. aviation, shipping, steel etc.<sup>22</sup>), the specific investment requirements and mitigation potential of these solutions is not yet well documented.**

However, estimates gathered from various sources indicate ~50% energy-related emission reduction potential from operations by 2030 (97% by 2050<sup>23</sup>), and 20-45% from construction<sup>24</sup>. There is no reason why – if implemented at scale – these solutions together could not deliver 80-90% of the mitigation required for a zero carbon built environment.

Consultation revealed plenty of examples where solutions from all three pillars are already scaling.

## DESIGN

**Build visibility and preparedness for climate risks**

**[Transition 1]:** For example, Oxford Properties is currently piloting solutions to help track the physical climate risk facing assets using historical maps and insurance data.

## BUILD

**Increase use of alternative environmentally friendly building materials [Transition 6]:**

For example, Ivanhoé Cambridge alongside ICAMAP raised ICAWOOD, a fund aimed at developing a new-generation of timber offices in the Greater Paris region. The fund raised €750 million of equity capital, and is targeting development of 200,000 to 300,000m<sup>2</sup> of low-carbon offices by 2028. The fund will implement building technologies developed by WO2 (a subsidiary of Woodeum Group).

## OPERATE

**Decarbonise heating and cooling supply [Transition 7]:**

For example, **DREAM CA** worked with Hydro Ottawa to deliver the **ZCU district energy system, as well as the Zibi residential and commercial development**. ZCU relies on energy recovery from the local Kruger Products Plant for heating, and the Ottawa River for cooling, providing zero carbon heating and cooling for all Zibi tenants.

**Optimise operational resource use [Transition 8]:** For example, **LaSalle** has been recognized for implementing **green leasing language and processes across its portfolio of managed assets**. These leasing practices provide a win-win framework for landlords and tenants to invest in and benefit from energy efficiency and sustainability improvements.

## CROSS-CUTTING

**NREP has systemically introduced sustainability**

**requirements, metrics and tools in their core processes**

from diligence to exit as part of their “imperfect journey to Net Zero by 2028”. This included updating their underwriting model, introducing carbon fees, defining performance standards for embodied and operational carbon, and developing an ESG action plan for standing assets.

21 IIGCC. 2022. [Climate Investment Roadmap A tool to help investors accelerate the energy transition through investment and engagement](#)

22 Energy Transitions Commission (ETC). 2021 & 2022. [A Strategy for the Transition to Zero-Emission Shipping, Making Net-Zero Aviation Possible, The Net Zero Steel Sector Transition Strategy](#).

23 IEA. 2021. [Net Zero by 2050, A Roadmap for the Global Energy Sector](#)

24 Emissions associated with manufacturing, transportation, installation, maintenance, and disposal of building materials – R. Esau, M. Jungclaus, V. Olgyay, A. Rempher. 2021. [Reducing Embodied Carbon in Buildings Low-Cost, High-Value Opportunities. RMI](#)

## CURRENT MARKET AND REGULATORY FAILURES INHIBITING CAPITAL DEPLOYMENT AT SCALE

Today the investment aligned with a net zero built environment is a fraction of what is required. This begs the question: why isn't capital pouring into these solutions at the scale needed? From a demand perspective, issues include:

- **Homeowners and tenants** are struggling with a lack of financial solutions, especially to improve properties. While availability of finance is better for commercial properties, retail finance products are often challenging to access, costly and involve complex repayment structures.

“ There is a huge gap in the market for supporting individual property owners and landlords to improve properties. But this needs to move beyond green mortgages - we need products that offer cheap and long term financing and overcome split incentive issues. A GFI survey highlighted willingness of UK homeowners to increase indebtedness to improve the energy performance of their properties, despite rising interest rates. This shows how much the messages about energy security are coming through. ”

- **Property developers** struggle to access finance to build and insure net zero buildings. Lenders are wary of unfamiliar projects where fire risk, longevity and performance under various weather conditions are unknown. These projects may not have financing approved, or face higher costs of capital. Developers of purely timber framed structures in particular face challenges in accessing insurance due to fire risk.

“ Property developers are struggling to access finance to build net zero buildings. For example, in the UK, insurers have called for hybrid timber structures (rather than 100% timber) to make these buildings easier to insure. ”

- **Construction companies** face weak incentives to adopt low carbon or alternative building materials. As a low margin part of the value chain, the additional risk and higher upfront costs associated with innovative solutions are key barriers to adoption. Shifting towards long-term partnerships with developers and investors to share risk and reduce the imperative for construction companies to compete on cost will be key to addressing this, as will cheaper cost of capital for those adopting riskier green solutions.
- **Municipal governments** need to broaden and deepen sources of financing as cities grow. This calls for moving beyond traditional public funding to much larger private pools of savings, particularly through domestic capital markets and commercial partnerships. Currently, however, there is limited collaboration from city governments and the public finance sector to develop a pipeline of project opportunities for investment.
- **Multilateral finance** is struggling to effectively mobilize private capital to fund projects that can deliver improved environmental and social outcomes, particularly in emerging markets and developing countries.



As well as challenges on the demand-side, consultation with stakeholders revealed that private finance also faces its own obstacles to deploying capital into the transition at scale. These can be distilled into 3 key barriers.

## 1. MARKET FAILURES

**Many sustainable solutions face weak business cases relative to conventional and high carbon alternatives.**

Central to this is **poor pricing by the market** of climate and transitional risk, externalities, and future capex requirements for greening buildings. This makes it difficult for investors and asset owners to capture value from the benefits these solutions provide. The challenge is compounded by the short time horizons used for insurance policies and asset valuations. Limited hold periods for assets also conflict with high upfront capex and long payback periods for some greener solutions, such as heat pump installation, which deliver returns over a timeline that exceeds many investor horizons. As a result, asset managers and owners (including homeowners) face a high opportunity cost from investing in operational and structural improvements. Given these challenges, innovative financing mechanisms such as green bonds have an important role to play in improving incentives for greening buildings by offering low-cost, long-term capital. There are positive indications that this is effective: after renewable energy, green buildings are the leading asset in the green bond market, with \$150 billion issued in 2021 (30% of total issuances)<sup>25</sup>.

“Sustainability makes sense for long-term investments, however it is more challenging when planning an exit in 2-3 years.”

“There is a key challenge regarding the level of tolerance from private finance players to invest in pioneering sustainable solutions, i.e. how much concession on ROI they are willing to take, as sustainable projects might be more costly and as the opportunity cost of doing something else bringing better returns is high.”

**The challenging business case for green solutions is compounded by a principal-agent problem.** In the highly fragmented real estate value chain, incentives are frequently misaligned. For example, landlords take the financial hit for greening domestic properties, but in many cases are unable to pass the cost on to the occupier. Similarly, contractors must take on the risks and higher upfront cost of alternative materials, but do not benefit from the upside in property value. In other words, there is a poor sharing of risk and reward in the system today. This may need innovative mechanisms to create shared value (e.g. green leases), voluntary codes of conduct or updated regulation to solve.

“Many of the leading green solutions come with higher upfront costs or some additional risk. These solutions do drive impact and can offer financial returns, but today there is often a mismatch between the parties carrying those risks and costs versus those who will benefit.”

**It is hard to scale solutions in the built environment because the market is highly localized, fragmented and dependent on local municipal restrictions.**

Projects are often subscale, and so not relevant to large pools of capital. This hampers development of strong demand-supply links between city mayors and Private Finance Institutions. Innovative approaches are starting to emerge to address this by bridging the gap between cities and finance. For instance, the C40 Cities Finance Facility (CFF) offers technical assistance to city administrations to develop their sustainability priorities into bankable projects. Scaling mechanisms like the CFF will be vital to connect private finance with net zero aligned projects in cities.

“Today there is weak collaboration from city governments and finance players, limiting a recognizable pipeline of investable projects that will help drive the transition.”

“In theory, by collaborating, investors can create an ecosystem that accelerates the adoption of new products and therefore would allow these to scale at the pace needed.”

## 2. INFORMATION FAILURES

**The built environment today lacks a single source of truth.** There is still no consensus on the definition of sustainable or net zero buildings – particularly for whole life-cycle approaches. This lack of agreement is further complicated by fragmented, regionally specific standards, each with their own methodologies and approaches. The resulting inconsistency limits comparability across investments, and drives complexity in assessment and disclosure. Often times, these standards are not formally net zero aligned, or rely on data and data collection tools that are not even widely available today (e.g. construction waste or embodied carbon emissions are challenging to track). A related challenge is investors' poor visibility on the cost and returns (both financial and impact) of green interventions. Without this information, the private finance community (as well as regulators) struggle to decisively 'get behind' winning interventions. For example, the climate and business case for mass retrofits remains uncertain in the macro context of the renewable energy transition and electrification of the economy. Without good data to evaluate assets or demonstrate impact, investors and asset owners aren't able to access cheaper debt or insurance premiums for the most impactful investments, reducing incentives.

“Today, the main challenge is around defining what is “green” – there are no easily available metrics (i.e. climate return on capital) and certifications that can be replicable across geographies and portfolios. There is also uncertainty around whether taxonomies will change in 5-10 years' time, meaning what is net zero aligned today might not be in the future. This is not about creating a new set of standards, there are already too many in the market, but creating some alignment to better understand where to allocate capital that will have the biggest carbon reduction impact.”

## 3. POLICY AND PLANNING FAILURES

**Today's policy environment is sending the wrong signals.**

For example, without mandatory energy performance standards in place, it remains uneconomical for the majority of developers and owners – particularly in residential buildings – to implement efficiency measures. As a result, more than 3.5 billion m2 were built in 2020 without mandatory energy performance requirements – the equivalent of France's entire building stock<sup>26</sup>. Likewise, governments continue to offer cheap insurance for real estate at high risk from climate disasters, as with the US Federal Emergency Management Agency (FEMA)<sup>27</sup>. Some sustainable solutions are disincentivized or prohibited by policy, such as restrictions on the use of structural timber in the UK<sup>28</sup>. Policy to create a workforce that can implement the transition (i.e. through focus on upskilling and green jobs) is missing in many places. Finally, at the city level, planning regulations do not offer sufficient incentives for greener options, such as offering fast-track planning permission for green development. Without the right policy environment to reward net zero alignment, some investors also choose to divest from high polluting investments rather than pay for upgrades – thereby progressing towards their own net-zero ambitions without reducing emissions at the system level.

Despite this challenging policy outlook, there are encouraging examples, notably in the US' recent Inflation Reduction Act (IRA). The bill will lower the cost of clean energy technologies, including heat pumps, and offer tax incentives for home upgrades, providing crucial momentum for US cities striving to meet ambitious climate targets<sup>29</sup>. Other positive carrot and stick measures include examples from Italy, where the government returns 110% of the cost of insulating a home<sup>30</sup>. Overall, however, these policies are too scarce and far from the scale required.

26 IEA. 2021. [Building Envelopes](#)  
27 Ben-Shahar and Logue. 2015. [The Perverse Effects of Subsidised Weather Insurance](#)  
28 Barker. 2022. [UK government introduces restrictions for timber in mid-rise buildings' external walls](#)

29 C40. 2022. [C40 Cities calls on U.S. House of Representatives to pass Inflation Reduction Act](#)  
30 Italia Domani NRRP. n.d. [Ecobonus and Sismabonus offer up to 110% for energy efficiency and safety of buildings](#)

“ In many markets there are no incentives or obligations to build green, where aesthetic and cost still prevails over sustainability; so why would you invest CAPEX when there is no clear reward for this? ”

### THE HIGHLINE – NEW YORK IN 2000 VS. 2013



Photographs: Mathias Rhode / Alamy Stock Photo; Image Professionals GmbH / Alamy Stock Photo

A defunct, elevated railway was transformed into a public park, creating a range of benefits – offering a public amenity, raising tax contributions to the city, providing a boost to small businesses in the neighborhood, and increasing in nearby property values.

## SOLVING CHALLENGES: OPPORTUNITIES TO DRIVE POSITIVE TIPPING POINTS

**While the precise market, information, and policy conditions vary between contexts, the underlying challenges facing the built environment are consistent across building classes and geographies.** In all cases, if left unchecked they will lead to disaster for cities and those who live and work in them. There is, however, a path to a better future for the built environment: one where the interests of diverse stakeholders are aligned to invest in more liveable, nature-positive, and net zero cities. The private finance community has a clear stake in helping to build this future. It offers a huge opportunity to drive positive asset values over time, create new markets and revenue streams, and mitigate the physical and transition risks confronting the sector. What's more, Private Finance Institutions are uniquely well placed and resourced to help drive the changes required.

**Through consultation with city stakeholders, a strong conviction emerged time and again that bold collective action could accelerate change in the built environment while creating outsized benefits for the Private Finance Institutions.** By shifting mindsets to a focus on partnership, and pioneering approaches that can share the risks from the transition throughout the value chain, Private Finance Institutions can play a central role in better aligning incentives to unlock the transition. In particular, nine initiatives emerged as key opportunities to tackle. None of these initiatives are a silver bullet to today's failures, nor are they exhaustive. But they are a starting point for how the private finance community could come together to accelerate positive tipping points across the design, build and operation of our built environment.



“ There is no shortage of capital, technical solutions or financial instruments to drive the transition, the challenge is allocating the capital to the right places. Priorities from PFIs need to fundamentally shift before the end of the decade to drive this. ”

## 9 INITIATIVES WHERE THIS COMMUNITY COULD DRIVE THE TRANSITION ACROSS THREE PILLARS OF THE BUILT ENVIRONMENT

### THE BUILT ENVIRONMENT

#### CROSS-CUTTING

- A. Create shared approaches & transparency on what is net zero across the Built Environment value chain
- B. Develop shared approaches to assessing, disclosing & pricing physical and transition risk
- C. Agree on priority messages for policymakers to accelerate market tipping points

#### DESIGN

- D. Build the opportunity for densification through existing stock
- E. Identify ways to monetize urban green spaces

#### BUILD

- F. Accelerate development of a materials passport for buildings
- G. Develop partnerships to share the risks and costs of decarbonizing the construction sector

#### OPERATE

- H. Scale retail finance mechanisms to lower barriers to home energy retrofits
- I. Work with cities to aggregate demand for low carbon solutions

**For each of these initiatives, the private finance community is well placed to lead, given its expertise, resources and the market conditions you face.**

However, shifting the system is a challenge too big for any one player, or even a single step in the value chain to solve. Catalysing change calls for collective action on key priorities by diverse players. Strengthening dialogue between private finance and companies along the built environment value chain will be crucial to overcome siloes and perceived trade-offs, and to developing the integrated solutions that are urgently needed. Collective action on these priorities can mark the next crucial step in unlocking the multi-trillion dollar opportunity the built environment transition represents. The good news is that these efforts are not starting from scratch. They can draw on the learnings and efforts of organisations already working in the space, accelerating and scaling initiatives that are already in flight.

## EXISTING INTERVENTIONS FOR INITIATIVES TO ENGAGE AND BUILD ON

	 WORLD GREEN BUILDING COUNCIL						OTHERS (MORE SPECIALISED)
<b>A.</b> Create shared approaches & transparency on what is net zero across the BE value chain	✓ WLC Roadmap		✓ Net zero carbon buildings commitment		✓ Zero Carbon Buildings for all	✓ Market Transformation 'work area'	 GRESB  MISSION POSSIBLE  GFANZ  wbcscd  NZAM
<b>B.</b> Develop shared approaches to assessing, disclosing & pricing physical and transition risk	✓ Measuring & reporting framework	✓ Transition risk & valuation	✓ Adaptation toolbox				 TCFD  CRREM
<b>C.</b> Agree on priority messages for policymakers to accelerate market tipping points	✓ Advocacy manifestos		✓ U20		✓ Advocacy manifestos	✓ Public Policies 'work area'	 E3G  PositiveMoney  COALITION URBAN TRANSITIONS  RMI
<b>D.</b> Build the opportunity for densification through existing stock		✓ Smart Urban Development report					 Laudes Foundation
<b>E.</b> Identify ways to monetise urban green spaces		✓ Case for Open Space report	✓ Urban Nature Accelerator				 CITY FOREST CREDITS  WORLD ECONOMIC FORUM
<b>F.</b> Accelerate development of a materials passport for buildings				✓ Renovation Passport		✓ Building Data & Measurement 'work area'	 MADASTER
<b>G.</b> Develop partnerships to share risks & costs of decarbonizing construction sector						✓ Market Transformation 'work area'	 wbcscd
<b>H.</b> Scale retail finance mechanisms to lower barriers to home energy retrofits				✓ PLF taskforce			 RMI
<b>I.</b> Work with cities to aggregate demand for low-carbon solutions			✓ Assessment of PFI role	✓ Retrofit GM		✓ Finance 'work area'	 RMI

The Annex of this document includes deep dives on each of these nine initiatives – the challenges they address, the opportunity they represent, and ideas on concrete steps that could bring them to life.

## CONCLUSION

The built environment is at a critical juncture. With decisive action by the private finance community and partners throughout the value chain, there is potential to catalyse real progress towards net zero, nature-positive and inclusive cities. Failing to act now will leave the built environment on a business-as-usual trajectory that fails to protect people, planet, and property. Private finance has a pivotal role to play in shaping which future comes to pass – and a massive stake in doing so. The built environment is the biggest asset class on earth, – and making it sustainable is a multi-trillion dollar opportunity in which the private finance community has a huge role to play. What's more, the ingredients for the transition to a better built environment are all here.

By stepping up now, we can help overcome the barriers to scaling private investment in the transition and unlock the unprecedented commercial opportunity it represents – opening up new markets and revenue streams, and safeguarding assets against physical and transition risk. The good news is that no one has to act alone. By coming together, we can go further and faster in charting a course towards a better built environment.

# A. CREATE SHARED APPROACHES & TRANSPARENCY ON WHAT IS NET ZERO ACROSS THE BUILT ENVIRONMENT VALUE CHAIN

Key

1. Design

2. Build

3. Operate

## CONTEXT

Today, there is **no consensus on the definition of a net zero asset** in the built environment. There are **multiple areas of disagreement**, including on boundaries, whole lifecycle emissions, and the role of offsets, among others. **Divergent definitions** mean organizations **work towards different outcomes** with **varying degrees of ambition**. This inconsistency is compounded by poor data transparency.

Inconsistent definitions also flow through to **evaluating and certifying progress** towards net zero. While **there are certifications and standards** to support these efforts, they are **fragmented, regionally-specific**, or not **formally net zero aligned**.

**Without robust and comparable data, certifications and definitions** on what net zero looks like, investors, developers and others in the value chain **contest what it means to have a net zero aligned asset** or strategy.

They also face challenges **evaluating whether existing assets are on- or off-pathway**, and in **accessing preferential cost of capital & capital and insurance** for greener investments.

## WHAT IF...

...consensus was reached on a science-based definition of what net-zero means for different RE assets?  
...this definition was supported by priority metrics & thresholds, and disaggregated for different geographies and asset types?  
...the definition was leveraged to raise the ambition of existing leading tools, frameworks, standards and targets?  
...Financial institutions developed products linking good performance vs. net zero with preferential capital,?  
...together, these efforts enabled and incentivized the entire value chain to move at speed and scale to transition the built environment?

## THE CASE FOR PFI ACTION

Cheaper debt and insurance for low-carbon investments from sustainability-linked financial instruments.  
Ability to credibly demonstrate net zero alignment to investors.  
Reduced cost and administrative burden from simplified & harmonised net zero standards & disclosure.

## INDICATIVE NEXT STEPS

1. **Reach consensus on the definition of net zero** in the built environment, including **identifying key parameters** (e.g. whole life-cycle; inclusion of scope 1, 2 & 3 emissions; role of offsets; boundaries – such as inclusion of the grid; amortization of carbon; absolute or normalized emissions), **developing a typology of archetypes of assets and geographies** through which to de-average the net zero definition, and **defining what 'good' looks like** for each archetype – **solving back from sector pathways**.
2. **Undertake gap analysis for existing tools and certifications** vs. the net zero definition.
3. **Leveraging the gap analysis**, engage with existing tools, standard and certification bodies to adapt, build on or develop products that are truly net-zero aligned.
4. **Engage FIs to strengthen offering of financial products linked to net zero**, including through piloting **sustainability linked products offering cheaper debt or insurance** premiums to net-zero aligned assets.
5. **Set or update targets** to align with the agreed net zero definition.

## INDICATIVE TARGET

Formal adoption of the net zero definition and targets set or updated by at least 20 private finance institutions by the end of 2023.

## KEY STAKEHOLDERS

### Lead:

Developers, large asset managers & owners (e.g. pension funds)

### Involved:

World and Local Green Building Councils, SBTi, Mission Possible Partnership, WBCSD

## PILOT GEOGRAPHY OPTIONS

**Global**, but could be regionally focused to mirror WGBC chapters for its NZ Roadmap efforts.



## INITIATIVES TO ENGAGE

**SBTi Buildings Project** will outline 1.5 °C roadmap for in-use and embodied carbon & approaches.

**WGBC's Net Zero Whole Life Carbon Roadmap** - common vision & actions can inform identification of key dimensions

## PAST EXAMPLES & SUCCESS

Shared and transparent approaches to standards, measurement, governance and disclosure outside emissions e.g. generally accepted accounting principles (GAAP).



## B. DEVELOP SHARED APPROACHES TO ASSESSING, DISCLOSING & PRICING PHYSICAL AND TRANSITION RISK

Key

1. Design

2. Build

3. Operate

### CONTEXT

**Exposure** to intensifying storms, flooding, wildfires, extreme heat, and rising seas is a **major threat to the future operations and value of RE assets**. So too is the **risk that future climate-related regulation, technologies, or strategies** will leave some assets **stranded**. Today, however, **physical climate risk and transition risk are not effectively linked to valuations**. Consequently, asset owners **face weak incentives to assess these risks** to their portfolios, and **even weaker incentives to disclose** this information.

**Without a consistent framework to assess climate risks**, or a means to **demonstrate and unlock financial value from risk-reduction strategies**, investors **struggle to develop a strong business case for upgrading assets** to make them resilient to both physical and transition risks. In parallel, **without physical and transition risk data** from asset owners, insurers and debt providers **struggle to bring new risk-linked financial products to market** that could incentivise steps towards investing in more resilient assets.

### WHAT IF...

... a streamlined, harmonised framework for asset owners & investors to assess physical and transition risk was developed?  
...the resulting data and analytics improved visibility on climate risks, resulting in better informed decisions on investment and upgrades to increase the resilience of assets?  
...robust risk data enabled comparison, benchmarking, and streamlined disclosure processes?  
...better data on physical and transition risk meant lenders started to offer risk-linked financial products that actively rewarded more resilient, lower-risk assets?  
...together, these efforts created the market conditions to incentivise investment in enhancing the resilience of buildings to climate risk?

### THE CASE FOR PFI ACTION

Improved visibility on exposure to climate and transition risks can enable (pre-emptive) steps to minimize and address risk to valuations and of stranded assets. In the longer run, potential for cheaper debt and lower insurance premia for more resilient or less exposed assets that can improve the business case for upgrading assets.

### INDICATIVE NEXT STEPS

1. **Evaluate existing physical & transition risk standards and approaches**, identifying strengths and limitations.
2. **Agree a harmonised, streamlined set of dimensions & metrics against which to assess** these risks.
3. Agree on **data requirements and scenarios** (e.g. IRENA, BEF, IEA) and the tool to use (e.g. ongoing ULI tool).
4. **Pilot assessment of the risk analytics tool** on e.g. 1 portfolio / geography in 2-3 participating organizations.
5. **Develop blueprints & pilot financial mechanisms to unlock value from climate risk mitigation investments** (i.e. insurance premium, underwriting model, cheaper capital etc.).
6. **Scale common climate risk assessment framework & new financial products across portfolios.**

### INDICATIVE TARGET

Pilot of the new climate risk framework implemented on at least one full portfolio by end of 2024.

### KEY STAKEHOLDERS

#### Lead:

RE Investors

#### Involved:

RE asset managers, pension funds, insurance companies, Climate Risk Assessment solution providers

### PILOT GEOGRAPHY OPTIONS

**Global**, could start with pilot for one type of RE asset in one region (eg. in the EU in conjunction with CRREM)



### INITIATIVES TO ENGAGE

#### ULI, as part of the

[C Change Project](#) - a tool for pricing climate transition risks into property valuations.

Taskforce for climate-related financial disclosures ([TCFD](#))

[CRREM](#) tool to assess exposure to stranding risks based on footprint & data and regulation

### PAST EXAMPLES & SUCCESS

Effective strengthening and integration of risk assessment and disclosure and in **other sectors** – e.g. electric utilities in Hawaii have assessed climate-vulnerable assets, integrated climate risk analysis into grid planning & investment, and developed TCFD and SASB-aligned disclosures

## C. AGREE ON PRIORITY MESSAGES FOR POLICYMAKERS TO ACCELERATE MARKET TIPPING POINTS

Key

1. Design

2. Build

3. Operate

### CONTEXT

Today's **policy** environment is sending **mixed signals** to RE investors and developers. While **net-zero commitments have flourished** at both the national and city level, targets are frequently **not accompanied by the policy shifts needed** (incl. building codes upgrade and green-only public procurement) to stimulate action and incentivise net-zero aligned private investment at the speed and scale required. **Efforts by the private finance community to shape city policy agendas** have been **fragmented**, and hampered by **messaging promoting diverging policies, limiting clarity on what shifts are most needed**. Mayors and governments also need clarity on how policy to accelerate **net zero** intersects with **top-burner social issues like affordability and inequality**. Concerted action to clarify and advance a BE policy agenda is also crucial to **capitalise on the positive momentum** ignited by the US **Inflation Reduction Act**.

### WHAT IF...

- ...PFIs harnessed their collective influence to advocate for critical policy shifts at the local or national level?
- ...governments across the world took decisive action to...
  - ...introduce carbon pricing to bring forward the benefits of zero carbon interventions?
  - ...improve regulation & transparency of carbon markets?
  - ...incentivise sustainability through tax incentives and property tax regimes?
  - ...promote densification through planning, zoning, expediting permit application and reducing permit costs?
  - ...revise building codes and standards in line with advances in materials and technology?
  - ...introduce net zero procurement policy?
- ... policy shifts mobilised private capital at scale to transition the BE?

### THE CASE FOR PFI ACTION

Favourable policy change can shift the business case for net-zero aligned action to enable PFIs to deliver on climate commitments and investment in an inclusive, resilient BE without compromising returns.

### INDICATIVE NEXT STEPS

1. Convene a cross-value chain working group to **identify a long list of policy shifts** at the city & national level
2. **Agree the top 5 priorities** (i.e the most impactful from a financial and climate return on investment perspective) based on analysis and consultation across the stakeholder group, and develop core shared messages
3. Identify **best practice and benchmarking to build the evidence base** for prioritised policy shifts
4. **Engage in a dialogue with city governments** through C40 Network and with national governments via COP

### INDICATIVE TARGET

Have one advocacy paper ready for publication by end of 2022, focused on one top priority topic for policy shift.

### KEY STAKEHOLDERS

#### Lead:

TBD based on policy area (institutional investors for market-based mechanisms; developers for building standards etc.)

#### Involved:

National and local governments, C40 (leverage best practice to build case for policy change), WGBC, GFI

### PILOT GEOGRAPHY OPTIONS

**Global**, Start in Europe & US given favourable regulatory signals



### INITIATIVES TO ENGAGE

**Advocacy manifestos by regional WGBC networks** to shift policies (eg. Europe Regional Network [advocating for recognition of key role of BE in delivering a climate neutral Europe in 2019](#))

WEF [Green Public Procurement: Catalysing the Net-Zero Economy](#)

### PAST EXAMPLES & SUCCESS

Initiative of WGBC and others to develop an **EU Policy Whole Life Carbon Roadmap**, setting out how whole life carbon and circularity principles can be integrated into existing EU building sector policy within the current European Commission mandate

## D. BUILD THE OPPORTUNITY FOR DENSIFICATION THROUGH EXISTING STOCK

### CONTEXT

Today, **urban sprawl** is a leading driver of **rising emissions** in cities. **Densification**, however, offers a solution; multiple studies have demonstrated that **smarter, more compact development** can simultaneously mitigate **carbon emissions**, improve **citizen wellbeing** and deliver **investor returns**.

To unlock these benefits, local governments and investors need not look just to new construction. **Increasing the utilization of under-exploited buildings and spaces**, as well as **developing the space above existing buildings, and under buildings and roads**, can enhance densification (without necessarily requiring changes in zoning). This is a **significant opportunity** – the US government alone owns an estimated 45,000 underutilized building, and up to 630,000 new homes could be built on top of London's municipal buildings (HBR, 2020; WSP & UCL, 2014).

Today however, **investments to increase efficient use of existing stock in this way are limited**. Beyond the economic conditions, policy and personal preferences driving sprawl, **investors also lack visibility on the tangible opportunities to optimise existing stock**, are unclear on the business case for investment, and **run the risk that ambivalent attitudes to densification will lead to rejections in planning applications**.

Key

1. Design

2. Build

3. Operate

### WHAT IF...

... space for millions of new homes was identified - just through optimising existing stock rather than building new?  
... local governments adapted planning and regulation to actively incentivise development of untapped floorspace?  
...investors unlocked new development opportunities at scale in today's saturated markets?  
...increasing utilization and building above and below existing buildings helped cities solve for sprawl and emissions and enhanced living conditions?

### THE CASE FOR PFI ACTION

Access to additional development and investment opportunities in high value and saturated RE markets

### INDICATIVE NEXT STEPS

1. Building on previous analysis, **evaluate the financial opportunity** for PFIs and environmental, social and economic benefits from optimizing existing stock through building above, below, and maximising utilization
2. Supplement analysis with a **mapping exercise for 2-3 pilot cities** to **identify unexploited or underexploited space** (within current planning regulations), and **estimate the investment (and carbon) opportunity**
3. **For the underutilized space identified, match available solutions to demonstrate concrete potential for developing** the identified spaces (e.g. adding affordable residential property on top of commercial premises)
4. Leverage this **evidence base** to **advocate for cities to incorporate densification into net zero plans** (if not included already) to **improve the probability that planning for projects advancing densification are approved**

### INDICATIVE TARGET

**By 2025, 20% of new residential RE investments in 3 pilot high-sprawl cities are “building optimization” investments** – through building up, building down, or increasing utilization (brownfield development or building recycling)

### KEY STAKEHOLDERS

**Lead:**  
RE developers and/or investors

**Involved:**  
Major landlords, local municipal governments

### PILOT GEOGRAPHY OPTIONS

**Cities facing sprawl and high land value** (e.g. London Plan features densification as a priority)



### INITIATIVES TO ENGAGE

**ULI** analysis demonstrating investor and citizen upside from denser cities  
– potential to expand e.g. through deep diving on opportunity from specific modes of densification such as converting existing stock

### PAST EXAMPLES & SUCCESS

Competitions to invite innovative solutions for optimizing sustainable use of space, including [Réinventer Paris; Inventons la Métropole du Grand Paris; C40 Reinventing Cities](#)



## E. IDENTIFY WAYS TO MONETIZE URBAN GREEN SPACES

Key

1. Design

2. Build

3. Operate

### CONTEXT

**Urban green spaces (UGS) provide numerous benefits for people and planet** - sequestering emissions, supporting biodiversity, enhancing air quality, mitigating extreme weather, and improving mental health. Despite these mitigation and adaptation benefits, and their potential to increase social capital, and reduce healthcare and HVAC costs, **today UGS are in short supply** in many cities. At the heart of this undersupply is **the market's failure to value the crucial positive externalities** that UGS provide.

**Various potential approaches** to address this through **monetizing UGS have been tabled**, including carbon credits, advance market commitments, densification bonuses, land value capture, and "offset-plus" products that incorporate energy- and carbon-savings, biodiversity and health benefits. However, **no option has clearly proven to effectively internalise the benefits of UGS and offset the opportunity cost** from not developing green spaces. As such, land use continues to disproportionately favour the built environment.

### WHAT IF...

...mechanisms that delivered competitive returns from keeping or making urban spaces green could be scaled?  
...new markets opened up for ecosystem services generated by UGS?  
...cities could create a step change in progress towards their net zero ambitions through UGS?  
...private investors could factor local green spaces into assessments of their assets' net zero alignment?  
...individual home and landowners could capitalise their land or gardens through credits?  
... UGS could reduce urban heat island effects and drive energy and cost savings for cooling buildings?

### THE CASE FOR PFI ACTION

Potential to open up valuable new markets and revenue streams for ecosystem services provided by UGS

Potential to accelerate progress on net zero commitments without sacrificing returns

### INDICATIVE NEXT STEPS

1. **Baseline and evaluate existing attempts to monetize/value UGS**, including products and tools e.g. Carbon Credits, Offset Plus products, City Forest Credits, Purchasable Density Bonuses, Tax credits etc.
2. Select 1-2 approaches with **most significant potential**, based on analysis
3. **Design pilots to test potential to scale high potential opportunities, engaging with city officials as needed**, e.g. one place to start could be to explore the potential of a marketplace for private land as carbon sinks

### INDICATIVE TARGET

35% of urban area in 5 cities greened by 2025 (from a baseline of <20%) through use of measures to monetize UGS, with at least half of that greening occurring in low-income communities or communities of colour

### KEY STAKEHOLDERS

**Lead:**  
**Venture Capital** (to identify existing solutions); **larger RE investors** (who to provide funds & pilot an approach)

**Involved:**  
**City mayors, solution providers** (working on UGS solutions), **individual landowners/homeowner, green banks, DFIs, impact investors, philanthropies**

### PILOT GEOGRAPHY OPTIONS

**~5 North American / European cities**, targeting those with an **enabling policy/municipal environment** e.g. Seattle



### INITIATIVES TO ENGAGE

**TBD based on mechanism** (e.g. carbon credit certification organizations, etc.)

### PAST EXAMPLES & SUCCESS

**Single. Earth** – tokenizing property owners' land using digital twin technologies to enable trade in carbon offsets  
**Innovative models in other contexts** (e.g. tax increment financing for public transport)

## F. ACCELERATE DEVELOPMENT OF A MATERIALS PASSPORT FOR BUILDINGS

Key

1. Design

2. Build

3. Operate

### CONTEXT

The building sector is a **leading user of material resources**. Despite this, **robust and transparent data on material use at the asset level is lacking**, and in its absence, the **building sector has also become a leading producer of waste**. **Without data** to inform re-use or recycling opportunities, end-of-life building materials are **dumped, downcycled or burned**, driving up **costs and emissions**.

The lack of visibility on materials **also inhibits credible evaluation and demonstration of assets' embodied carbon**. **Without this data**, PFIs **struggle to access the financial benefits** associated with lower carbon assets, **so reducing the incentive** to choose lower embodied carbon materials upfront. Efforts have begun in some quarters to **address these challenges** through **consolidating building materials data** in online platforms – but today these efforts are **fragmented and not at scale**.

### WHAT IF...

...a buildings material passport could be scaled and adopted across the RE sector?  
...buildings were reconceptualised as material 'banks', storing resources for future re-use and recycling?  
...robust data on materials and embodied carbon made it easy to check and credibly demonstrate the sustainability of assets?  
...prevailing linear models of 'take, make, waste' in the building sector transitioned to more cost effective and low-carbon circular approaches?

### THE CASE FOR PFI ACTION

Potential for cheaper debt and lower insurance premiums for assets demonstrating low embodied emissions footprints  
Cost savings from using buildings as materials banks and offering reusable materials back to the market  
Better visibility of asset carbon/emissions profile – and overall sustainability performance – during due diligence  
Long term better lending options for buying a property with a "green passport"

### INDICATIVE NEXT STEPS

1. **Evaluate existing landscape of building material passport solutions** – incl. content and requirements (i.e. composition, origin, specification), data management (how data is aggregated, processed, and storage and governance), and robust Scope 3 measurements and metrics
2. **Look for opportunities to implement and accelerate deployment of building passport solution(s)** to a set of suitable buildings i.e. with probable short lifetime and containing sufficiently valuable/re-usable components
3. **Engage a selection of insurance providers and lenders** to evaluate opportunities and disclosure requirements for linking data in material passports to **more favourable cost of capital and premiums**
4. Identify **follow-on application** to unlock **potential from circularity**, such as launching or scaling a marketplace for recycled materials from buildings

### INDICATIVE TARGET

10 private finance institutions implementing building material passports in new developments by end of 2023.

### KEY STAKEHOLDERS

**Lead:**  
**Developers** to implement & fund (or co-fund with investors) materials passport

**Involved:**  
**WGBC; Debt providers** (could require passports to underwrite assets), **architecture and engineering firms in the circular economy space**

### PILOT GEOGRAPHY OPTIONS

**Europe targeting new commercial properties - given regulatory signals** (e.g. Amsterdam)



### INITIATIVES TO ENGAGE

[GFI work on a Building Renovation Passport](#) – consider lessons/ application for a materials passport  
[Madaster](#) – potential to partner, accelerate & build on material passport initiative for the construction sector

### PAST EXAMPLES & SUCCESS

**Battery passports** - digital systems storing relevant data along the entire battery lifecycle – including constituent parts, supply chain traceability etc. – to enable sustainable & circular management

## G. DEVELOP PARTNERSHIPS TO SHARE THE RISKS AND COSTS OF DECARBONIZING THE CONSTRUCTION SECTOR

Key

1. Design

2. Build

3. Operate

### CONTEXT

To **decarbonize** the built environment, **every stage of the value chain** must reach net zero. Today, however, the value chain is fragmented, and certain steps – in particular the **construction sector** – face **weak incentives to adopt low carbon solutions** or **alternative materials**. As a **low margin** part of the value chain, the **additional risk and higher upfront costs** that construction companies face from innovative solutions are **key barriers to adoption**. What's more, while construction companies bear the risk and costs of these solutions, they often **do not benefit from the upside** in asset value, creating a **principal agent problem**. These misaligned incentives **are compounded by a 'one-off' mentality**, where rather than reaching long term agreements with construction companies, **developers go out to tender for each new project** – and construction companies in turn go out to tender for raw materials. These **competitive processes** naturally **create an imperative** for construction companies **to be competitive – including on cost – further reducing incentives to opt for new solutions with higher capex and more risk**.

### WHAT IF...

...a collective of PFIs came together to identify and support champions in the construction sector to lead in adopting low carbon solutions to drive the transition?  
...through building trusted long-term partnerships, PFIs and construction companies could better share risk and cost of innovative solutions?  
... by unlocking systemic demand, green solutions could be industrialised, unlocking economies of scale and reducing cost?  
...this collaborative approach helped build the evidence base for green construction solutions, reducing the perceived risk?

### THE CASE FOR PFI ACTION

Share risk and cost of early adoption of low carbon solutions and alternative materials  
Potential to strengthen the evidence base and track record for low carbon solutions  
Potential for a shared 'playbook' of construction partners with strong sustainability credentials

### INDICATIVE NEXT STEPS

1. Identify **local construction champions in ~5 pilot cities** (based on e.g. large companies showing willingness to adopt decarbonization solutions, based in large cities with significant ongoing development)
2. Identify **high potential low carbon solutions / alternative materials** that are **struggling to scale** due to higher risks or cost premiums
3. **Establish partnerships** (or de facto offtake agreements) **between developers and/or investors committing to contract the selected companies conditional on use of the chosen solutions or materials – sharing the risk and cost** of doing so
4. Develop a **codified playbook of green solutions** (e.g. including their impact, cost, implications for project timelines or other risks) and **construction players** with strong sustainability capabilities

### INDICATIVE TARGET

15 new developments underway by 2024 using innovative low carbon solutions or alternative materials based on partnerships between developers / investors and construction companies.

### KEY STAKEHOLDERS

**Lead:**  
**Developers, construction companies, investors** (key to creating the indirect demand for low carbon solutions), contractors

**Involved:**  
**Low carbon / alternative material solution providers**

### PILOT GEOGRAPHY OPTIONS

Pilot with construction companies operating in Europe / North America



### INITIATIVES TO ENGAGE

**Global ABC [Market Transformation work area](#) with WBCSD** - focused on aligning decarbonization efforts across value chain, incl. through procurement, collaboration, leveraging WLC data & targets etc.

### PAST EXAMPLES & SUCCESS

**[Dream Social Procurement strategy](#)** – targets requiring a set proportion of procurement be from local, independent and socially responsible business **to create a more diverse and inclusive value chain**



## H. SCALE RETAIL FINANCE PRODUCTS TO LOWER BARRIERS TO HOME ENERGY RETROFITS AND UPGRADES

Key

1. Design

2. Build

3. Operate

### CONTEXT

Home energy performance upgrades have a vital role to play in decarbonising cities. However, the economic case for homeowners, tenants and landlords to invest in energy retrofits and energy system upgrades is weak. High upfront costs, long payback periods and uncertain impacts on property value are limiting uptake. Poor incentives are compounded by educational issues and costly retail finance products with complex repayment structures.

Better designed customer finance solutions are emerging which offer homeowners access to cheaper finance to cover the high upfront cost of energy performance upgrades, including insulation and heat pumps. These mechanisms include on-bill-financing, salary sacrifice schemes, heating and cooling as a service and debt of property or property linked finance products - but these are emerging too slowly and are not at scale.

### WHAT IF...

...the most effective retail finance products were identified, developed and scaled?  
...lower cost of capital and simpler repayment transformed the business case for energy upgrades and created a step change in household investment in the energy transition?  
...a range of products was available suited to different sectors (e.g. owner occupied vs. private rental sector) and socio-economic contexts (e.g. concessional vs. standard short-term financing)?

### THE CASE FOR PFI ACTION

Potential for new debt products offering lenders very low risk and stable returns over time  
Access to underexploited market of homeowners and tenants

### INDICATIVE NEXT STEPS

1. **Evaluate landscape of existing financial products** or mechanisms that can incentivise end-users / individual homeowners to pursue renovation, including identifying existing use cases, and articulating barriers and opportunities to scaling
2. **For the most effective product(s), identify how, where and with whom (i.e. potential partners) to scale**, and develop a roadmap – including a pilot and ramp up phase.
3. **Launch pilot**

### INDICATIVE TARGET

Partnering with a major utility provider, one lender to structure a retail finance product based on on-bill-financing or property linked finance to be deployed at scale in one city by 2023.

### KEY STAKEHOLDERS

**Lead:**  
**Commercial / infrastructure lenders**

**Involved:**  
**Partners relevant to specific product** (e.g. city municipalities for debt of property, utilities for on-bill-financing); **solution providers; homeowners, green banks** (could provide de-risking)

### PILOT GEOGRAPHY OPTIONS

Markets where investment in heat pumps and retrofit have been identified by the IIGCC as the highest priority



### INITIATIVES TO ENGAGE

**Ren-On-Bill initiative** – EU funded scheme to scale investment in deep energy renovations of residential buildings through on-bill schemes  
**PACE programme:** US debt of property product  
**GFI Property Linked Finance report** building the case for PLF in the UK, and suggesting to convene a taskforce to design a prototype

### PAST EXAMPLES & SUCCESS

**Green mortgage products**  
**Scalable business models in other household level investments** e.g. role of third party-owned and community-shared models to address high upfront costs and other barriers of solar

# I. WORK WITH PARTNERS TO AGGREGATE DEMAND FOR LOW CARBON SOLUTIONS

Key

1. Design

2. Build

3. Operate

## CONTEXT

Clear leaders have emerged in the low carbon solution space, including heat pumps and distributed renewable energy generation, that can make assets “net-zero ready”.

Despite the benefits they offer for both people and planet, these technologies have struggled to scale – trapped in a cycle of high upfront costs that hamper mass adoption – and which in turn leaves economies of scale out of reach. This challenge is compounded by the mismatch in deal size and risk profile between the institutional capital available to finance these solutions, and the fragmented market of individual households and private landlords.

### WHAT IF...

... innovative solutions to aggregate local household & end-user demand for low carbon solutions were scaled?  
...institutional investors overcame the blocks to financing household energy upgrades, to gain access to a massive new market?  
...economies of scale drove down unit costs of solutions for manufacturers and installers, making them affordable?  
... aggregation lowered the financial risk and increased willingness of contractors to implement new low carbon solutions?  
...demand aggregation by local utility and municipal energy providers helped solution providers enter new markets?

### THE CASE FOR PFI ACTION

Potential for institutional investors to participate in home energy efficiency infrastructure market that today is not suitable given small ticket size, risk profile and fragmentation.

## INDICATIVE NEXT STEPS

1. **Assess potential “clients”** (e.g. large scale private landlords, city governments, individual homeowners) for suitability and willingness to participate in a demand aggregation vehicle
2. **Create a platform** where customers (of different scales) can register interest so that demand can be accurately forecasted & locked in
3. PFIs to work with city/ local utility providers to **develop a low-interest line of finance to enable bulk procurement of infrastructure from solution provider(s)** or to develop community finance vehicles and/or mechanisms that are deployable across different classes of investment

### INDICATIVE TARGET

Pilot with one city to develop a portfolio of aggregated customers, and develop a corresponding line of finance, to install 10,000 new heat pumps over the next 18 months.

## KEY STAKEHOLDERS

### Lead:

Commercial lender or an infrastructure investor, working with VC/PE focused on decarbonisation solutions

### Involved:

City mayors and administrations (through C40), solution providers and installers, municipal energy companies (potential vehicle to scale)

## PILOT GEOGRAPHY OPTIONS

**Milan, Madrid, Barcelona, Warsaw or London**

(i.e. cities where appetite for demand aggregation for heat pump previously tested by C40)



## INITIATIVES TO ENGAGE

**C40 ongoing assessment** of potential PFI role in scaling solutions including heat pumps, with cities as finance-consumer intermediaries

## PAST EXAMPLES & SUCCESS

**Bristol City Leap** – city / private finance partnership to deliver £1bn of low carbon & energy infra.

**Ithaca & BlocPower** – electrifying building stock at city-scale

**RMI Solarize campaigns** – community bulk-purchasing, campaign for solar

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