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Modern housing
An environmental common good

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Summary

Housing is a fundamental human right, our core social foundation. As such, housing intrinsically integrates the challenges of both social and environmental justice. Yet its current trajectory, defined by financialisation, extraction and inequality, mitigates against achieving either goal. We are at a critical juncture as a result, and we must fundamentally rethink our approach to housing. Could we reverse our extractive approaches in order to produce housing that is dignified, durable, beautiful and adaptable, and made available for all, as a common good? And could the way that we make common good housing happen also produce clean, safe, healthy, convivial and nourishing shared environments?

A coherent strategy would see the interdependent dynamics of making housing – building and retrofitting – realigned, redeployed and interconnected across an integrated global approach, and redefined by a revived common good framework. It would recognise that the way these dynamics play out in the Global North directly affects the Global South and vice versa, and that this symbiotic, entangled relationship must work within planetary boundaries. It would recognise the right to housing, but also the rights of the environment. It would recognise the right of people to remain in place, as well as the increasing need to fulfil migrants' rights to housing.

This requires a transformation in practices around housing in terms of design, construction, care, economy, and more diverse forms of shared living, tenure, ownership and governance. At the larger scale, the industry behind housing must shift towards retrofit, reuse and redistribute, cultivating new and old skills with circular materials from regenerative sources designed for assembly and disassembly via modular fabrication. At the smaller scale, genuine participation in making and re-making housing can be unlocked through self-build, adaptive, open building systems. A redistribution of existing living spaces must meaningfully counterpoint the extractive practices of building. In all this, engaged, publicly led planning and policy can be complemented by a revived public and social housing, which can create and direct sustainable and affordable housing markets outside extractive financialisation.

Housing policy and practice could powerfully articulate and demonstrate a new policy framework for 'reviving the common good.' This would be oriented towards the rights of the environment as well as people, and based around principles of purpose and directionality, co-creation and participation, collective learning and knowledge-sharing, access and reward-sharing for all risk-takers, as well as transparency and accountability in decision-making.

1. Introduction

"Modern housing, if it is to be done at all, cannot be patchwork. It is not reform within the old pattern. It is either an entirely new method of providing an entirely new standard of urban environment, or it is nothing ... It has become a Public Utility."
Catherine Bauer, *Modern Housing* (1934)

"He looked at the granite. To be cut, he thought, and made into walls. He looked at a tree. To be split and made into rafters. He looked at a streak of rust on the stone and thought of iron ore under the ground. To be melted and to emerge as girders against the sky. These rocks, he thought, are here for me; waiting for the drill, the dynamite and my voice; waiting to be split, ripped, pounded, reborn; waiting for the shape my hands will give them."
Ayn Rand, *The Fountainhead* (1943)

Housing is a fundamental human right. It is not only the foundation for other core rights, including health, education, water and sanitation, freedom of association and freedom of expression, but also for the right to life itself, the right to live with dignity (Mazzucato and Farha, 2023). Equally, as housing is at the heart of the built environment sector – its materials, resources, systems, land-use – the way that we make housing also embodies the rights of the environment, at least when understood from beyond a narrowly anthropocentric perspective.

It is entirely possible for housing to be dignified, durable, beautiful and adaptable, and made available for all, as a common good, in ways that are affordable, valuable and environmentally sustainable. This paper demonstrates that many, if not most, of the technologies required to achieve such a goal are in place, as are a diverse range of approaches, from policy to process to participation. The motivation to do so is also present, if not yet evenly distributed. Housing's positive systemic impact is such that it can be at the core of our grand challenges (Mazzucato, 2018a; 2021), the red thread woven through our sustainable development goals. Its foundational positioning means that housing policy can be the forum for integrated human and environmental development.

Currently, however, housing is not being created, delivered or made available as if it were a fundamental human right. Over a billion people worldwide are living without a home at all or in grossly inadequate housing, lacking the most basic services. In almost every city around the world, housing is unaffordable for those on low and middle incomes, with housing costs growing faster than incomes (UN Habitat, 2022). Nor is it being constructed, maintained or developed with the rights of the environment in mind. In fact, quite the opposite is true.

The interplay between these neglected rights is leading us to an increasingly tight double-bind. Our need to house people – a need that may be predominantly driven by climate migration sooner than we think – is contributing heavily to greenhouse gas emissions and biodiversity loss. This will increase the severity of the climate crisis and drive further climate migration, which will, in turn, create further need for housing. In most cases, every time we build a house, we are making this situation worse.

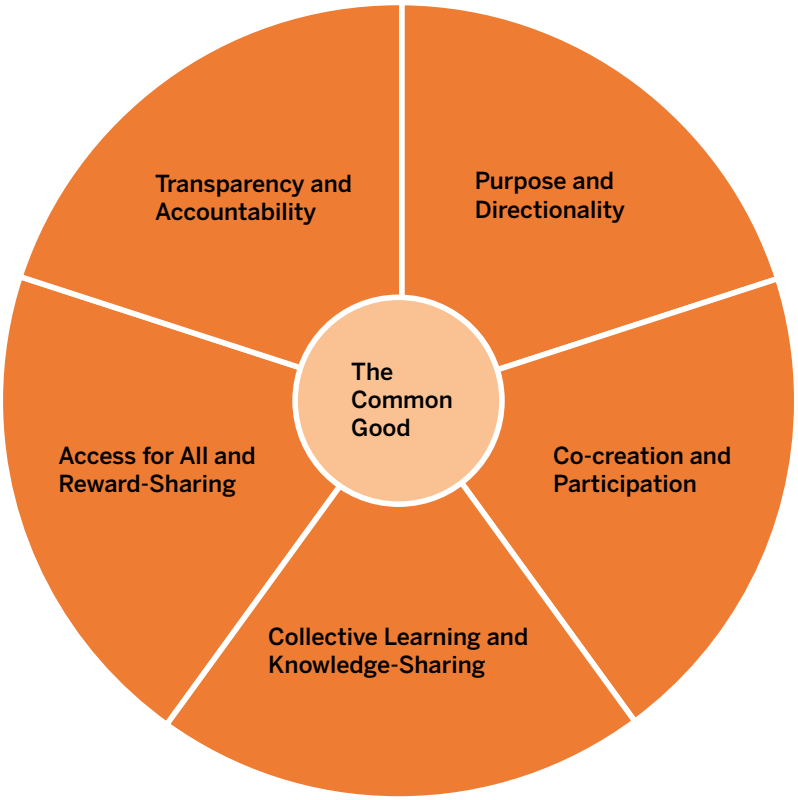
The challenge is to break the spiral, producing regenerative biodiversity while ensuring that good quality housing is available to everyone, as a human right, wherever they live.

To achieve the task at hand, the transformation of housing policy requires a renewed underlying economic framework that articulates, captures, and promotes the ways in which ambitious goals can be collectively set and met. Thus far economic theory has been unable to offer such a framework, remaining tied to the assumption that the state can, at best, fix market failures and is always at risk of "capture". Public good scholarship, as the guiding conceptual lens that informs the state's involvement in the economy, advocates for public intervention only when markets have failed. For example, negative externalities, such as those created by pollution, are considered to require public measures that cause the private sector to internalise external costs, such as through a carbon tax. While such an approach is useful for describing steady-state scenarios in which public policy aims to put patches on existing trajectories provided by markets, it is less useful when policy is required to ambitiously shape the direction of markets and the economy more broadly. Thus, meeting the challenge of creating inclusive and sustainable housing, requires less a redistributive state that fixes market failures *ex-post* and more an entrepreneurial state that shapes them *ex-ante* (Mazzucato, 2013).

Guided by a market shaping view of government, an economics of the common good offers an improved framework by incorporating collective intelligence into the coordination between a range of actors required to meet common objectives. As shown in Figure 1, the common good foregrounds the "how" of economic activity as much as the "what" by introducing five pillars that can guide policy and practice (Mazzucato, 2023). The first pillar, purpose and directionality, can promote outcomes-oriented policies that are in the common interest. The second pillar, co-creation and participation, allows citizens and stakeholders to meaningfully participate in debate, discussion and consensus-building that bring different voices to the table, and provide for shared ownership. The third pillar, collective learning and knowledge-sharing, can help design true purpose-oriented partnerships that drive collective intelligence and knowledge-sharing as well as resources. The fourth pillar, access for all and reward-sharing, enables the sharing of the benefits of innovation and investment with all the risk-takers, whether through equity schemes, royalties, pricing or collective funds. The fifth pillar, transparency and accountability, can ensure public legitimacy and engagement by enforcing commitments among all actors and by aligning on evaluation mechanisms (Mazzucato, 2023).

In centring these five pillars, an economics of the common good is different from exploiting housing as a speculative financial asset geared towards profit maximisation and value extraction (Mazzucato, 2018b; 2023). While terms like Global North and Global South are gross simplifications, and examples of living environments typically associated with the term Global South can be found within the North and vice versa, it is also possible, and necessary to recognise that these patterns of extraction are highly visible within global flows of material, capital, culture and people themselves, and that the Global North has extracted resources, natural and otherwise, from the Global South to produce its built environment. For this reason, answers to the most urgent contemporary challenges must include voices from the most marginalised, whether it is Indigenous communities, women or people of colour who have been left out of the process of deciding "what is to be done." Different voices must be brought to the table to discuss what it means to achieve an equitable, just, and sustainable economy that is co-created by actors from both developed and developing countries. The common good framework centres this

Figure 1. The common good (Mazzucato, 2023)

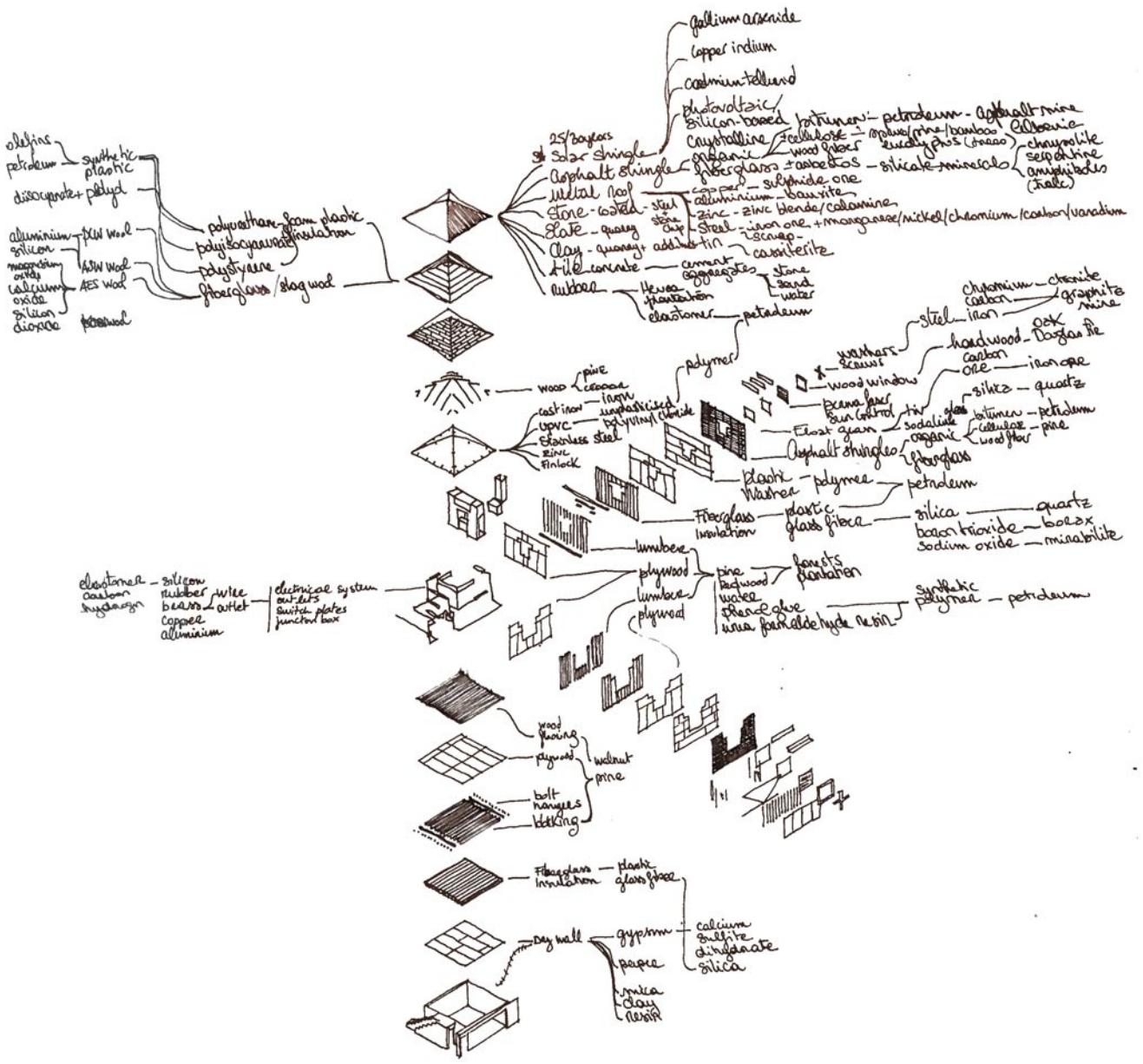


aspect through its focus on co-creation and participation as well as access and reward-sharing. It proposes a different strategy that sets out to reverse many of the dominant economic logics and power structures that have shaped housing policy across much of the world, particularly over the last half-century.

Before the recent turn to individualised and privatised housing, diversified portfolios of housing policies were in play, with many drawing from the progressive directions laid out in Catherine Bauer's 1934 book, *Modern Housing*. Yet within a few decades of Bauer's book, architecture, construction, and housing economics had largely turned away from her systemic and socially just directives, translating the technological possibilities of modernism in another direction, captured in the narrowly individualistic and environmentally destructive philosophies evoked in Ayn Rand's *The Fountainhead*, published a mere nine years after *Modern Housing*. That Rand, a strangely pervasive influence even today (Freedland, 2017), saw nature as merely "waiting for the drill, the dynamite and my voice; waiting to be split, ripped, pounded," means that she was sadly more prescient about the following century's culture than Bauer had been.

Perhaps now, our shared interlocking crises, our contemporary technologies and the benefit of hindsight combine to provide the impetus for such a reversal. We can return to Catherine Bauer's starting point of housing as a "public utility", but, given the nature of the entangled challenges we face, with the aim of using every tool at our disposal. This must include the ability to deliberately shape markets to achieve collective goals, as well as to create dignified public and social housing as a core foundation – and thus housing as a common good (Mazzucato, 2023). In drawing on an economics of the common good, the article discusses how repositioning housing as a common good can provide long-run benefits through an integrated approach to societal and environmental wellbeing. Only by redirecting our economy – with the common good at the centre of production, distribution, and consumption – can the economy be shaped and co-created to produce more inclusive and sustainable outcomes.

1.1. Constructed from "shadow places"



Scales of Extraction (detail), Charlotte Malterre-Barthes (2021)

Housing is uniquely complex. It can be a fundamental shared infrastructure, slow-moving durable good, industrial output, financial asset, cultural expression and, most importantly, a home. It is often all these things at the same time. The way that we imagine and enact housing reveals not only what we stand for as a society – who we are, our identities and cultures, histories and geographies, economies and polities – but also the way that we touch the earth.

Although houses would seem to be firmly rooted in place, as if drawn up from the soil, almost all contemporary buildings consist of a highly distributed global footprint, usually dispersed across what the Australian philosopher Val Plumwood (2008) called "shadow places". These shadow places are obliged to host the extractive practices that make up a house, such as dredging sand to make concrete or fibreglass, destabilising river systems and creating flooding (Koehnken and Rintoul, 2018), or doing the same to deep seabeds in order to extract nickel for steel.

Housing construction creates ravaged hillsides, denuded by logging, devastating regenerative ecosystems. The iron ore extraction destroying ancient and sacred

Indigenous places helps produce the carbon-intensive steel beams for apartment blocks, just as the water contaminated by lithium mining enables batteries for roof-top solar cells, which in themselves require quartz, copper and aluminium frames produced from bauxite, ripped from open pit mines (Malterre-Barthes, 2021).

As houses are inhabited, further damage is created via fossil-fuel-based heating and cooling, or mobility-related emissions, exacerbated by careless urban and regional planning. When a building is subsequently adapted, it produces further material impacts and, if it is demolished, the waste tends to go to landfill. Globally, construction and demolition waste contribute over 30 per cent of the total waste produced (Purchase et al., 2021) and in the UK, for example, construction, demolition, and excavation related to buildings account for 60 per cent of both material use and waste generation (Mant, 2019). The industry is a long way from the end-of-life producer responsibility policies already in place in other sectors.

All these forms of lifecycle costs are rarely taken into account in any country. They are rarely communicated in the sale price of housing, never mind "priced in" for investors, developers or builders, and the impacts accumulate, just as individual houses cluster to form towns and cities. Between 1990 and 2019, emissions from buildings increased by 50 per cent (IPCC, 2022). According to the United Nations Environment Programme (UNEP) (2022a), the various processes involved in making and operating buildings represented around 37 per cent of global CO_2 emissions in 2021, and the construction sector is not on track to achieve decarbonisation by 2050. As operational lifecycle greenhouse gas emissions decrease proportionally over time due to energy efficiency advancements, the contribution of embodied greenhouse gas emissions related to the construction of new buildings is increasing, such that net-zero targets are still not being achieved (Röck et al., 2020).

Yet a focus on emissions has distracted us from the harm done by extraction. Construction consumes almost all the planet's cement, 26 per cent of its aluminium, 50 per cent of its steel production and 25 per cent of all plastics (Hurst, 2019). Sand mining for construction material and land reclamation are the largest extractive industries on the planet (Koehnken and Rintoul, 2018). UNEP (2022b, 2023) reports that this mining is rising at an unsustainable rate for a finite resource and that the existing 50 billion tonnes mined annually drive "erosion, flooding, the salination of aquifers and the collapse of coastal defences". Since 2000, the rate of demand for electricity in buildings has increased five times faster than improvements in the carbon intensity of the power sector (IEA, 2019), whereas the global mineral reserves required to manufacture even a single generation of the renewable energy systems imagined for tomorrow's settlements may not exist (Michaux, 2021).

These patterns of extraction are scored into the landscape, striped across our atmosphere and scar construction workers, as well as displaced or disenfranchised populations. The Global North has depleted much of its biomaterial and mineral reserves, and the footprint of its housing is increasingly in the Global South. As Liboiron (2021) suggests, "Pollution is colonialism."

In a sense, we cannot really "afford" to make housing – and yet we cannot afford not to. The impact of Northern growth hitting the South is that around 1 billion people live in slums or informal settlements, and around 3 billion will require adequate and affordable housing by 2030. These slums are not naturally occurring or inevitable; rather, they are policy outcomes, the corollary of urbanisation policies that drive land use and biodiversity depletion, and whose rapid growth has outstripped the provision of affordable housing (United Nations, 2019).

1.2. Are we constructing homes, or mortgages?

What drives systems in these directions? Policy frameworks in many high-income economies encourage demand for housing as a financial asset and means of wealth accumulation, tending towards an "overconsumption" of housing space and resources by wealthier groups, combined with a lack of investment in the energy efficiency and social value of housing stock (Ryan-Collins et al., 2017; United Nations Human Rights Council, 2017). Globally, this not only leads to an accumulation of carbon, a reduction in biodiversity and an increase in land-use impacts, but also unaffordable housing locally, to which the policy response is to build more housing.

Such supply-side thinking drives government housing targets, which attempt to use new-build housing to solve housing affordability crises. For example, Germany aims to build 400,000 new homes per year. The UK target is 300,000 homes. Yet in these countries, housing continues to be less, not more, affordable, due to the particular dynamics of land economics (Ryan-Collins, 2017). Across both countries several million existing homes are unoccupied and in the UK 50,000 homes are demolished each year (Harper, 2023). In Nanchang, China, almost 20 per cent of homes now lie vacant, due in large part to over-building; in the decade before 2021, the annual amount of housing construction in Nanchang roughly doubled, yet the population only increased by 25 per cent (Wakabayashi, 2023). The sheer volume of recent building in China is hard to fathom; as a yardstick, it is estimated that China used more cement in three years (2011-2013) than the USA did in the entire 20th century (Swanson, 2015; WWF, 2018). Concrete's environmental impact is such that it has been called "the most destructive material on Earth" (Watts, 2019) and there is thought to be little opportunity to reverse its impact via new buildings within the next decade (Habert et al., 2020).

Even though a socially-just green transition requires governments to work outside departmental silos and coordinate across policy fields (Mazzucato, 2021), these housing targets sit separate from their country's carbon goals. In terms of materials, resources and industrial processes, building the government's target number of new homes in the UK will consume most of the country's carbon budget (zu Ermgassen et al., 2022). Some estimates suggest that only 15,000 new homes per year may be possible if the UK attempts to stay within the planetary boundary constraints it has agreed to (Dark Matter Labs, 2023).

From this perspective, these houses are not being constructed to meet the needs of people and planet, but those of investment funds and construction companies. They are built manifestations of a financialised housing market in overdrive (Perucca et al., 2023). Indeed, after 2008's Global Financial Crisis – to some extent a property market-driven event – investor-owned housing in Europe increased by 700 per cent up to 2020 (Farha, 2021). With this "lock-in" taking hold over the last four decades across much of the Global North, there is little political capital to be gained by suggesting meaningful alternatives, despite its present and future outcomes. Rather, given its significant contribution to gross domestic product (GDP), a report on the "booming construction sector" – accompanying the politician's dream of "cranes on the skyline" – is often seen as an unalloyed good, in much the same way that new car sales are frequently reported on as a proxy for economic health, irrespective of their deleterious impact on the environment.

With these imperatives it is perhaps no accident, then, that 75 per cent of all housing produced in England since 2007 is "mediocre" or "poor" and does not meet "the basic requirements for civilised living" (Carmona et al., 2020). This outcome is hardly due to a lack of architecture, engineering, or construction capability in the UK and so it must be seen as government policy at work.

Table 1. Housing at a glance

The built environment sector contributed 37% of global energy and process-related CO_2 emissions in 2021 (UNEP, 2022a).	Around 97% of the existing EU building stock requires major upgrades (Buildings Performance Institute Europe, 2017).	In 2020, researchers found that 75% of all housing produced in England since 2007 is "mediocre" or "poor" and does not meet "the basic requirements for civilised living" (Carmona et al., 2020).
The sector is not on track to decarbonise by 2050 (UNEP, 2022). Architecture is described as "lagging behind" all other sectors (Saheb, 2022a).	The construction sector consumes almost all the planet's cement, 26% of its aluminium, 50% of its steel production and 25% of all plastics. (Hurst, 2019)	Reductions in life cycle greenhouse gas emissions in operation are countered by an increase in embodied greenhouse gas emissions during construction (Röck, 2020). For housing, replacements are often twice the carbon footprint of retrofit (Schwartz et al., 2022).
An extra €275 billion of additional investments per year are required to retrofit its building stock to achieve EU climate targets by 2030 (European Commission, 2020).	75% of waste generated by the construction industry has a residual value yet is currently not reused or recycled (Purchase et al., 2021).	Globally, construction and demolition waste contribute over 30% of the total waste produced (Purchase et al., 2021). A perceived sustainability leader like Denmark is only 4% circular across all sectors (Circle Economy, 2023).
Germany aims to build 400,000 new homes per year. The UK target is 300,000 homes. This would use almost the UK's entire carbon budget (zu Emergassen, 2022).	A quarter of a million homes have been empty for more than six months in England alone (Action on Empty Homes, 2023). Approximately 1.8 million are empty in Germany (Neate, 2015). In the UK, 50,000 homes are demolished each year (Harper, 2023).	In England and Wales, there are more than 4000 preventable excess deaths every winter due to cold homes (National Energy Action, 2023). In Australia, the hottest continent, more people die of the cold than in Sweden, linked to poor insulation in housing (Gasparrini et al., 2015).

If the current tangle of extractive growth and inequitable wealth accumulation stays in place, a just transition towards truly sustainable housing is likely to remain an impossibility, no matter how much technology and money are thrown at the problem. Explicitly defining a direction towards which policies may be designed and partnerships formed is critical to shaping the economy in the service of the common good (Mazzucato, 2021; 2023).

Yet just as construction's impact on the climate and biodiversity crisis implores us to squeeze the brakes on supply-side strategies, a flattening of global population growth rates provides another reason for a rethink. According to social geographer Danny Dorling (2020), the "slowdown" in population growth can be seen as a sign of progress, as falling fertility rates are often a result of increased prosperity, education, and reproductive autonomy for women. Dorling also suggests that such a slowdown could lead to a profound reduction in carbon emissions, given the historical links between modern economic activity and greenhouse gas emissions. Irrespective of the unpredictable patterning of migration, this total reduced population must impact our need for housing, as well as its dominant model of financing.

Frank Swiaczny, former chief of population trends and analysis for the United Nations, says "A paradigm shift is necessary. Countries need to learn to live with and adapt to decline [in population]" (Cave et al., 2021). According to Dorling

(2020), however, most current economic models cannot imagine that a population slowdown might be a possibility, and so housing strategies are still stuck replaying the moves of the "Great Acceleration" on a loop, essentially predicated on constant population growth driving constant construction – and thus, of course, constant extraction.

1.3. Building and retrofitting, South and North

Catherine Bauer's (1934) insights into an "entirely new method of providing an entirely new standard of urban environment" must now be re-worked for an age of non-extractive housing, based around careful, inventive, equitable and regenerative use of existing resources. As a precursor to this, housing must be unhooked from the narrowed idea of preserving private wealth irrespective of the environmental costs and directed instead towards unlocking its true potential for shared value and common good (Mazzucato and Farha, 2023). The impact of housing in terms of greenhouse gas emissions and biodiversity loss is such that any notion of "housing as a human right" must be intrinsically driven by strategies for broader environmental sustainability, beyond human interest. This imperative must apply to both a "mass retrofit" of the Global North *and* the new forms of housing required due to climate migration, often from the Global South, recognising that these are two sides of the same coin.

No matter how well-meaning urban development might be, the dark irony of building housing to solve climate migration, and in doing so exacerbating the climate crisis, can no longer be ignored. Nor can supply-side new-build strategies be blithely pursued, when they tend to produce biodiversity degradation and resource depletion, displaced peoples, and housing inequality. Nor can the housing policies of the Global North continue to extract resources and value from the Global South, as if these are separate systems and disconnected environments.

If we progressively take on the interwoven challenges of climate and biodiversity crisis, and the urgent need for a just transition, what would this re-tuned approach to housing look like? How might we re-imagine Bauer's "new standard" to exemplify clean, safe, healthy, convivial and nourishing shared living environments for all, by better balancing the quantity, quality and direction of retrofit and new-build housing?

A coherent strategy would see the interdependent dynamics of making housing – building and retrofitting – better aligned, deployed and connected across an integrated global approach, which recognises that the way these dynamics play out in the Global North directly affects the Global South and vice versa, and that this symbiotic relationship must produce common good outcomes within planetary boundaries. It would counterpoint inventive and equitable ways of redistributing space with more careful methods of building it. A century after Bauer's first waves of common good housing, "the right to housing" must now mean "the right to *sustainable* housing", where the rights of people are better balanced with the rights of the environment.

2. Building

Despite a slowdown in the rate of population growth, the global population will still grow until it begins to fall somewhere between 2060 and 2080 (noting that those dates are well within the typical life-span of a new house built today across most high-income countries). Further, within the existing population base, migration happens and urbanisation happens. Many people live in substandard housing and many have no housing at all.

So new-build housing will be required, but with tighter direction on where, what, how and for whom, and complemented by a greater emphasis on the adaptive reuse, or retrofit, of the buildings and neighbourhoods that already exist. With common good outcomes in mind, innovation in policy, design, construction and maintenance must see this significant shift towards the retrofit of our existing living environments, aligned with far greater care and attention taken to what gets newly built in the gaps.

While many housing advocates fall back on the comforting rallying cry of "build more homes," building more will not dig us out of this extractive hole. This applies to the rights of people – as Dorling (2014) put it, "Building more may result in the wealthy owning even more houses, more families renting some of those homes, but more being empty at any one time and in greater future inequality" – as much as it does to the rights of the environment. As with any form of mission-oriented innovation (Mazzucato, 2018; 2021), the direction and quality of what gets built is more important than sheer quantity or mindless speed.

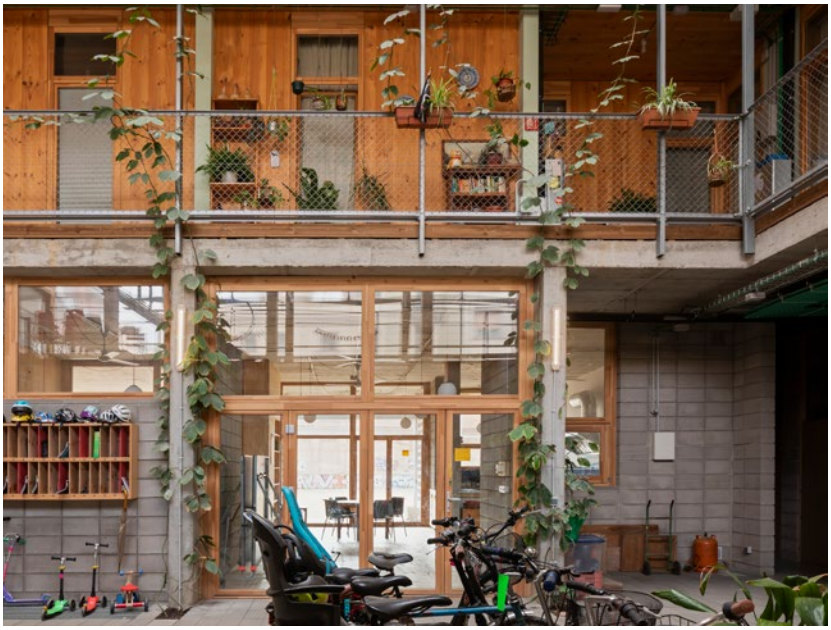
Yet even suggesting such a "limitation" in building new housing is a radical shift in economies attuned to the primacy of construction and property development industries. The necessary innovation to work within such constraints is currently unlikely to emerge from the mainstream private sector oriented around the "easy money" of traditional supply-side policies for housing.

Instead, as is often the case (Mazzucato 2013), innovative directions for building housing can be glimpsed within the rich diversity of experimentation at the edges of public, social and citizen-led housing. It is from these edges that a contemporary iteration of Bauer's "new pattern" might emerge, ultimately producing a better balanced "playing field" of complementary forms of public, social and private housing in roughly equal measure.

2.1. Building social housing

"Social" includes a diverse array of cooperatives housing associations, not-for-profit and limited-profit organisations, and shared self-build ventures. These tend to sprout from a rich soil nourished by both community innovation and city-led action: land-use policies and supporting services such as coherent planning, design and procurement, and re-aligned material supply chains.

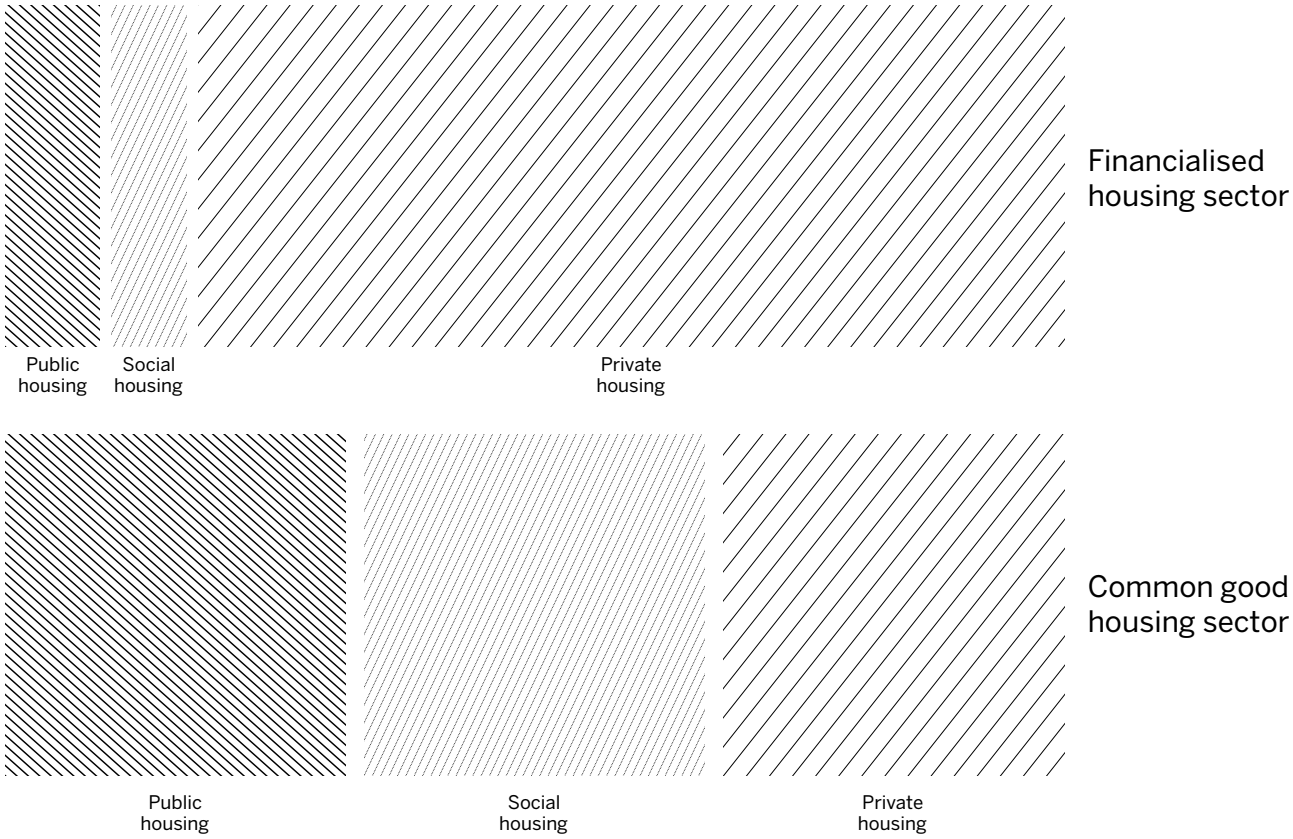
Having diversified across numerous environments over the last century, cooperative housing provides a particularly robust, well-tested and well-researched alternative to traditional private property ownership patterns. Most emphasis is placed on the idea of the cooperative as a collective owner of the properties, avoiding individualistic financialisation of dwellings, but the shared co-ownership models underpinning such structures also tend to facilitate more sustainable



La Borda cooperative housing project by Lacol, Barcelona (image credits: Álvaro Valdecantos (top left), Joan Andreu and Usue Belandia (bottom left), and Lacol (top right, bottom right))

La Balma cooperative housing project by Lacol, Barcelona (image credit: Milena Villalba)

Figure 2. Financialised vs common good housing sector



housing than typical private market housing. This is because the difference saved via cooperative models often goes towards features such as shared energy, mobility and other common infrastructures.

The participative co-design cultures and processes common to cooperatives can bind communities around shared resources and spaces, minimising emissions and resource use. Shining examples include Zürich's Kalkbreite (Ruby et al., 2017) and Mehr Als Wohnen (Hugentobler et al., 2015), Stavanger's Vindmøllebakken (Spring, 2021), and Barcelona's La Borda[1] and Sostre Civic[2], each outlining innovative variants on sustainable living patterns supported by engaging, thoughtful and delightful architecture. In the Council on Urban Initiatives' case study report (Burdett, 2023), Melbourne's Nightingale can be seen to some degree as a variant on cooperative housing, with similar approaches mitigating against wasteful speculation and using the financial value saved to invest in sustainable buildings and services. In Latin America, Uruguay's FUCVAM projects have blazed the way for cooperative housing across Paraguay, Mexico and Bolivia.

While various conditions are required to prime such developments, including access to shared or municipal land, sophisticated co-design skills, and fine-tuned financial and legal structures, variations on housing cooperatives could provide the core platform for social housing in most countries, a "third place" hovering between private and public housing.

2.2 Building public housing

Public housing more directly provides the public sector with innovative "green procurement" possibilities, as well as better housing affordability across entire urban systems. Governing the economy for the common good means that the conditions must be correct in the first place, without over-relying on the redistribution of wealth that leaves systematic inequalities untouched (Mazzucato, 2023).

Housing is affordable if it is *made* affordable. This means it must be proportional to household income or made available outside of household income where that does not exist. Rather than reflecting public value, equitable access, or an environmental "bill of materials", in a financialised market, higher prices are simply a manifestation of what that market can bear and they tend to rise as high as possible. Given the context of a broader financialisation of many national economies, housing has become treated as a financial asset rather than a place to live, with its accrued profits and private investment extracted from the "socially and economically desirable sectors of … the real economy" (Ryan-Collins, 2017).

To steer housing in a sustainable and inclusive direction, governments must regulate and design partnerships that serve the common good (Mazzucato and Farha, 2023). This can include not only limited-profit and not-for-profit housing providers, but also private developers with a long-term focus that is not geared solely towards mere profit maximisation. Governments can also attach conditionalities, such as those related to access and reinvestment, to public funding (Mazzucato, 2022; Mazzucato and Rodrik, 2023).

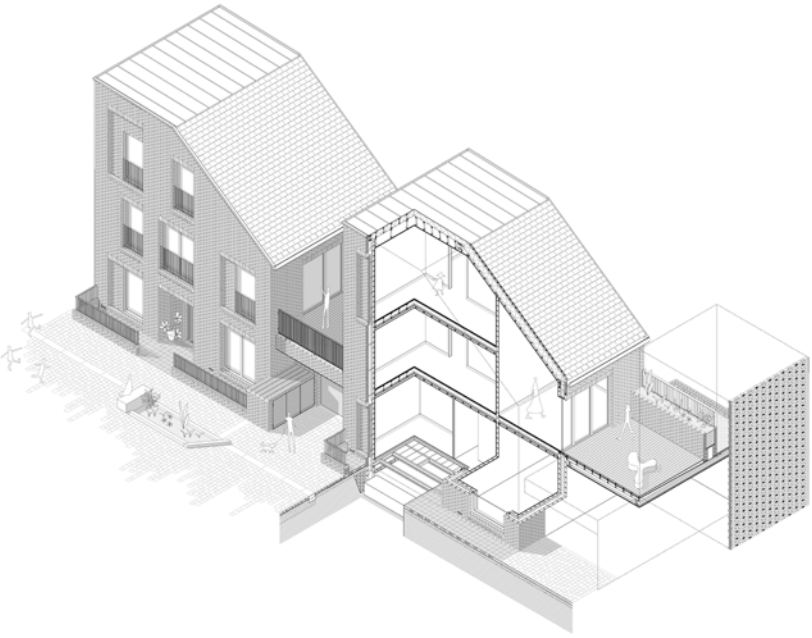
Mission-led procurement can also play a key role in the innovation chain. It can create markets by providing a demand-side pull for new products and services, widen the ecosystem of companies able to access government contracts and increase the local economic multiplier (UCL IIPP, 2023). When aimed at tackling socio-economic challenges, such as the climate and biodiversity crisis, mission-led procurement can allow countries to make a greater transformative impact with the same overall expenditure (Mazzucato, 2020).

Vienna provides a continuing example of reaping the benefits from the long-term maintenance of common good in public housing. As documented by Bauer in 1934, Vienna started building public housing at scale at the same time as many other European cities and regions, during the 1920s. Yet unlike most, Vienna continued to expand and maintain its high-quality public and social housing over the following century, and can now entwine sustainability and affordability as two related planning goals. Vienna's original purpose-driven motivation was to ensure that a large enough and decent enough supply of public and social housing improved housing for all, including private homeowners.

As a result, in the country that helped lead the development of *Passivhaus* building standards and mass timber structures, Vienna can now also drive the creation of a sustainable development sector via the scale and quality of the same public delivery and procurement capability (Förster and Mekning, 2018). Indeed, evidence from China suggests that such publicly led sustainable housing can drive "green" housing development by the private sector via considerable spillover effects (Zhang et al., 2018).

In a different context again, since the 1960s the work of Singapore's Housing Development Board (HDB) has persistently demonstrated the value of building publicly developed housing on government-owned land – at scale, with high quality and with land value uplift generally captured for public value. Public housing is thus a public asset, an investment in the common good rather than the "cost" it is often perceived as elsewhere. In Singapore, 80 per cent of residents live in publicly developed housing units, most of which are owner-occupied on 99-year leases

Crofts Street housing development, Cardiff, Wales, by RSHP, @Home, Wates and AECOM (image credit: © Joas Souza)



Dujardin Mews public housing, Enfield, London by Karakusevic Carson Architects (image credit: © Tim Crocker (left))

(Chan and Yap, 2023). To counter financialisation dynamics, Singaporeans are effectively "long-term leasing" the property from the state. They are also prevented from owning more than two residential units at any time (Bryson, 2019). In Singapore's planning model (Housing Development Board, 2023), housing is seen in the context of neighbourhoods or "towns" and is woven in alongside social and cultural infrastructures and integrated approaches to healthcare. In this sense, Anne Haila (2016) has suggested that perhaps Singapore is even "resolving the housing question."

As can be expected six decades on, even Singapore's HDB model faces challenges. In terms of equity, some buildings are starting to near the end of their lease at the same time as resale prices on the private property market are rising (Chan and Yap, 2023; Purves, 2023). In terms of sustainability, Singapore must find ways to pivot housing towards circular biomaterials, renewable energy infrastructures, and the reduction of waste and water use. Yet by actively continuing to build public housing at scale, Singapore has retained the strategic lever with which to address such systemic challenges.

In the UK, the potential of a re-engaged "new municipalism", combined with a housing affordability crisis, means that public housing (AKA "council housing" in the UK) is finally back in play. Exemplary public homes are being built for the first time in decades. Peter Barber's (2024) designs for councils in Greenwich, Camden and Barking, or Karakusevic Carson Architects' (2021) work for Enfield Council, indicate the quality of architecture possible via this reinvigorated civic capability, enabling medium-density, convivial and sustainable spaces by integrating with local public transport networks and social infrastructure. RSHP's (2021) work at Croft Street in Cardiff demonstrates how innovative modular fabrication systems allied to contemporary utility services can produce high-quality public housing that effectively eradicates most energy costs for residents.

Equally, the UK has also demonstrated the problems that arise from mishandling public housing and the possibility of public housing as a common good asset will remain out of reach if it remains publicly owned but privately managed, or public land is simply sold to private developers, often with only meagre requirements to produce affordable housing. In these situations, the public continues to hold risk while profits accrue to private operators, well outside notions of public value or common good (Mazzucato, 2013). The assumptions underpinning public housing are quickly revealed – as if it is only a cost of market failure – and remain a long way from the strategic asset that a Vienna or a Singapore see.

However, recent research indicates that by engaging with purpose-driven policymaking and shared common good outcomes, the UK government would *save* around £1.5 billion annually by making good quality social/affordable housing available and thus negating the various costs incurred by homelessness. This is likely to be an underestimate, because of the added beneficial impacts on economic growth and productivity; employment and disability benefits; acute and chronic health; the criminal justice, health and care systems; educational attainment and life chances "(Fraser, 2023)."

Importantly, governments must invest in their internal capabilities to build, or re-build, the competence and confidence to successfully co-design and deliver programmes, and progressively care for and maintain places, while collaborating fluidly across business and civil society (Kattel and Mazzucato, 2018; Hill, 2019a; Farley et al., 2021; Kattel, 2022). As much as picking the willing actors outside government, the ability to coordinate within and across government is critical to break departmental silos, and reframe assumptions about financing and value, and instead adopt a whole-of-government approach to housing, integrating health, environment and social justice *via* housing. All activities must be aligned so that

Wikihouse wall blocks being erected, Peaks Barn construction, UK (image credit: © Jack Watts (left)). Aerial view of the De Stripmaker neighbourhood, Netherlands, with nine WikiHouses under construction (image credit: © WikiHouse NL (right)).

every policy and programme, from property taxation to housing income support and from land use to healthcare, is geared towards housing for the common good (Mazzucato and Farha, 2023).

2.3. Building self-build

At the smaller scale, self-build and self-organised structures and spaces could play a far more meaningful role than is usually allowed. These forms of housing often gently increase density by working in the gaps of existing places, such as Accessory Dwelling Units in Los Angeles, Wikihouse's open systems or Bristol's WeCanMake initiative. This increased density also layers in sustainable outcomes at the systemic scale of neighbourhoods and communities.

The WeCanMake model enables sustainable housing through the sharing of land and resources by organising around community land trusts and modern methods of construction (MmoC), utilising timber cassette systems and reusing local waste materials in the design and fit-out. Its local construction infrastructure makes visible the supply chains involved in building, necessarily foregrounding local skills, labour, materials and collaborative practices, articulating the possibility of a new retrofit industry. In doing so, self-building housing together expresses the diversity of local cultures and environments, oriented around common good outcomes. The "investor is the user" model of cooperatives also works in this context, enabling a community, over time, to more precisely and systematically tune its housing demand to supply, encouraging adaptation over demolition.

These contemporary technology-enabled approaches are inspired by centuries of vernacular architecture, as well as the systemic precedents of Walter Segal and John Turner (Grahame and McKean, 2021). Turner's (1967 in Lifschutz, 2017) research into the *barriadas* in Lima, Peru, led him to state: "Because the architecture of the barriada is based on a system, it can respond to changing demands and places itself in the hands of the user."

In terms of enabling a sustainable density, self-build need no longer be characterised by "one-off huts": Wikihouse's[3] Skylark system can produce three-storey townhouse or terrace typologies, with far better operational, embodied and adapted carbon performance than the housing the private sector volume builders tends to produce – yet still be self-organised. These construction technologies perhaps open up more possibilities for the self-builders and cooperatives who advocate open building systems than for the volume builders of the housing industrial complex who, outside occasional Japanese Metabolist efforts (Mack, 2022), have traditionally shown little interest in these innovative forms of building.

All these super-local approaches enable forms of adaptive design, where residents and users can continue to refine their buildings and neighbourhoods over time, ensuring they remain viable, desirable and valuable, despite the changing circumstances of demographics and environment, helping to avoid displacement and waste. Unlike the practices of the traditional construction industry, an adaptive design culture recognises that buildings are never finished; that, after Stewart Brand (1994), buildings must be able to learn; that building is a verb as much as it is a noun. The anthropologist Tim Ingold (2013) notes that the history of building tells us that "Completion is, at best, a legal fiction."

Shifting the perception of self-build among policymakers or citizens may be one of the primary innovations required. The British writer Colin Ward often reported and reflected on the many examples of successful, sustainable and high-quality self-build examples from around the world, yet by 1984 he noted that: "Everyone today is so completely dependent on the housing supply system ... that we find it hard to believe that people can house themselves." (Ward, 1990).

A key value of self-build housing, as with cooperatives, may be to illustrate that the sustainable and social are intrinsically linked. Richard Sennett's (2012) work on collaboration is derived from this concept of building and community being entwined. He observes that, "Mutual support is built into the genes of all social animals; they cooperate to accomplish what they can't do alone." And self-build housing is constructed as much through mutual support as it is through timber and nails, working from the community up. This requires a re-definition of the practices of building such that they integrate with those of dwelling, as a continual "refining in place", winding together "ville" (the city's built fabric) with "cité" (the city's culture) (Sennett, 2019).

These participative models of social and shared housing require advanced architectural practice, with engaged designers motivated to co-produce houses with their likely users, working with modular systems, approachable materials and appropriate technologies that allow inhabitants to elegantly shift their spaces over time. In 1972, then-Royal Institute of British Architects President Alex Gordon (1972) delivered a paper on "long life, loose fit, low energy", capturing much of this sensibility. Yet since the 1970s mainstream architectural culture and practice has arguably retreated from these possibilities, away from the buildings that most people inhabit, and further from the fundamental role and responsibility of the architect of ensuring the city as a common good.

2.4. Building design and architecture

Indeed, as the fees of professional architecture practices are generally a percentage of construction costs – a form of perverse incentive in this context at least, given the typical environmental impact of construction – the sector has often been blithely complicit in extractive processes. Many notable exceptions exist, yet the mainstream profession and its supporting institutions have rarely exercised their collective imagination about a genuine shift of emphasis. In her report for the Intergovernmental Panel on Climate Change (IPCC), Yamina Saheb (2022) noted that architecture is behind all other sectors in terms of decarbonising.

However, design's true value lies precisely in imagining and cultivating diverse possible futures. Joseph Grima (2021) imagines a "non-extractive architecture". He says: "Our goal as architects is not to limit carbon emissions. It is to come up with an idea of architecture that is not intrinsically dependent on some form of exploitation." In re-imagining housing, we must also re-imagine architecture.

This includes its very materiality and recognises that the "matter" of architecture will be shaped by the systemic "dark matter" of the policies, processes and

practices it works within (Hill, 2012a). For example, the German state-owned bank Kreditanstalt für Wiederaufbau (KfW) has promoted the green transition by issuing loans to the country's steel sector, conditioned on firms' reduction of their resource use and greenhouse gas emissions (Mazzucato, 2022; 2023). Such interventions work not by levelling the playing field, but by tilting it towards the desired outcomes. The assistance provided by the government to the steel industry included conditionalities that required the reduction of carbon content in its steel. In this way, industry was not just given a handout, but had to transform itself. Reducing the material content of heavy industries like steel, and introducing a circular economy for waste in sectors with a repurpose, reuse and recycle mentality, will be critical. As part of Germany's energy policy, KfW also supported small- and medium-sized enterprises (SMEs) in need of finance for the refurbishment and construction of non-residential buildings with up to €10 million per project, conditional on producing energy-efficient buildings. The higher the standards met, the higher the repayment. Such policy initiatives, if extended, indicate how transforming housing could be used to transform numerous industrial sectors and vice versa.

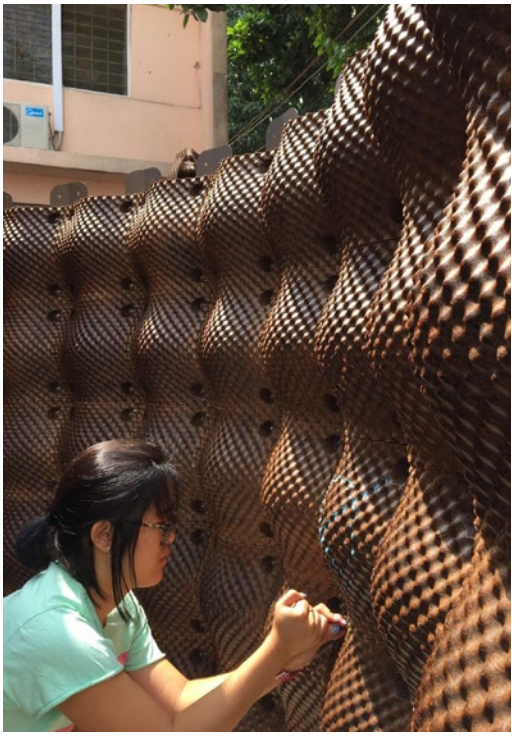
In addition to making construction materials like steel and concrete greener, it will ultimately be critical to replace them with regenerative sources wherever possible. Indeed, for new-build, various forms of timber can largely replace concrete, steel and brick in construction supply chains. Although many individual houses are built with timber frames, those frames are often filled with these carbon-intensive materials, whereas larger housing blocks still tend towards steel and concrete for their structure, despite the proven capabilities of structural "mass timber".

Timber ensures carbon capture is an outcome of building, rather than its more typical polluting opposites, alongside its further benefits in terms of health, adaptability and aesthetic qualities. In its various forms, such as glue-laminated or cross-laminated, hand-crafted or machine-cut, timber can be complemented by papers, bamboos, reeds, straw-bale, hempcrete, biocomposite plastics, clays, rammed earth and numerous other variants on biomaterials (Material Cultures, 2022).

In contrast, no matter how much research effort is devoted to so-called "green steel and concrete", it is hard to see how such materials could ever be carbon positive in the way that this largely "plant-based architecture" could be. In terms of a transition strategy, however, steel and concrete will be required for the foreseeable future for numerous use-cases, including construction. Intensive research and innovation is required to ensure a fossil-free production and application of these legacy materials, as well as their efficient recycling, building on the aforementioned KfW example.

Yet *systemic* transition requires a shift akin to that of the mobility challenge: simply producing cars with electric rather than diesel engines, yet manufacturing and using them in the same volume, will not reduce the impact of a twentieth-century mobility model. Transformation requires an overall *reduction* in private car-use counterpointed by an *increase* in public transport, shared transport and active transport, alongside visionary engaged planning. Mobility is in abundance in either model, but only the latter produces common good outcomes, environmentally and socially.

Similarly, a cleaner steel industry is still extractive. It requires extremely expensive new technologies and its production is likely to remain so energy-intensive that the renewable energy sources required to produce it at scale do not yet exist (Jones, 2023; Pooler, 2023). Systemic change means not simply doing "less bad" versions of business-as-usual but finding or inventing entirely new common good approaches. With construction, a significant swing towards regenerative biomaterials is the only viable transformation agenda.




Coconut-based building materials, Mae-ling Lokko, Chale Wote Street Art Festival, Jamestown, Accra, Ghana (image credits: Josh Draper and Mae-ling Lokko)

Modular mycelium panels by Mae-ling Lokko, Agrocologies: Housing the Human, exhibition, Radialsystem, Berlin 2019 (image credit: Camille Blake)

Even swapping in timber requires systems thinking and practices, coherent planning, ecosystem stewardship and industrial innovation on a regional and global scale. Bioregions require regenerative forestation alongside planted and semi-natural forestation, balancing biodiversity with timber production. The harvesting required for timber buildings must not deplete timber stocks but increase and diversify them across both urban and rural environments. Procuring and cultivating timber based on multiple system outcomes could tie innovation in forestry and land use directly to construction and design, with improved labour conditions on both sides of that equation. Logistics and construction systems for timber need optimising, just as they have historically been for concrete and steel. Without these systemic shifts, even a reorientation towards timber will not reduce emissions sufficiently, but if addressed via a multi-sector, multi-actor, mission-oriented approach, both top down and bottom up, timber for build and retrofit unlocks the possibility of both forests and cities working as vast, symbiotic carbon sinks (Mazzucato, 2021; Hill, 2022a).

Other agricultural by-products, including from food production, offer up further possibilities. The Ghanaian architectural scientist Mae-ling Lokko is re-imagining agrowaste as a renewable bio-based construction material (Lokko, 2022). University of Tokyo researchers have produced a form of concrete that is stronger than existing concrete from vegetable and fruit waste (Machida and Sakai, 2021). Closing the loop from the other direction, replacing flushing toilets in dwellings with composting "dry toilets", as imagined by the City of Helsinki's *huussi* exhibit at the 2023 Venice Biennale, would enable human waste from housing to enrich agriculture nutrient cycles, while also reducing water use. In developed economies, 30 per cent of domestic water use is used for flushing toilets (Renell, 2023). Equally, the amount of global land currently taken by agriculture – particularly for animals eaten by humans – largely means that land is not *also* available for biomaterials for construction. Without systemic shifts integrating agrowaste and construction, alongside a large-scale transformation of diet and therefore agriculture, there will be insufficient biomaterials for housing. Rethinking housing means rethinking waste means rethinking agriculture.

The Good Cycle Building in Nagoya, Japan, by Nori Architects, is a breakthrough example in a country that has tended to dispose of old buildings (Good Cycle, 2024). The project has transformed rather than demolished a 30-year-old office building, via a cedar log, earth plaster and "waste material"-led retrofit. The building's inhabitants have been directly involved in the design and renovation.[4] In a similar vein, Taisugar Circular Village, by Taiwan Sugar Corporation (2021) and Bio-architecture Formosana, is constructed largely from circular materials, including salvaged hardwood for structural elements. It features modular fabrication for assembly and disassembly, and material passports to enable building as material bank (BAMB), as well as significant amounts of on-site food production. The Taiwan Government's Five Plus Two industrial strategy – the "two" being the transformation strategies of a circular economy and a new agriculture – provides the impetus for such developments (Circular Taiwan Network, 2024).

By helping to redevelop the practices of bio-based material production for bioregional construction economies linked to local skills and ecosystems, UK-based Material Cultures is rebuilding a direct relationship between architecture and place (Gormley, 2021). Intriguingly, the skills required to work with circular materials are both old and new. In some cases this means reviving ancient craft practices; in others deploying modern methods of construction or developing new materials like nanocellulose (Hill 2012b). A new industry, replete with forms of meaningful work, can be glimpsed between the lines of two Material Cultures' recent reports. *Wetlands and Construction: An Opportunity for Berlin-Brandenburg* (with Bauhaus Erde) (2023) links the problem of reducing emissions from drained peat wetlands to the opportunity of new construction material. *Circular*

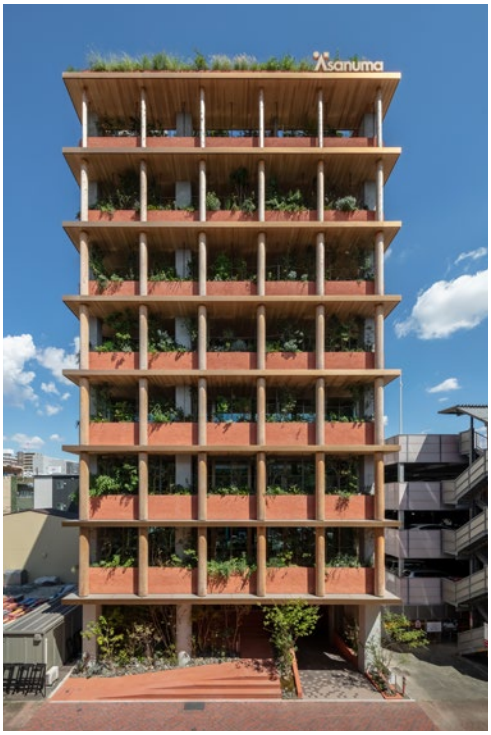
Taisugar Circular Village in Shalun, Taiwan, by Taiwan Sugar Corporation, featuring modular design, circular and recycled materials, on-site food production and material passports (image credit: Taiwan Sugar Corporation)

Biobased Construction in North East and Yorkshire (with Arup) (2021) indicates the economic and employment potential for this UK region in a way that incorporates rather than ignores the possibility of decreased carbon emissions and biodiversity loss alongside increased public health.

We must also move beyond a supply-side emphasis, so that all materials are capable of being reused or recycled across a richer, fuller idea of lifecycle, comprising materials, building and community. This implies nothing less than a reorientation of architecture alongside a radical widening of scope. This would recognise that a building such as a house is essentially a conscious entangling of materials at a single point in time, usually for a particular use, before those materials flow on elsewhere. The material is what persists, albeit shifting form and state over time. The custodianship of these material flows, recognised as both elemental and cultural, becomes the imperative for design just as much as their assemblage as a building in a particular moment.

To help articulate this, artificial intelligence techniques like large language models (LLMs) could be employed to enable pattern-matching across material passports, property asset classes and prefabricated construction systems – could large material models or large design pattern models be developed? – which would then be multiplied with data about complex environmental conditions and local building practices. How might these often opaque systems be made legible, accessible and broadly usable, in order to reinforce public value from within construction processes? Equally, could these technologies avoid the "capture" seen elsewhere with digital platforms (Zuboff, 2018) by remaining connected to place-based local economies and cultures?

Currently, however, a built environment sector largely bereft of purpose-driven innovation – or, with some honourable exceptions, much innovation at all (Hasan et al., 2018) – means there are few such open, addressable and verified data sets on the details of supply chains (materials, logistics and labour), construction practices (fabrication systems, build quality, insulation and labour conditions), and performance over time (including operational footprint and environmental quality outcomes, ongoing adaptation, disassembly, end-of-life producer responsibility and recycling).



Good Cycle Building, Nagoya, Japan, by Nori Architects (image credits: Jumpei Susuzki)

Data, framed as a civic asset, must become the new "mortar between the bricks" in any systemic approach to sustainable housing – ideally replacing *actual* mortar and bricks. This data can better support the modular prefabrication systems that can transform construction and adaptation practices. There are numerous advances in the latter: available, tested, implemented and investment-ready from a common good perspective, describing a spectrum from "at-hand" open building systems to larger-scale fabrication systems. However, they are unevenly distributed and the commercial built environment sector in general remains a long way behind other equivalent industries.

Re-imagined architecture and construction sectors can technically aspire to a balance between in-situ self-build adaptation for smaller structures and retrofits via open building systems, with the effectiveness and scale of off-site prefabricated building for larger elements. Both sides of this equation must be embedded in circular biomaterial supply chains from regenerative sources, manipulated by new forms of equitable local labour and technology. An increased focus on local engagement – with people and place, but also material resources and their linked craft practices – can be complemented by making global supply chains legible.

Crucially, such a shared and systemic approach to housing can enable the development of costing at the system level, purposefully absorbing externalities that are currently disregarded when costing at the unit level of the individual house. As Mark Wigley (2021) has imaginatively described, each time we make a house we make a hole; or rather a series of distributed holes, across "shadow places" (Plumwood, 2008), each time further degrading land, waterways and atmosphere. The same applies to infrastructure connected to housing. The systemic impact of these "holes" is rarely if ever recognised in the sale price or rent of the resulting house, or in most of its operational emissions. Moving from unit level costs to what Indy Johar (2022) calls system-level financing could require economic innovation at a global scale, including tilting the playing field towards the Global South, as a connected form of spatial justice.

Indeed, a challenge for any subsequent housing "mission" will be in actively demonstrating how this thinking and practice does not only take root in the well-funded European research and innovation landscape, but is made available globally, recognising that these systems are interdependent. If we took the true

systemic externalities of building into consideration, it would radically change whether we build, as well as where, what, how and for whom.

Architecture must respond to this new brief, finding a way to imagine and create settings and spaces, exchanges, and environments, for diverse cultures and shared common good value, by not-building as much as building, and by building different things to buildings. In their book *Architects After Architecture*, Harriet Harriss, Rory Hyde and Roberta Marcaccio (2020) have pushed out the edges of the landscape around architecture as it is traditionally practised. Lesley Lokko's (2023) *Laboratory for the Future* for 2023's Venice Architecture Biennale serves as a collective open sketchbook of such possible futures, vividly adumbrating a "different and broader understanding of the term 'architect'" in response to a "rapidly hybridising world". Indeed, Lokko's school in Ghana, the Africa Futures Institute (2023), is pursuing such a new architecture, explicitly framed around "the twin issues of decarbonisation and decolonisation". Design schools elsewhere must play their part in cultivating new practices and perspectives, as "common good institutions" (Ingold, 2020).

Again, the public sector can directly stimulate and support the development of this new architecture, tuned for new outcomes. Catherine Bauer's "modern housing" of the 1930s, as with the modern movement generally, was largely developed through European public purpose agendas and programmes, while in the USA, President Roosevelt's governments defined a new architectural style, *PWA Moderne*, via the Public Works Administration, alongside the arts and culture, public space and cultural infrastructure programmes of the Works Progress Administration (Leighninger, 1996). Housing expos like International Building Exhibitions (Internationale Bauausstellung or IBA) – full-scale "system demonstrators"– continue to have a role here, procuring both architectural and construction innovation, and creating an experiential full-scale "living lab" format for industry and public alike.[5]

A century later, programmes like the European Commission's *New European Bauhaus* or the Biden Administration's *Inflation Reduction Act* could instigate a similar shift – *if* they can emphasise common-good-oriented cultural movements for transformative systemic change alongside technical endeavour.

So social, cultural and industrial transformation is required alongside governance transformation. Advocacy groups like the Shift recognise that the dynamics underpinning housing are political and cultural, and use the tools of culture accordingly.[6] Similarly, and quite distinct to the engineer's focus on problem-solving, the work of architects and designers is primarily that of cultural invention. This suggests a re-imagining of architecture itself, focused on deep retrofit, circular materiality and regenerative landscapes, and non-extractive and non-exploitative participative practices, producing settings for diverse cultural expression and social cohesion, all drawn from fundamentally different reconciliations with people, place and environment (Hill, 2020).

The architecture of the "Great Acceleration", complicit in building our climate and biodiversity crises as much as our towns and cities, may see this as a diminution of the individual architect's role. In "making do" with existing places would this not reduce the lustre of the hero figures that Ayn Rand imagined in her fevered prose?

On the contrary, by reasserting and reactivating architecture's ethical responsibility for the common good in our towns and cities, design can find new ways to move forwards rather than backwards. It requires ever-greater invention to "make do with now" and organise custodianship of material flows rather than raze and rebuild. It is also a much larger mission, as retrofitting puts *all* existing housing and neighbourhoods on the table, working within multiple interdependent systems

Nightingale not-for-profit housing in Melbourne (photo credit: © Hacer (left)); Nightingale ParkLife designed and developed by Austin Maynard Architects and Nightingale Evergreen by Clare Cousins Architects (image credit: © Tom Ross (right))

and flows at global scale (Shinohara and Ruby, 2023). This gives the designer, and others, many more leverage points to work with. This may not only be a future for housing, but a future for a transdisciplinary design for housing, fusing architecture with the increasingly pluriversal design practices for technologies of everyday life, for infrastructures nature-based and otherwise, for the relational practices of urban design and landscape architecture, for participative design and retrofit/repair, and with visionary urban planning and strategic design (Escobar, 2018).[7] These are the capabilities and organisation we need to help us imagine how we might conjure new cities from the fabric of the old, articulating the possible futures latent in what already exists.

There are also new jobs here, new skills, greater impact, greater engagement – it's estimated that approximately 95 per cent of houses in the UK, North America and Australia are constructed without an architect being involved at all (Hyde, 2017; Dickinson, 2022; Power, 2022) – and potentially a newly dignified position within society, economy and governance, reversing architecture out of the moribund cul-de-sac that Rand mistook for a freeway to the future.

The question we must ask, in the words of architectural historian Kōji Ichikawa (2023), is "How can architecture be created in today's socio-natural context, and how might architecture be used to change society and nature (for the better)?" Working within that "socio-natural" context is architecture's next challenge.

2.5. Building community

A systemic approach to housing for the common good encompasses demand as well as supply, requiring a focus on the activities involved in living environments, including careful design for "low impact" lifestyles drawn around the diverse living habits and rituals of residents and users.[8] Melbourne's Nightingale Housing describes its approach to designing demand with its residents as "reductionism: build less, give more."[9] Through careful design work and public engagement, its blocks are designed without the second bathrooms or individual laundries typical of the city's small apartments and they essentially eliminate individual car parking altogether. The resource and cost saved is spent on better insulation, double-glazing, renewable energy generation and storage, shared mobility and

Mehr als Wohnen cooperative housing, Zürich, masterplan by Futurafrosch and Duplex Architekten, and architects including Pool Architekten, Müller Sigrist, Miroslav Šik and landscape designers Müller Illien (image credit: Ursula Meisser)

more convivial, diverse shared spaces. This paring back is not seen as a "loss" of amenity: it is worth noting that Nightingale's developments are no longer niche and each has a multi-year waiting list.

Some of the many examples of cooperative housing across Europe are similarly inclined, such as Zürich's Mehr als Wohnen (More Than Living), whose residents, dotted across 13 cooperative blocks, aim to "live well" within the 2000-Watt Society model (Hugentobler et al., 2015). These common good minded examples are economically viable, socially accessible and convivial, and often years ahead of the mainstream commercial market in terms of performance. These variations on demand-side reductionism might be better framed as a form of abundance – the increased amenities and collective cultural expression possible when shared.[10]

Co-designing ensures that the particularities of living are the starting point for design and policy, so housing is drawn up as if it is a form of physical "shroud" that momentarily envelops and articulates the diverse cultures, demographics and social patterns in a place. Such participative practices can unlock these richer sets of possibilities for sustainable building and living in a way that speculative housing – designed for unknown, generic and individualised "units of human" – usually cannot.

True collaboration of this kind moves well beyond simplistic consultation. It not only develops these more sophisticated outcomes, but can also garner and maintain citizens' trust in government, as well as its corollary – a government's trust in its citizens. It can help avoid the capture of policy objectives by vested interests, allowing for policymakers to work closely with citizens and their institutional associations via designers, and other specialists trained in participation and collaboration techniques. This requires new capabilities within city governments, as well as among their partners (Hill, 2019b; Anderson, 2023). Initiatives like the UK's Public Practice are cultivating precisely this shift.

Ultimately, fostering these diverse and direct forms of engagement enables decision-makers to see challenges from multiple perspectives (Hill, 2022a; Mazzucato, 2023), while opening up the question of who decision-makers are. Examples of participative co-design processes range from the open process for the new Helsinki City Library[11] to the "hybrid forum" for the rebuilding of Constitución

after the 2010 Chile earthquake (Boyer and Hill, 2013), or from the co-production of Barcelona's 2018 Climate Action Plan to that city's Superilles ("Superblocks") programme. Replicable patterns are emerging, such as participatory budgeting and citizens assemblies, or the "14 Principles for Citizen Participation" from the Participatory City Foundation,[12] drawn from its groundwork in Barking and Dagenham, London.

Elsewhere in London, community activists, business owners, academics and organisational leaders came together in 2020 to form the Camden Renewal Commission (2021) and begin the conversation about how to redesign their housing estates with and for the people living in them. The Commission's initial work, for example, was focused on gathering evidence and hearing from residents about what they see as the grand challenges facing the London borough.

Camden's wealth fund and local social infrastructure

A programme is underway to transform Camden's under-used spaces on estates into productive, social value uses. This responds to acute inaccessibility or lack of availability of community, social enterprise and SME spaces in the borough – and the potential they have to create public value and be a key piece of social infrastructure. A discovery phase has been completed to review the types of spaces which could be brought into social value use. This includes estate community spaces, garages, multi-use games arenas, undercrofts, pram sheds and some commercial units. Cases are now being developed for a portfolio of different types of space, requiring different levels of intervention and with a range of potential uses. Crucially, the Camden Renewal Commission is exploring how a local wealth fund's dividend can both support and draw from these local assets and resources for the benefit of local residents, such that locally owned integrated financing can support sustainable urban development. Camden's Commission is exploring how such approaches can work for both local government and neighbourhoods.

For newly built places, well-run contemporary district design projects increasingly incorporate citizen participation practices in genuinely meaningful ways – at least where municipalities, or equivalent, have the resources and capabilities to host such processes. However, there may be a challenge in extending the deeper participation of cooperative-run projects or self-build projects into participative co-design for other forms of housing as well, especially the retrofit of existing neighbourhoods with their existing communities (Arnstein, 1969).

Typologically, almost all these buildings referenced suggest the "appropriate density" crucial to sustainable housing: four to eight storeys, give or take, is economically and socially viable for both building and retrofitting many urban districts in existing towns and cities. This density is also environmentally beneficial, enabling easier construction from biomaterials, space to be re-programmed and ongoing adaptation. It also allows for the careful clustering of shared social infrastructures, such as parks, playgrounds, swimming pools, markets, schools, libraries and so on, as demonstrated by previous generations of common good housing.

Patterns emerge: narrower footprints that allow natural cross-ventilation, with shallower floor plans enabling dual-aspect units; shared deck-access apartments; well-insulated structures and skins made from biomaterials; sustainable service infrastructures; accessible green rooftops; diverse and shared communal facilities and spaces; viable, effective and convivial mixes of walkable environments; and nearby public transport connections to local infrastructures, attractions and employment possibilities.

Researchers at Rocky Mountain Institute assessing American metropolitan regions suggest that, on average, land use reforms enabling such medium-density housing within existing cities "can reduce vehicle miles travelled by up to 13 per cent, building energy use by up to 16 per cent, and local greenhouse gas emissions by up to 14 per cent" (Holland, 2023). The case study on Melbourne's Nightingale Housing suggests even greater sustainability performance is possible from these medium-density urban forms, not only in terms of their own direct footprints, but through their proximity to public transport, spaces and services (Burdett, 2023). Further reinforcing this realisation that affordable housing and sustainable housing are, in fact, the same challenge, we must reverse the current dynamics of poor housing design, whether linked to the poor insulation and energy efficiency that make houses unnecessarily expensive to live in, or the integrated car parking that makes them unnecessarily expensive to buy or rent as well as reinforcing carbon-intensive mobility patterns (Shoup, 2011; Miller 2017; Graber, 2023). Retrofit at the house, block and neighbourhood scale can resolve this.

This balance of convivial density and participative design supports contemporary decentralised technologies for shared utility infrastructures, linking energy, mobility, water and waste. The rapidly falling cost of infrastructures such as local renewable energy generation enables these services to be folded into both self-build and social housing, reinforcing neighbourhood-led organisation and reducing emissions (although even these renewable infrastructures contain their own material impact challenges – up front in terms of minerals or at end of life in terms of recycling). Well-designed digital services could enable such infrastructures to be shared easily and effectively, depending on their governance and business models, better balancing resources that are otherwise wastefully duplicated or entirely absent in individualised housing models.

Although back in 1934 Catherine Bauer understood that "a modern house is a knot in a network of utilities," housing has only recently been intrinsically re-connected to super-local energy, mobility, water and waste systems. This is enabled because contemporary systems allow an integrated "bundling" of these services together in the home and neighbourhood.

This is another (welcome) challenge to various orthodoxies. An increasingly everyday example might be an electric vehicle connected to a house's battery fed by solar cells on the roof. This simple bundling together immediately destabilises twentieth century governance structures, because it is house, energy and transport all at the same time, rather than separate systems to be managed independently. However, these directly interconnected systems of systems do not fit neatly into the existing silos, where a department of housing is separate to a department of energy, that is separate to a ministry of transport.

The integration of practices encouraged by today's networked technologies is not unique to our age, nor does it simply concern the tangle of systems in a house itself, but multiple forms of interdependent value. The energy crisis of the 1970s forced much similar thinking around self-organised and cooperative systems across urban design and planning (Borasi and Zardini, 2007), while in the 1930s housing in Britain was the responsibility of the Ministry of Health. However, having long separated housing and health, the cost of poor housing to the British National Health Service is £1.4 billion per annum (Garrett et al., 2021). In contrast, Bogotá's Care Blocks programme powerfully demonstrates the alternative: the value of re-integrating health, education and social care into mixed-use urban development (Council on Urban Initiatives, 2022; Hill, 2022b).

Further, as Bauer also noted, these examples of successful modern housing must carefully integrate social infrastructures: schools, shops, parks, playgrounds, swimming pools, cafés, kindergartens, libraries, museums, elderly care and

Ciudad Bolívar Care Blocks housed within the SuperCADE building, Bogotá (image credit: © Ilanofotografia)

shared workplaces, woven together by good streets. Again, these neighbourhood elements can generate public health and create social fabric, just as much as they can reduce carbon emissions and mitigate against biodiversity loss. They are integrated elements which produce integrated "multi-solving" outcomes and must be managed and maintained as such (Sawin, 2018). The high-quality public programmes that marked the years following Bauer's *Modern Housing* frequently fused such infrastructures with housing, whether in the visionary works of the London County Council Architects' Department or the maturing of the Miljonprogrammet housing developments in Sweden and their equivalent in most other Nordic countries, Singapore's Housing Development Board or the numerous and diverse examples from across Latin America.[13]

Such publicly led social and cultural infrastructures not only build resilience and health within communities, but they are also key to the creation of community (Klinenberg, 2018; Sendra and Sennett, 2022), placing culture at the heart of a renewed democracy and a collective future reoriented around the common good.

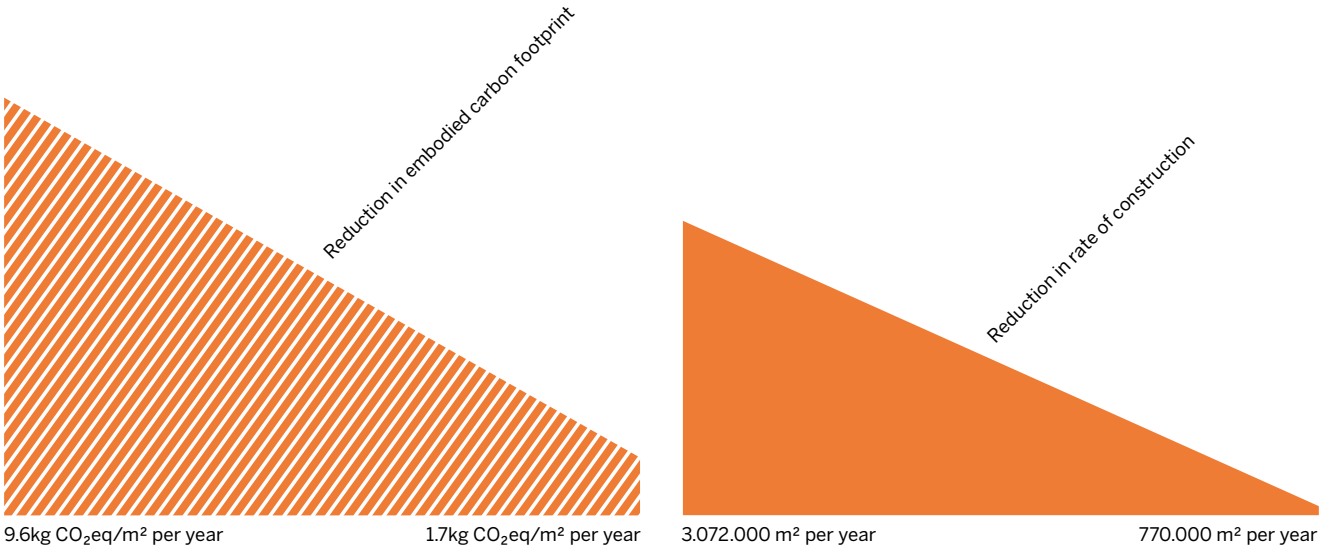
Drawing this together, a holistic approach to the challenge of how housing builds sustainable community includes elements that are not houses, such as those supporting social infrastructures – further "knots in networks", albeit social and cultural – as well as the way that participative co-design processes can ensure the question of housing starts with community, rather than it being an afterthought, or something simply left to residents to figure out over time.

In these models, housing is woven into mixed-use, medium-density neighbourhoods, with linked social infrastructures affording conviviality and culture, social and political engagement, public health and social fabric, intergenerational and demographic diversity (Klinenberg, 2018), as well as reduced carbon, and minimised land use and extraction.

2.6. Building a new practice of housing

With this systemic lens over housing, the unit in focus shifts from the house to the block to the street to the neighbourhood, each nested within the next, and beyond to the wider city and region. The systemic design interventions that reduce carbon also increase health; those that reduce crime can also improve the social fabric;

Figure 3. Danish reduction roadmap



those that reduce car accidents also increase innovation. This suggests possible forms of compounding and multiplying value, produced by integrated and inclusive systems-level financing, governance and design for high-quality sustainable housing.

Yet such upstream approaches are alien to many contemporary bureaucracies. Outsourcing strategy and delivery to consultancies has left governments without the strategic capability to cross-pollinate incentives or systemically address system challenges (Mazzucato and Collington, 2023). Hence, the tendency to focus only on the supply side of problems rather than simultaneously engaging holistically with demand. Reorienting around public and social housing puts these strategic systems back on the table.

The numbers remain challenging. Even in Denmark, with its advanced construction sectors, strong public bodies, perceived sustainable lifestyles and a tradition of diverse housing tenures and types, building industry emissions require a 96 per cent reduction rate in order to remain within a "safe operating space" (CEBRA et al., 2023).[14] In terms of new-build housing, this means moving from the current Danish average emission level of 480 kg CO_2eq/m² to only 20 kg CO_2eq/m². For lifecycle emissions, this requires a similarly huge drop from the current Danish median of 9.6 kg CO_2eq/m² per year to 0.4 kg CO_2eq/m² per year, over a 50-year building lifecycle.[15]

Even with such efficiencies applied to construction, for Denmark to "live within planetary boundary goals" requires it to reduce those emissions associated with building and living in houses, while also reducing the rate of construction from 3,072,000 m² of housing per year to 130,000 m² per year (CEBRA et al., 2023). Only through this reduction in the amount of housing produced, alongside an increase in the quality and direction of production, do the Danish numbers add up.[16]

The emphasis on shared space and amenity with modified ideas of environmental comfort will require highly sophisticated participative design and planning; precisely the opposite of typical speculative development practices which edit out difference by designing for generic consumers. Reframed fiscal policies must

support this shift too, removing incentives that reinforce the idea of housing being primarily a vehicle for investment, which has led to the over-production of space in new-build housing. Fundamental changes in architecture and design education and practice, as well as more inventive products and services, are required to help better understand the patterns and values of everyday life as cues for design and build. This suggests a new transdisciplinary practice of housing, integrating architecture, economics, service design, engineering, ecology, sociology, health and so on.

The outcome could be a colourful spectrum of housing, a non-binary blurring, rejecting hard divisions between formal and informal, public and private, individual and community, and producing instead complex, diverse and dignified arrays of housing.

Such a sustainable re-balancing across type, tenure and taxation would mean significant transfers of wealth – from consumers to commons, investors to users, North to South – and there is little sign of mainstream political appetite for this yet. But attitudes are shifting as incumbent strategies repeatedly fail. The panoply of tax incentives underpinning housing as a financial asset is not a law of physics; these structural economic barriers are themselves a construction and, as David Graeber (2015) has written, "The ultimate, hidden truth of the world is that it is something we make, and could just as easily make differently."

The truths of how and why we make housing, and housing markets, can no longer be left hidden.

3. Retrofitting

The aphorism "The greenest building is one that already exists" may be an over-simplification, because it depends on the operational footprint involved in existing buildings, as well as their embodied carbon. Yet it can also be true and remains a useful jolt to existing logics, implicitly calling out those gleaming new towers, those "spreadsheets in the sky" whose Green Star ratings do not speak to their true impact on the environment (Reece, 2019).[17]

Indeed, this most fundamental shift towards sustainable housing does not concern rammed earth, photovoltaic cells or structural timber, but the economic backdrop to our towns and cities. Toni Morrison (2015) spoke of the slow twentieth century drift from "citizens" to "consumers" and then mere "taxpayers". With homes, the idea that residents must become footloose property flippers and portfolio investors is equally diminished, aping that same consumer/taxpayer logic.

3.1. Re-distributing existing space

This financialisation of housing has led directly to a self-imposed "crisis" in most high-income countries (Ryan-Collins, 2017; United Nations Human Rights Council, 2017). In these places, many houses lie unoccupied while many others have been encouraged to be extremely wasteful in terms of living spaces or operational performance. Rather than continuing to focus supply-side thinking on new-build, how might this vast amount of distributed space, with its environmental impact already embodied, be redistributed for common good outcomes? Old houses becoming new homes, empty rooms becoming occupied – what would a "re-commoning" of domestic spaces look like? How could those privately owned empty houses, decaying buildings or vulnerable financial structures be better positioned as common good assets instead? While these reframing questions appear incredibly challenging under what transition theorists would call "incumbent regimes", never mind existing regulations, they suggest a re-design of the conditions by which housing is inhabited, as well as the houses themselves.

In a play on an old architectural maxim, historian Carol Willis (1995) has suggested that "Form follows finance." If this is true, more diverse forms of sustainable housing necessarily require more diverse forms of sustainable market-shaping. Progressively eroding this imperative to see houses as investment assets rather than homes means redesigning taxation, banking, planning and industrial policy. This would include reversing the numerous incentives for new-build housing, while systematically incentivising retrofit, finding ways of making empty housing or unoccupied space addressable, accessible, habitable and convivial.

The IPCC's Yamina Saheb suggests that the buildings already built – including the many commercial buildings left half-empty in the wake of the COVID-19 pandemic (Glaeser and Ratti, 2023; Wong et al., 2023), as well as existing empty housing – should always precede any notion of new-build. "Each city should (first) look at how many buildings are unused and work on repurposing them. And if there is a need, we may build a little bit" (Saheb, 2022b).

Commercial buildings such as office blocks are not easily retrofitted into housing and pursuing this agenda requires genuinely inventive architecture, engineering, service design and strategic design. The story of architectural studios 51N4E and l'AUC (2023) organising the adaptive reuse of the defunct Brussels World

Trade Center, documented in *How Not to Demolish a Building* (2023), leaves a breadcrumb trail of beguiling clues as to what these hybrid practices might look like. Housing charity Habitat for Humanity[18] has launched new blueprints for converting disused office and retail space into social housing – *Empty Spaces for Homes* – based on their work in the UK and Poland.

To some extent, the COVID-19 pandemic abruptly forced a reshuffling of the deck, emptying out mono-functional city centres and forcing domestic spaces to absorb aspects of work in return. Yet these patterns were broadly visible prior to the pandemic. Writing in *The Atlantic* in January 2020, Derek Thompson (2020) described how most of the recent residential skyscrapers built in Manhattan had been half empty for the previous five years, underscoring how such property is built for financial demand rather than housing need. The Empty Homes Network found that, by 2020, local authorities across England, Scotland and Wales were sitting on enough empty commercial property to create more than 19,500 homes (Highfield, 2023).

Again, however, care must be taken with such opportunities. An emphasis on speed and cost-savings over quality and public value leads only to sub-standard living environments. But a more conscious retrofit agenda is possible, nurtured by city governments and local trades, with new capabilities for ensuring circular materials, construction innovation and repair cultures, alongside ways of articulating and holding value for the common good. These broader redistributive forces could be channelled through both city centres and suburbs, each thriving via a greater diversity of activity, more evenly distributed, with vacant or under-used offices reworked for housing, culture and community, and gently densifying mixed-use suburban neighbourhoods no longer fixed as residential dormitories.

More directly perhaps, there are the systemic possibilities inherent in public authorities buying – and in some cases buying back – private housing for public housing. For example, in November 2023 the Mayor of London (2023) announced a programme to convert under-used private housing into council homes. In this way, London attempts to produce 10,000 additional council homes (public housing) in the next decade, from within the existing housing stock. The irony of this "right to buy back" policy happening in a nation which led the "right to buy" privatisation of council housing in the 1980s is not lost on us. In many cases, this will transfer the very same bricks back into the shared, public ownership that produced them. Yet it also means that these houses can now take advantage of neighbourhood-scale, publicly led, strategic retrofit programmes, while also helping London avoid the emissions and biodiversity loss associated with new-build housing.

However, simply addressing and accessing empty buildings can only be part of the answer. We must also make them convivial, sustainable, fulfilling, adaptable, and economically and socially viable. Happily absorbing new residents into these existing houses, buildings and places will not be easy, and current NIMBY versus YIMBY debates may seem like so many storms in a teacup compared to the ferocity of the political tempests that are likely under this entirely new climate (e.g., Boyer and Hill, 2013).

Ultimately, carefully deployed, systems-level forms of equitable land and property tax, land-use policy, rich open data and deliberative decision-making mechanisms will be required to unlock and redistribute space fairly and sustainably. Rather than assuming such complex socio-technical systems will elect to transform themselves overnight, the place-based prototyping of some mission-oriented innovation programmes suggests promising approaches to instigating, publicly testing, and spreading such transitions (Hill, 2022a).

3.2. “Never demolish” the “As found”

More broadly, the operational footprint of existing and occupied buildings can also be significantly transformed through retrofit, providing further imperatives for focusing on the existing housing stock before considering new-build at all.

A retrofit revolution would require coordinated transformation across complex systems. It suggests regional missions with a renewed focus on the adaptation of existing housing stock; and transdisciplinary efforts comprising economics, planning, design, construction and community participation, as well as public, private and third sectors. Such a retrofit challenge exists at both fiscal and architectural ends of the problem and touches all points in between. It can only be truly addressed via a systems-of-systems approach, comprising non-extractive value mechanisms that produce long-term returns encompassing both local and global economies.

Yet the scale of the retrofit challenge is enormous. For example, around 97 per cent of the EU’s building stock requires major upgrades (in a region which already features some of the highest building standards in the world). Even this relatively wealthy continent may struggle to find the extra €275 billion of additional investments per year required to retrofit its building stock to achieve its own climate targets (Buildings Performance Institute Europe, 2017). (Note also that so-called “extreme” weather patterns may require even greater building resilience.) The retrofit challenge is not only large-scale, but also highly heterogeneous; retrofitting formal neighbourhoods and informal settlements hold very different implications in terms of land management, planning and construction.

Europe’s response – its Renovation Wave – is ambitious, but the current annual deep renovation rate stands at only 0.2 per cent on average in the EU, and speculative property financing continues to find easier pickings in new-build housing (Buildings Performance Institute Europe, 2017). This deep renovation rate must drastically increase to reach at least 3 per cent by 2030 and be maintained up to 2050 (Buildings Performance Institute Europe, 2021). As daunting as the scale of that looming Wave may appear, if the technical challenge of retrofitting at scale within planetary boundaries can be overcome – no mean feat and well beyond current approaches – a large-scale retrofit would be a far more effective way of rapidly reducing emissions while producing numerous other forms of common good value.

There are indications of the shift afoot. Anne Lacaton and Jean Philippe Vassal winning the 2021 Pritzker Prize for architecture provides one such cultural data-point, given their bold manifesto of: “Never demolish, never remove or replace, always add, transfer and reuse” (Druot et al., 2007). Their Cité du Parc in Bordeaux (2016), a retrofit of three inhabited social housing buildings with over 4000 dwellings, helped signpost the possibility of retrofit over demolition, within the professions at least. The programme was cost-effective, relatively rapid and socially just, retaining rather than displacing existing residents even during renovation. It is a significant functional and aesthetic upgrade within the same building.

Similarly, the renovation of one of Europe’s longest buildings, the vast Le Lignon housing estate in Geneva by Jaccaud Spicher Architectes Associés indicates that scale need not prevent retrofit. The vast mid-century public housing programmes peppered across Sweden and Finland are now being carefully renovated (the work of KTH professor Erik Stenberg (2013) indicates that much of Sweden’s Miljonprogrammet-era modular public housing is well-suited to retrofit.) Research by non-profit architecture firm OFFICE in Melbourne powerfully shows how a retrofit of the city’s public housing stock would be more cost-effective,

Work by non-profit architecture firm OFFICE in Melbourne shows how to retrofit the city's public housing stock for more sustainable outcomes, while retaining the existing community and costing less than scrap-and-build (image credits: existing Ascot Vale housing by Ben Hosking (top); projected retrofit by OFFICE (bottom)).

environmentally sustainable and socially just than demolition (Convery, 2022). The CO-HATY project in Ukraine indicates how housing retrofit can be pursued even under conditions of war. "Curing the Limbo", led by the City of Athens, demonstrates how affordable housing can be retrofitted for and with refugees, and combined with educational programmes and neighbourhood-scale citizen-led activities.

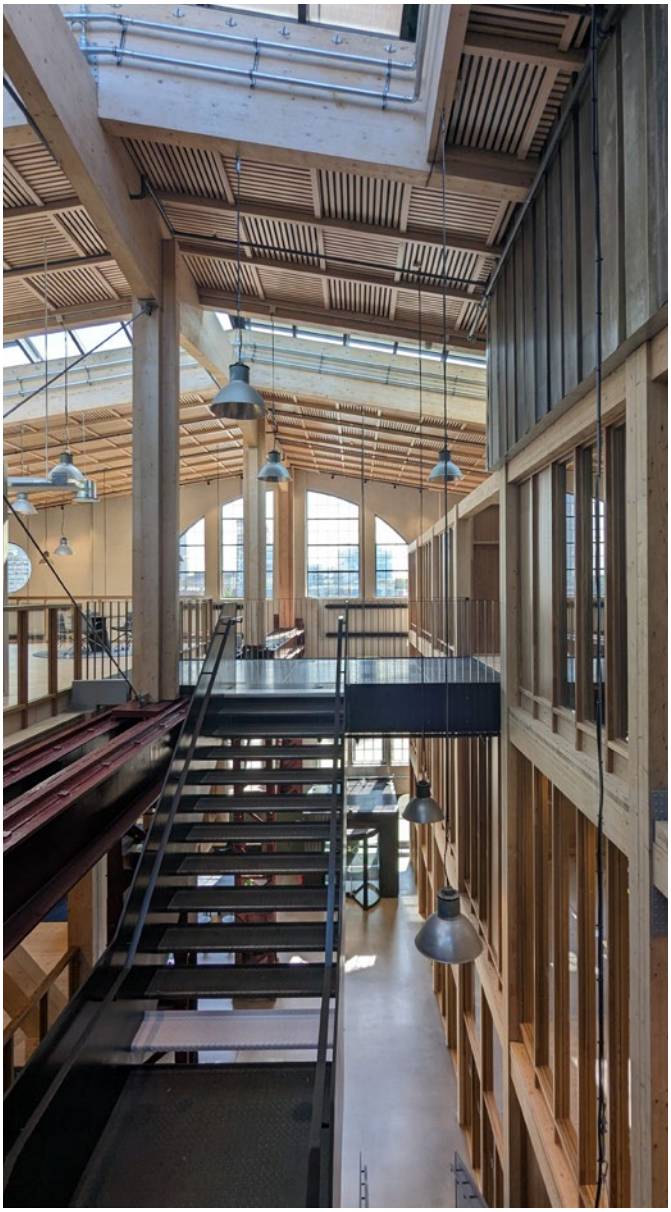
Where elements of buildings are retrofitted, materials previously seen as waste must be retained and reinvented. The Gent Waste Brick, devised by a consortium of designers and researchers, is made from local construction waste and will be used to build the new wing of the Design Museum Gent (Peacock, 2023). Dutch design researcher Emy Bensdorp has found a way to clean per- and polyfluoroalkyl substances (PFAS or so-called "forever chemicals") from contaminated clay soil by firing it into bricks.[19] For the 2023 Venice Architecture Biennale, British collective Urban Radicals created a temporary pavilion composed of bricks made from waste sediment dredged from the Venetian canals and other waste by-products from the surrounding industrial areas (Urban Radicals, 2023). Belgian firm Rotor Deconstruction[20] and the City of Malmö's Varvsstaden Material Bank[21] harvest and document existing materials, rescuing them from construction waste streams, forging new supply chains and making them available for reuse.

A new emphasis on adaptive reuse over "demolish and build anew" must work at multiple scales. Regional planning can reverse sprawling greenfield expansion. Urban design helps to re-imagine the existing neighbourhoods, weaving together retrofits across buildings, services and landscapes, as Dark Matter Labs and Sweden's Vinnova have suggested via their street-scale retrofits (Dark Matter Labs, 2021; Hill 2022a). A new architecture can pivot around re-building rather than new-building, recalling British architects Alison and Peter Smithson's (1990)

focus on the "As found": "Where the art is in the picking up, turning over and putting with … finding out how the existing built fabric of the place had come to be as it was."

An integrated approach to the building scale, such as Energiesprong in the Netherlands, featuring offsite construction of retrofit elements, mass customisation and digital surveying, and integrated heat pump, solar, battery and heat recovery ventilation, hugely reduces installation time, costs and emissions (Friedler and Kumar, 2019). Yet efficiency-driven innovation can also unhelpfully lead to the Jevons Paradox, where increased efficiency results not in reduced, but increased, overall consumption. In order to tackle such upstream demand-side dynamics, interdisciplinary practices are also required, assessing demand reduction or reorientation as well as supply-side efficiency, widening the scope of what "the system" is perceived to be. As Australian engineer Saul Griffith (2022) writes of electricity, "We must transform supply and demand simultaneously." This is a principle that could apply to housing generally, just as much as the energy systems within buildings. For example, without also prioritising the insulation of its housing, the UK's efforts to decarbonise heating via electrification, such as via widespread adoption of heat pumps, will not work (Watson et al., 2019).

As well as building retrofit, forms of "low-tech, low-impact" lifestyle may need to come into play to balance these higher technology approaches. We might also shift



Varvsstaden materials bank, Malmö (image credit: Finn Williams)

our basic expectations of thermal comfort too, via passive or super-focused heating and cooling, alongside careful co-design and communications. Spain's recent legislation to put limits on air conditioning and heating temperatures in public and large commercial buildings sets a useful precedent here (Sullivan, 2022).

Again, retrofit interventions around environmental performance, aimed at climate mitigation and adaptation, can also produce win–win, multi-solving health outcomes. In England and Wales, there are more than 4000 preventable excess deaths every winter due to cold homes, a number recently increasing year on year (National Energy Action, 2023). Australians are almost twice as likely to die from cold weather than Swedes, linked to poor insulation in housing (Gasparrini et al., 2015). More broadly, excess heat already results in greater loss of life than other weather-related extreme events and endangers many more, exacerbated by a symbiotic relationship between climate breakdown, and the poor design of housing and neighbourhoods (Mora et al., 2017; Ebi et al., 2022). Recent analysis of Madrid by Arup and UCL (2023) indicated that 492,000 children and older people were living within urban heat island (UHI) "hot spots" of 7°C or more. Urban heating at night is particularly deadly. Recent research across 28 large cities in East Asia found that the risk of death from excessively hot nights may grow six-fold from 2016 to 2090 (He et al., 2022).

Again, an integrated approach to health, sustainability and social justice provides the answer, best handled by folding housing design and healthcare into neighbourhood design (Samuel, 2023). Here, the UHI effect is mitigated against by (re)introducing nature-based and passive solutions, such as retrofitting neighbourhoods with benevolent tree canopies, extensive permeable surfaces across streets and parks, active transport infrastructure, and cooling "cold lane" strategies (Yao et al., 2020), or adding improved insulation, window shading and cross-ventilation to houses and equipping rooftops with greenery or reflective and solar PV cells (Jay et al., 2021). Research by Rocky Mountain Institute indicates that retrofitting roofs with passive daytime radiative cooling (PDRC) materials would greatly reduce indoor temperatures. It estimates that deploying PDRC materials in "cool roofs" across informal settlements and low-income housing in India alone could save 317,000 lives and 8 million tonnes of carbon dioxide equivalent (tCO2e) in cooling-related emissions between now and 2030 (Rasmussen and Nanavatty, 2023). This, for a fraction of the cost of air conditioning units.

Finally, these retrofit measures must take into account embodied carbon and biodiversity loss in their own materiality, requiring any such practices to also work with biomaterials from regenerative sources. Retrofit offers opportunity for significant innovation in materials, logistics, design, fabrication and operation, as well as rediscovering and regenerating traditional craft practices.

All this prompts an artful re-imagination of architecture itself. In 1955, British architecture critic Reyner Banham (1955) stated that, "Architects are by training, aesthetics and psychological predisposition, narrowly committed to the design of big permanent single structures and their efforts are directed merely to focusing big permanent human values as unrepeatable works of art." Almost seven decades later, many architects are still stuck there. It is time to move on.

Noting Nightingale's cleverly aspirational reframing of "reductionism", all these shifts need not be experienced as a loss. They may require us to design different forms of value to convey what could be thought of as a collective abundance. Rebecca Solnit (2023) describes the need to find "a sense of meaning, of deep connection and generosity … the kind of abundance we need to meet the climate crisis, to make many, or even most, lives better."

Khudi Bari houses, Bangladesh, by Marina Tabassum Architects (image credit: Asif Salman)

3.3. Retrofitting regions

Reinforcing existing places through careful retrofit is also possible at the scale of entire regions. What if we enable as many people as possible to live in upgraded housing in their own homelands, cultivating resilient settlements transformed to meaningfully thrive despite the global climate breakdown? Could we prevent the environmental and social costs associated with forced migration by retrofitting housing at home, rather than having to build new housing elsewhere?

We must first recognise that, in many cases, the term "climate migration" obscures the "economically-driven" land use and biodiversity loss that forces many to flee or the politically motivated upheavals that create mass displacement. Just as the climate crisis is produced by economic and political choices, so is migration. Although heat, drought, fire and flood will exacerbate the nature of these forced relocations, and with dire consequences, the cause of that migration often lies elsewhere, beyond those people affected. This is what forces people to move. As Somali-British poet Warsan Shire (2011) writes, "No one leaves home unless home is the mouth of a shark."

Elsewhere, movement is aspirational, as those in high-income countries are incentivised to trade up a housing ladder towards, and then within, a small set of gilded global cities. These processes also lead to the displacement of gentrification, as well as "organised abandonment" of towns and cities that are deemed to be in "the wrong place at the wrong time", beached when globalised economic flows appear to change direction or are actively redirected. This displacement can occur at the scale of house, block, neighbourhood or entire city-region, and often with complex, destructive effects, particularly for those most disenfranchised. It can even produce harmful effects if a "social mix" is imposed on existing residents, often in public or social housing, without physical displacement (Shaw and Hagemans, 2015). The last few lines of Otis Mensah's *We Were Never Derelict* (2020) (a poem commissioned for the retrofitted and largely privatised Park Hill housing in Sheffield) echoes Shire's words from another context: "We were never derelict/Just displaced and out of sight/Carrying home inside us/When home they tried to break."

Complementing Mensah's and Shire's poetry, Esther Duflo and Abhijit Banerjee's (2019) extensive research indicates that, essentially, most people would rather stay where they are, where they are from: "The fact is that unless there is a disaster pushing them out, most poor people prefer to stay home. They simply aren't knocking on our door; they prefer their own countries. They don't even necessarily want to move as far as their local capital city. People in rich countries find this so counterintuitive that they refuse to believe it, even when faced with the facts."

Why should people not be able to stay in situ wherever possible, in their existing homes, cultures, and towns and cities? Could these places be successfully adapted to environmental circumstances? What is a retrofit at regional scale?

The stories of places and their peoples, like Los Bañados in Asunción, reveal what is at stake. These neighbourhoods are constantly assailed by riverine inundation (Los Bañados translates as "the bathers") yet the deeper currents washing up there are not natural, but political and economic (Costa, 2019). There are many ways that people can live alongside inundation and we will surely be about to discover many more. However, if we attempt to hold two variables constant – finding a way for the 100,000 residents of Los Bañados to stay in their homes, while accepting a complex environmental condition – then the variables that must change are political and economic.

Adéwálé Májà-Pearce (2023) notes that Lagos's name is also drawn from its geography. Lagos means "lakes" in Portuguese and just over half its area is wetlands, with much of the rest of its land less than 1.5 metres above sea level. As Májà-Pearce powerfully relates, much of this land is likely to be submerged by the end of the century due to climate breakdown, yet the impact of that climate breakdown will be exacerbated by extraction closer to home. In Májà-Pearce's telling, the reclaimed land "luxury developments" of Eko Atlantic and Banana Island are displacing entire coastal settlements and systems via transformed ocean dynamics. According to Muftau Ayọ̀délé, a spokesperson for the Okun Alfa coastal community, "The community has relocated thrice because of ocean surge, the other three places are now buried deep inside the ocean, our former houses are now home to mermaids (Májà-Pearce 2023)."

Only rarely are residents facing inundation in Global North cities asked to relocate. Indonesia-based architectural theorist and designer Nashin Mahtani (2020) describes how "apocalyptic narratives" driven by global development agendas support the costly "displacement" of much of Jakarta to a new "smart" capital city surrounded by an outer sea wall and offshore real-estate developments designed by Dutch consultants, while "the majority of Jakarta's residents continue to rearrange and reposition themselves, creating new alternatives to reinvent viable livelihoods." Mahtani (2020) asks us to "imagine different futures – ones that emerge from embracing, instead of cancelling, pluralistic histories and temporalities capable of inhabiting turbulence ..."

Elsewhere in Indonesia, Surabaya's Kampung Improvement Programme, which ran from 1969 to 1998, demonstrated how an effective and empowering upgrading of existing informal settlements could be achieved through participative retrofit methods (Hart and King, 2019). Similarly, Thailand's Baan Mankong (affordable housing) programme has enabled the upgrade of over 300 districts, via low-interest loans and long-term leases made directly available to communities in existing informal settlements. Local community groups were able to lead their own planning efforts, leading to an increase of almost 20 per cent of the population living in durable buildings with new sanitation and infrastructure (Dabari, 2018).

Bogotá's recent Plan Terrazas recognises the complex realities of informal settlements in the city and now allows residents of self-built houses to secure a building permit from the city administration without incurring costs. This means existing residents can then receive grants to upgrade their home, incorporating modern sanitation units, water and waste facilities (Burdett, 2023). This allows for retrofit from within, rather than demolish and displace. While these upgrades are not yet driven by circular biomaterial use or sustainable infrastructures, by drawing them into the ambit of publicly led city climate strategies they now can be.

As former mayor of Bogotá Claudia López states, "[Plan Terrazas] acknowledges that the informal city will continue to grow, and the state must adapt to people's complex and changing situations. We must invest in policies that benefit underprivileged residents. If we succeed in helping them thrive, the city will thrive" (Burdett, 2023).

The specific strategies required to enable and extend these outcomes must emerge from sophisticated practices of systemic and participative design and policy work, but, fundamentally, framing these questions, rather than assuming extraction, is a necessary precursor to discovering answers. It requires a genuine engagement with the many forms of value implicit within informal settlements and the inherent complexity of their urban design (Dovey et al., 2023).

Significant ingenuity will be required in those places populating the frontline of the climate emergency. Here, learning from Indigenous Peoples' knowledge systems may provide insights for resilient, nature-based infrastructures, circular biomaterials, active sustainable land management and inventive patterns of settlement (Watson, 2019). How might existing networks like the Latin American University Network of Housing Departments, which has trained over 14,000 housing and habitat professionals since its founding in 1994, be supported to develop their work in these directions?

The kinship relationships common to many Indigenous Peoples' knowledge systems reorient the idea of rights to encompass those of the environment itself and it is no coincidence that innovative frameworks recognising nature as legal entities are emerging in places such as Ecuador, Bolivia, Canada, Australia and New Zealand. While these approaches draw from practices and sensibilities that have been refined for millennia, new decentralised digital technologies might enable "self-sovereign" capabilities for entities such as rivers and forests, as well as for houses and infrastructures, and the elements they are constituted from.[22] Will conveying rights upon natural systems prevent the damaging land use and biodiversity loss that has often forced migration in the first place? Equally, how will anti-colonial policy agendas impact existing assumptions about property and land rights?

The Olkola Aboriginal Corporation in Cape York, Australia, has started building projects that allow its people to move back on to "Country" through the creation of sustainable livelihoods, living once again on the land previously stolen from them.[23] The initial array of built projects includes a Cultural Knowledge Centre constructed with rammed earth and local timber, supported by decentralised and renewable energy and water infrastructures, with drone and satellite technology supporting traditional "cool burning" practices for bushfire management. Housing, in the form of a ranger base and caretaker residence, is to follow. The climate and biodiversity crisis will impact heavily upon areas like Cape York, yet the "deep time" knowledge systems (Nursey-Bray et al., 2019), ecosystem services economy (Roberston, 2019), and practised cultures of Traditional Owners, combined with contemporary technologies, offers clues as to what living well with climate change might look like.

Similar cases exist elsewhere, providing patterns of hope. The Khudi Bari houses by Bangladesh architect Marina Tabassum (2020), funded by the Foundation for Architecture and Community Equity, are designed to enable otherwise marginalised landless peoples to live amidst the sand beds of the Meghna River, despite inundation and other climate-related challenges. Khudi Bari houses are simple, elegant space frame systems, designed to take advantage of lengths of readily available bamboo, connected with steel joints and hoisted high, as with much of the vernacular architecture of the South. The ground plane is compacted earth and the structure is filled with panels of reeds or woven grass. They were designed with local people, can be built by residents themselves and can house a family of four for around £300.

Recognising the complexity of the Ganges Delta, Tabassum says this is an "architecture of impermanence", yet Khudi Bari's highly participative approach allows for dignified adaptation on people's own terms. The construction system has since been used for larger structures, such as community centres, in the Rohingya refugee camps. Tabassum describes these in-between places as belonging to the river rather than the land, yet Khudi Bari demonstrates that, even under these conditions, housing can be designed to work with the environment rather than against it, allowing people to remain in place.

Housing can flow with the rivers, desertification can be reversed (Feng et al., 2016) and urban sprawl can be unpicked (Hill, 2021). Wealthy cities like New York are already spending billions on flood mitigation infrastructure, for example, just as countries like Finland can effectively "end homelessness" by simply giving good-quality purpose-built housing to people at risk (Hancock, 2022). The key questions may be who gets to benefit from these techniques and who decides?

Here, retrofitting means new approaches to working with old places, connected strategies across shared challenges, a global mission for the right to remain in place as much as the right to move. This would be a truly meaningful common good "moonshot", avoiding the degradation of people and environment associated with mass relocation.

It would require an ambitiously transdisciplinary approach to housing, as the challenge cuts across architecture, planning, construction, economics, anthropology and numerous technologies, alongside new practices cultivated within innovative public institutions. Working directly with vulnerable groups, ensuring that their voice is to the fore alongside that of the environment itself, can drive diverse possible futures through meaningful forms of participative design and ownership that produces in situ sustainable development that reinforces and repairs settlements, rather than relocating them.

3.4. Retrofitting for migration

The Olkola-led projects are a deliberate movement back towards traditional homelands. Marina Tabassum's Khudi Bari enables people to live amidst shifting sands. Yet as the climate crisis unfolds, migration will be forced upon many who live in increasingly inhospitable environments. With respect to Banerjee and Duflo's point, this is now the "disaster pushing them out" and yet another evolution of Warsan Shire's "shark". If the world continues its trajectory towards 2.7–3°C of warming by 2100, around a third of people on Earth will be pushed outside the "human climate niche" (Lenton et al., 2023). Movement away from rising sea levels, desertification and drought, or extreme heat, humidity and chaotic weather dynamics will, in turn, necessitate the provision of dedicated forms of housing – new-build and retrofit – designed specifically for and with climate migrants.

An imperative to produce shelter rapidly may lead to well-meaning yet careless use of high-carbon and resource-intensive building, reinforcing a "social deficit" model of housing provision bereft of dignity, delight or resilience, while further exacerbating climate breakdown through its embodied greenhouse gases and biodiversity loss. Addressing a short-term local problem may only lock in the longer-term global problems – the implications of which will return locally soon enough. Many current examples of housing for disaster-relief, while urgently necessary in emergencies and usually driven by development aid decision-making cultures, are rarely meaningful upstream solutions that enable good quality modern housing.

Designing or adapting genuinely sustainable, healthy and dignified housing for climate migration can be informed by the adaptive, participative techniques of vernacular systems and nature-based technologies, as well as contemporary technologies. Systems-wide approaches are required to ensure that housing for those forced to move addresses both the short term and the long term simultaneously, while collapsing scale such that the local solution reinforces the global and vice versa.

Again, this challenge requires an integrated approach: engaged participative design methods; biomaterials and modern methods of construction; local resource loops and shared infrastructures; and the equivalent of systems-level value modelling, akin to Finland's Housing First strategy, but dedicated to climate migrants and climate refugees. Here, the goal is inclusive, high-quality common good housing for displaced peoples, mitigating against and adapting to the impacts of the climate and biodiversity crisis, rather than continuing to exacerbate it.

It is necessary for us to work hard to make this forced migration not the rule but the exception, wherever possible. The human right to housing is thus bound up within broader rights: the rights of the environment and the right to the city that people already live in. So there are two housing design "moonshots" here, both of which must achieve dignified, equitable and sustainable housing, across new-build and retrofit, for those who wish to remain in place and for those who are forced to move.

4. Housing as public utility and environmental common good

By seeing these two movements – building and retrofitting – as integrated and interdependent, woven around each other, we allow for citizens' rights to sustainable housing to be nested within the broader "right to the city" as a common good (Lefebvre, 1968), and for the rights of the environment itself. For this, we need new actors or agencies that can orchestrate systems, making housing, rather than mere houses. A systemic challenge requires a systemic approach.

This requires a collective perspective that can inform the ways in which we think about global challenges as structured by conflicting interests and power structures on various levels – individual, national, regional, and international. Still, we could do worse than to pick over the forward-looking thinking tucked away in texts like Catherine Bauer's *Modern Housing*, identifying those ideas that have endured, while critically noting those others that can now be filed under "early twentieth century missteps".

This approach is the ethos of the EU's New European Bauhaus programme,[24] which harnesses the spirit of the 1930s transformations enabled by technology, aesthetics and new patterns of living for a new age, now reframed by imperatives for social inclusion, regenerative biodiversity and the recognition of the fundamental interconnectedness of global systems (Bason et al., 2021).

Through the lens of mission-orientation and an economics of the common good, we might be able to grasp Bauer's suggestion once again and see the value in re-imagining housing as a public utility, as a common good:

"The fundamental premise about housing has undergone a tremendous change. It has become a public utility, in accepted theory at least, if not as yet in any complete sense of accomplishment. The right to live in a decent dwelling has taken its place among the national minima – the right to good and abundant water, to sanitation, to adequate fire and police protection, to the use of paved and lighted roads, to education, to a certain amount of medical care, and ... to various forms of social insurance."
Catherine Bauer (1934)

As Bauer indicates, the theory of such "national minima" had not been translated into practice by 1934. Indeed, for many, such public utilities are still not in place in 2024, yet the goal of the mission still motivates: how might we re-imagine this "right to live in a decent dwelling" for an age of climate and biodiversity emergencies, of fervent social change and crushing inequalities? As in the 1930s, the combined weight of these social and environmental drivers ought to provide impetus for change. Similarly, as with Bauer and Bauhaus, an array of powerful new technologies have concurrently matured; they are just not evenly distributed yet. Indeed, the fourth common good pillar emphasises that new thinking is required for the ability of public institutions to share not only the risks, but also the rewards. A balanced risk-reward relationship is not only about redistributing *ex post*, but also about proactively ensuring a fair distribution from the outset – in a pre-distributive way.

An expanded definition of dwelling must now include the local and global footprints of connected systems and materials, circular and regenerative, from beyond the

false edge of the building site. Similarly, the definition of decent must include Bauer's perspective of healthy and just, but it must also be reoriented around richer ideas of value, balancing dignified common good outcomes for people alongside the rights of the environment itself. This reciprocal definition is akin to Aldo Leopold's 1943 "land ethic" – neatly paraphrased by writer Kim Stanley Robinson (2020) as "What's good is what's good for the soil" – or the much older, deeper Indigenous Australian kinship relationships of "Look after country and it will look after you."

This broader perspective – learning from Indigenous cultures, the Bauhaus and otherwise – also points to an enriching of the notion of a decent dwelling not as a utilitarian baseline defined around mere shelter, but as about, alongside other social foundations, culture. Thus, housing is also about shaping and supporting both the vital life force of everyday life and the way we collectively imagine, articulate and form possible futures (O'Connor, 2024). The way we make housing directly or indirectly addresses this aspect of culture, revealing much. Part of the failure of previous generations of social housing may have been in aligning it solely around the reductive idea of fixing market failures – poor quality housing for when you can't afford anything else (Mazzucato 2013). The contemporary reframing of shaping markets, in a way that guarantees the high-quality public/social housing examples provided in this paper, suggests quite different forms of aspiration for, and expression of, community, and thus in turn for democracy and economy (O'Connor, 2024).

Rethinking when, where or whether housing is built for the common good requires a reckoning with the alternative of "business as usual": forced migration, the creation of new slums or the endlessly spiralling urban sprawl, biodiversity loss, pollution and extractive resource use driven by property speculation. For Bauer (1934), this was redolent of nineteenth century urban development or what she called "the era of wasteful expansion", describing how speculative development would mean "the city bursts all the walls and spreads out like a spring flood over the meadows."

It should be a salutary wake-up call that the twenty-first century generally continues these patterns, building housing further into actual rather than metaphorical flood zones (Hill, 2023b). Our emphasis here must be on collectively retrofitting and re-imagining the homes and neighbourhoods that already exist, alongside strategic programmes of public, social and shared housing and social infrastructures. Each can forge new retrofit industries based on plant-based biomaterials, gently densifying intergenerational mixed-use districts, threaded through with integrated social and utility infrastructures, and producing climate resilience and public health through nature-based technologies. Whether in large-scale industrial fabrication or community-scale self-build systems, each can create new jobs and trades in and around construction, oriented around assembly, adaptation and disassembly, around care and maintenance, within regenerative material cultivation and harmonious supply chains supported by open civic digital infrastructures.

Both urgency and imagination must be brought to bear here, as many of these settlements may be in places that are currently assumed to be at or near the front line of the climate and biodiversity crisis. What diverse forms of innovation would it take to enable people to thrive in the places they already call home?

Governing housing for the common good through emphasising retrofit and public/social housing can also help drive construction innovation in privately owned housing. This means that new-build housing can trace similar trajectories towards common good outcomes.

A non-extractive architecture for tomorrow's housing must engage the imagination and everyday lives of billions, defining a contemporary iteration of Bauer's "public utility" housing, full of verve, delight and conviviality; carbon positive and brimming with life, human and otherwise, and within planetary boundaries. Adaptive design principles, alongside local capability-building, can enable an ongoing refining in place, unlocking future retrofit for applications unforeseen, alongside long-term carbon sequestration. Circular design principles, akin to tightening (localising), learning (adapting), slowing and closing loops[25] must define building systems.

Culturally diverse and super-mixed-use versions of what Bauer called "neighbourhood units" can be co-produced by newly participative practices that touch the earth not only lightly, but in continually nourishing ways. As illustrated, these forms of participation can unlock ways of living in less individual space, yet with greater collective possibility, generating forms of increased abundance through shared "public luxuries". Clearly, however, "doing more with less" requires advanced co-design capabilities, technical acumen, collective imagination, social cohesion and earned trust. These require us to imagine what Bauer's "entirely new methods" of planning, construction, design and politics might mean now when oriented around local loops; around relationships rather than ownership.

Such principles, together with the common good pillars, must translate into new code-based public infrastructures to support tenure types, building standards and usage permissions that might interact, diversify and adapt to form effectively real-time planning and management systems. Interoperable data standards for materials, flows, spaces and relationships can support shared systems-level financing, local value mapping and self-sovereign natural ecosystems, all sheltering under umbrellas of supportive local, municipal and bioregional nested governance (Samuel, 2023). These constitute part of the infrastructure that could enable continual adaptation within planetary boundaries – yet also evoke the essence of "city-ness" that Saskia Sassen (2013) describes, framed around the motive forces of complexity, incompleteness and the possibility of making anew. Taken together, they suggest the possibility, or even necessity, of developing missions at neighbourhood scale, woven together to make towns, cities and regions (Cook and Pagh, 2023).

Moving through the scales, these interactions must be reorganised around an equitable redistribution of common wealth and regenerative biodiversity at a global scale, akin to a so-called "Earth system law" governing the flows of materials, resources, labour, knowledge and culture across these complex connected systems of building (Kotzé and Kim, 2019).

In this way, the common good outcomes of housing – health, social fabric, learning, biodiversity, culture, community, creativity – might be understood as somewhat more important than tomorrow's house prices or yesterday's construction industry. Each of these outcomes can form the basis of a systems-level and performance-based approach to value. Such a model can unlock the "upstream" returns currently lost to housing policy, such as healthcare, social care and environmental savings, transforming the way that regional treasuries might work (Heath, 2020). This new balance sheet also enables a powerful shift in industrial policy, away from counting the stolid mass of rent-seeking capital locked up in housing and towards investment in agile industrial innovation of carbon-positive technologies, skills and capabilities, both locally and globally.

These remain fiendishly difficult challenges. As Richard Nelson reminded us in 1977, in the language of the day, "solving the ghetto" is more difficult than getting to the moon. Unlike literal moonshots, innovating in homes and neighbourhoods concerns the politics and practices of everyday life (Mazzucato 2021). It requires new fiscal policies for property ownership and land use that deliberately shake centuries-old structural inequalities. The "dark matter" of

Table 2. Nine design principles for common good housing missions

Retrofitting first Retrofit first, via circular biomaterials, nature-based infrastructures and participative co-design with people, place and environment, recognising the rights of people to remain in place rather than be displaced by external forces, removing operational emissions while retaining embodied carbon and interconnected biodiversity, and reinforcing the social and cultural fabric.	**Moving second** Wherever the climate and biodiversity crisis makes existing settlements uninhabitable, ensure dignified, secure, inclusive, affordable and sustainable housing is made available for those displaced, carefully integrated into retrofit neighbourhoods and supporting social infrastructures, and with care taken in terms of governance and co-design, ensuring culturally diverse possibilities.	**Adapting third** Ensure the right to self-build, repair and adapt at both housing and neighbourhood scale, via open building systems, shared common good infrastructures, new skills and trades, engaged policy, and legible supply chains for materials and resources, allowing existing environments to refine in place and new housing to adapt.
Circular biomaterials Whether retrofit or new-build, prioritise biomaterials from regenerative sources, produced, installed and maintained, and reused to high standards. Source locally wherever possible and from locally managed sustainable environments, and produce, maintain and recycle under dignified and safe labour conditions, creating new forms of employment, trades and cultural activity.	**Definancialised markets** Create an even balance of housing across public, social and private sectors, with diverse types, tenure and land ownership, removing financialisation's imperative for over-building. Make existing under-utilised spaces more openly available. Direct sustainable building sectors via collaborative public leadership, procurement and operations.	**Legible systems** Ensure a new "right to the city" incorporates the rights of the environment itself, by developing open, interoperable, legible systems to track provenance, performance and permissions of habitats, materials, resource flows and building/land use. Develop new common good "balance sheets" based on smart contracts for shared assets and activities.
Convivial infrastructures Prioritise planning for harmonious density that unlocks sustainable common good outcomes, where housing design integrates diverse, high-quality and well-maintained social infrastructures, alongside shared systems for active mobility, public transport, renewable energy, on-site water storage and green/blue infrastructure, food production and local waste loops, facilitated by accessible public digital services.	**Open buildings** Deploy advanced biomaterial-oriented fabrication systems for construction and retrofit, from open digitally enabled community-scale self-build and repair systems operated, maintained and resourced locally, through to large-scale industrial modular and automated fabrication and construction systems for larger buildings and infrastructure, linked to legible, equitable and regenerative material supply chains in both instances.	**Systemic governance** Ensure systemic perspective to design, construction and governance of housing incorporates integration of these linked infrastructures and practices, working systemically across house, block, neighbourhood, city, region, nation and global scale, recognising that these are all the same system from a planetary boundaries perspective.

policy (Hill, 2012a), law and financing that has accreted around housing will need unpicking and reorienting, noting that sustainable housing may generally need to be definancialised and refocused on human rights (Farha et al., 2022), and the rights of the environment. This will need engaged and forward-looking regional planning and policy support to enable places to adapt, rather than simply allowing managed decline and mass displacement. It means redistributing spaces and infrastructures. It means a valorisation and prioritisation of careful, deep retrofitting over demolition. This requires an acceleration of innovation in the many creative, technical and political challenges of retrofitting existing homes and neighbourhoods.

However, that people largely want to stay in the places they call home provides a fundamentally powerful rationale for such transformations. Similarly, if housing demand and supply are addressed holistically, most, if not all, the technologies and techniques we need are already available to us. A global population slowdown provides further imperative to rethink our systems of extraction.

4.1. Conclusion: Housing the future, for the common good

Finally, the existential threat of the climate and biodiversity crisis presents us with the clearest ultimatum of all. Housing sits at the heart of contemporary ecological, economic, and social challenges. Approaching housing via an economics of the common good provides the opportunity to set and meet ambitious goals through collective intelligence. Many aspects of the most urgent challenges – dwelling, community, social and cultural life, health, energy, mobility, land use, industry, finance – are in play whenever a house is built or retrofitted. Thus, putting the common good at the heart of how we think about housing in this nexus can empower and encourage governments, business, and civil society to actively shape markets and to incorporate public value into the coordination required to meet common objectives. It requires governments to set bold missions that catalyse cross-sectoral investment and collaboration, to embrace their role as market-shapers, to align public sector tools, institutions and finance with these missions, and to design partnerships – including with the private sector – that priorities housing as a common good. The five principles become active areas for not just practice but for the capabilities needed by governments to perform core policy functions related to governing housing for the common good (Kattel and Mazzucato 2018; Mazzucato and Kattel 2020).

Each of the examples in the Council on Urban Initiatives' 2023 *Housing and the City: case studies of integrated urban design* report indicate ways forward (Burdett, 2023). Cases from Barcelona, Bogotá, Melbourne and Mumbai are humble steps made under difficult circumstances, working against the grain of local and global orthodoxies, yet each has the DNA to trigger systemic change programmes across their cities and beyond, while Singapore's procurement model is an example of bold, publicly led long-term planning, design and delivery.

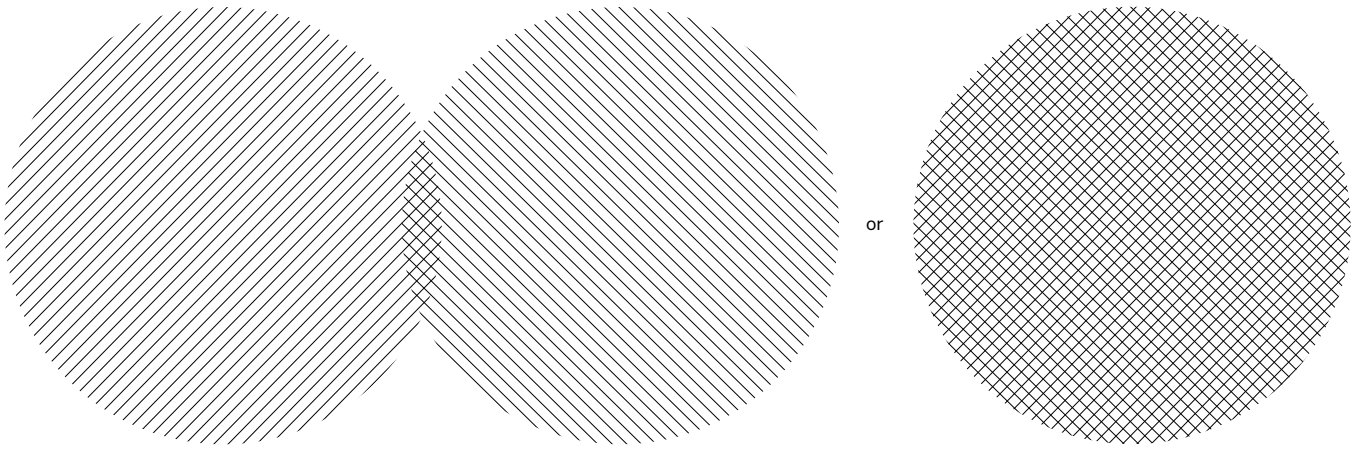
In different ways, all these cases can powerfully mitigate against extraction of both people and materials. Crucially, several of the cases embody the principle that forward-looking sustainable housing development is intrinsically unlocked by participative, inclusive, socially and ecologically just housing policies for the common good. Each case could powerfully articulate and demonstrate a new policy framework governing housing for the common good, based around principles of purpose and directionality, meaningful co-creation and participation, collective learning and knowledge-sharing, access for all and reward-sharing across all risk-takers, and transparency and accountability (Mazzucato, 2023). These five "common good" principles guide the development not just of policies, but also of the dynamic capabilities required by governments to effectively design and deliver such policies in relevant areas (Kattel and Mazzucato, 2018).

As we have discussed, this transformation of governance must be complemented by a systemic transformation of industry and of architectural practice. Each case study sketches loose structures that might now be imaginatively filled in with the transformative design and construction approaches described above, delivering not simply less bad versions of business as usual, but genuinely transformational common good outcomes across connected systems, cultures, and places.

Recognising that the conditions for systemic transformation are in place, possible futures for modern housing must now be made desirable, viable and highly probable – for the common good. For when we are making housing, we are making the future.

"Instead of trying vainly to salvage the past, we must first safeguard the future."
Catherine Bauer (1934)

Figure 4. Common good housing policy



Bibliography

51N4E and l'AUC. (2023). *How to not Demolish a Building*. Ruby Press.

Action on Empty Homes. (2023). *Empty Homes Numbers Rise AGAIN In Every Region as Homelessness Peaks, November 2023 Government Data Shows*. [Online]. Available from: https://www.actiononemptyhomes.org/news/empty-homes-numbers-rise-again-in-every-region-as-homelessness-peaks-november-2023-government-data-shows.

Africa Futures Institute: Research. [Online]. Available from: https://www.africanfuturesinstitute.com/afi-research-pinpoint [Accessed 1 October 2023].

Anderson, J. (2023). The New Problem-Solving Skills That All Cities Need. *Stanford Social Innovation Review*, 29 September 2023. Available from: https://ssir.org/articles/entry/city_government_problem_solving_skills#.

ArcDes. (2019). Public Luxury exhibition. Atkdes, Stockholm. 1 June 2018–13 January 2019.

Arnstein, S. (1969). A ladder of citizen participation. *Journal of the American Planning Association*, 35(4), 216–224.

Arup/UCL. (2023). Urban Heat Snapshot. [Online]. Available from: https://www.arup.com/perspectives/publications/research/section/urban-heat-snapshot.

Banham, R. (1955). *Vehicles of Desire*. Art.

Banerjee, A.V. and Duflo. E. (2019). *Good Economics for Hard Times*. Allen Lane.

Peter Barber Architects. (2024). [Online]. Available from: http://www.peterbarberarchitects.com/housing.

Bauer, C. (1934). *Modern Housing*. University of Minnesota Press.

Bason, C., Conway, R., Hill, D. and Mazzucato, M. (2021). A New Bauhaus for a Green Deal. UCL Institute for Innovation and Public Purpose. [Online]. Available from: https://www.ucl.ac.uk/bartlett/public-purpose/publications/2021/jan/new-bauhaus-green-deal.

Bocken, N. et al. (2016). Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering*, 33:5, 308-320. Available from: https://doi.org/10.1080/21681015.2016.1172124.

Borasi, G. and Zardini, M. (2007). *Sorry, Out of Gas: Architecture's Response to the 1973 Oil Crisis*. CCA/Corraini Edizioni.

Boyer, B. and Hill, D. (2013). *Brickstarter*. Sitra, Helsinki.

Buildings Performance Institute Europe. (2017). [Online]. Available from: https://www.bpie.eu/publication/97-of-buildings-in-the-eu-need-to-be-upgraded/.

Buildings Performance Institute Europe. (2021). *Deep Renovation: Shifting from exception to standard practice in EU Policy*. [Online]. Available from: https://www.bpie.eu/publication/deep-renovation-shifting-from-exception-to-standard-practice-in-eu-policy/.

Burdett, R. (Ed.). (2023). *Housing and the City: case studies of integrated urban design*. Council on Urban Initiatives. [Online]. Available from: https://councilonurbaninitiatives.com/resources/housing-and-the-city-case-studies-of-integrated-urban-design.

Brand, S. (1994). *How Buildings Learn: What Happens After They're Built*. Viking Press.

Bryson, J. (2019). A century of public housing: lessons from Singapore, where housing is a social, not financial, asset. *The Conversation*, 31 July 2019. Available from: https://theconversation.com/a-century-of-public-housing-lessons-from-singapore-where-housing-is-a-social-not-financial-asset-121141.

Camden Renewal Commission. (2021). *Developing Renewal Missions in Camden*. Renewal Commission Report. [Online]. Available from: https://camdenrenewal.com/wp-content/uploads/2021/12/Developing-renewal-missions-in-Camden_Renewal-Commission-Report-2021.pdf.

Carmona, M. et al. (2020). *A Housing Design Audit for England. Place Alliance*. Available from: https://www.ucl.ac.uk/news/2020/jan/new-housing-design-england-overwhelmingly-mediocre-or-poor.

Cave, D., Bubola, E. and Sang-Hun, C. (2021). Long Slide Looms for World Population, With Sweeping Ramifications. *New York Times*, 22 May 2021. Available from: https://www.nytimes.com/2021/05/22/world/global-population-shrinking.html#:~:text=Demographers%20now%20predict%20that%20by,reduce%20household%20burdens%20for%20women.

CEBRA, EFFEKT and ARTELIA. (2022). *Reduction Roadmap*. Available from: https://reductionroadmap.dk/ [Accessed 5 June 2023].

Chan, H.C. and Yap, W. (2023). Delivering affordable and adequate housing as a human right. In: R. Burdett, R. (Ed.). (2023). *Housing in the City: case studies of integrated urban design*. Council on Urban Initiatives. Available from: https://councilonurbaninitiatives.com/resources/housing-and-the-city-case-studies-of-integrated-urban-design.

Circle Economy. (2023). *The Circularity Gap Report*. Available from: https://ddc.dk/new-report-denmark-is-far-behind-in-the-circular-transition/.

Circular Taiwan Network. (2024). *Development of Circular Economy in Taiwan*. Available from: https://circular-taiwan.org/en/city/taiwan/.

Convery, S. (2022). Refurbishing not demolishing Port Melbourne public housing estate could save Victoria $88m, study finds. *The Guardian*, 2 November 2022. Available from: https://www.theguardian.com/australia-news/2022/nov/02/refurbishing-not-demolishing-port-melbourne-public-housing-estate-could-save-victoria-88m-study-finds.

Cook, T. and Pagh, T. (2023). *Mission Neighbourhood: Re-forming Communities*. Danish Architectural Press.

Council on Urban Initiatives. (2022). *Shaping Urban Futures*. [Online]. Available from: https://councilonurbaninitiatives.com/resources/shaping-urban-futures.

Costa, W. (2019). Catastrophic flooding and state negligence in Paraguay leave the poorest vulnerable. *Open Democracy*, 7 June 2019. Available from: https://www.opendemocracy.net/en/democraciaabierta/catastrophic-flooding-and-state-negligence-paraguay-leave-poorest-vulnerable/.

Crofts Street, Cardiff. (2021). RHSP, AECOM and @HOME. [Online]. Available from: https://rshp.com/projects/residential/crofts-street/.

Darabi, A. (2018). Thailand upgraded thousands of its slums by giving residents control. *Apolitical*, 17 January 2018. Available from: https://apolitical.co/solution-articles/en/thailand-upgraded-thousands-slums-giving-residents-control.

Dark Matter Labs/Laudes Foundation. (2023). New Economic Thinking: Enabling a just transition of the built environment in Europe. *Medium*, 5 April 2023. [Online]. Available from: https://provocations.darkmatterlabs.org/laudes-x-dark-matter-labs-a-just-transition-of-europes-built-environment-e76be0a9dfa5.

Dark Matter Labs. (2021). Scaling the Right to Retrofit. *Medium*, 2 April 2021. [Online]. Available from: https://provocations.darkmatterlabs.org/scaling-the-right-to-retrofit-3b74aa6b08ad.

Dickinson, D. (2022). Architects Design Just 2% of All Houses–Why? *Common Edge*, 4 July 2016. [Online]. Available from: https://commonedge.org/architects-design-just-2-of-all-houses-why/.

Dorling, D. (2014). *All that is Solid: The Great Housing Disaster*. Allen Lane.

Dorling, D. (2020). *Slowdown: The End of the Great Acceleration – and Why It's Good for the Planet, the Economy, and Our Lives*. Yale University Press.

Dovey, K., van Oostrum, M., Shafique, T., Chatterjee, I. and Pafka, E. (2023). *Atlas of Informal Settlement: Understanding Self-Organized Urban Design*. Bloomsbury.

Druot, Lacaton and Vassal. (2007). *PLUS – Les grands ensembles de logements – Territoires d'exception. Editorial Gustavo Gili SL, Barcelona*. [Online]. Available from: https://www.lacatonvassal.com/index.php?idp=46.

Ebi, K. et al. (2022). Hot weather and heat extremes: health risks. *The Lancet: Heat and Health*, 398, 10301, 21 August 2021. Available from: https://doi.org/10.1016/S0140-6736(21)01208-3

Escobar, A. (2018). *Designs for the Pluriverse*. Duke University Press.

European Commission. (2020). *A Renovation Wave for Europe – greening our buildings, creating jobs, improving lives*. Available from: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1603122220757&uri=CELEX:52020DC0662 [Accessed 5 June 2023].

Farha, L. (2021). Affordable Housing is a Human Right. *Green European Journal*. Available from: https://www.greeneuropeanjournal.eu/affordable-housing-is-a-human-right/ [Accessed 4 June 2023].

Farha, L., Freeman, S. and Gabarre de Sus, M. (2022). *The Shift Directives on the Financialization of Housing: From Financialized to Human Rights-Based Housing*. [Online]. Available from: https://make-the-shift.org/wp-content/uploads/2022/12/Directives-Updated-Dec-9.pdf.

Farley, S., Rose, A. L. and Seelos, C. (2021). The 'Thou Shalt Nots' of Systems Change. *Stanford Social Innovation Review*. Available from: https://doi.org/10.48558/0BXX-MP20.

Feng, X., Fu, B., Piao, S. et al. (2016). Revegetation in China's Loess Plateau is approaching sustainable water resource limits. *Nature Climate Change*, 6, 1019–1022. Available from: https://doi.org/10.1038/nclimate3092.

Förster, W. and Mekning W. (Eds.). (2018). *The Vienna Model 2: Housing for the 21st century city*. Jovis.

Fraser, M., Jewell, N., Kirupanandan, V., Littleford, K., Pizzo, E. and Raine, R. (2023). *Design For All – A place to call home*. 3 October 2023. Available from: https://www.arc-nt.nihr.ac.uk/research/projects/social-and-affordable-housing-initiative/.

Freedland, J. (2017). The new age of Ayn Rand: how she won over Trump and Silicon Valley. *The Guardian*, 11 April 2017.

Friedler, C. and Kumar, C. (2019). R*einventing retrofit: how to scale up home energy efficiency in the UK*. Green Alliance.

Garrett, H., Mackay, M., Nicol, S., Piddington, J. and Roys, M. (2021). *The cost of poor housing in England*. Building Research Establishment Briefing Paper.

Gasparrini, A. et al. (2015). Mortality risk attributable to high and low ambient temperature: a multicountry observational study. *The Lancet*, 20 May 2015. Available from: DOI: https://doi.org/10.1016/S0140-6736(14)62114-0.

Glaeser, E. and Ratti, C. (2023). 26 Empire State Buildings Could Fit Into New York's Empty Office Space. That's a Sign. *New York Times*, 10 May 2023. Available from: https://www.nytimes.com/interactive/2023/05/10/opinion/nyc-office-vacancy-playground-city.html [Accessed 5 November 2023].

Good Cycle. (2024). *Good Cycle Building*. [Online]. Available from: https://www.goodcycle.pro/building/ [Accessed 3 October 2023].

Gordon, A. (1972). Designing for survival: the President introduces his long life/loose fit/low energy study. *Royal Institute of British Architects Journal*, 79(9) 374-376.

Gormley, P. (2021). In practice: Material Cultures on decarbonising construction. *Architectural Review*, 23 June 2021.

Grabar, H. (2023). *Paved Paradise: How Parking Explains the World*. Penguin.

Graeber, D. (2015). *The Utopia of Rules: On Technology, Stupidity, and the Secret Joys of Bureaucracy*. Melville House.

Grahame A. and McKean, J. (2021). *Walter Segal: Self-Built Architect*. Lund Humphries.

Griffith, S. (2022). *Electrify*. Random House.

Grima, J. (2021). Non-Extractive Architecture manifesto calls for buildings that are 'not intrinsically dependent on exploitation' Interviewed by Marcus Fairs. *Dezeen*, 13 April 2023. Available from: https://www.dezeen.com/2021/04/13/non-extractive-architecture-space-caviar/ [Accessed 5 June 2023].

Habert, G., Miller, S.A., John, V.M. et al. (2020). Environmental impacts and decarbonization strategies in the cement and concrete industries. *Nature Reviews Earth and Environment*, 1, 559–573 (2020). Available from: https://doi.org/10.1038/s43017-020-0093-3.

Haila, A. (2016). *Urban Land Rent: Singapore as a Property State*. Wiley Blackwell.

Hancock, E. (2022). Helsinki is still leading the way in ending homelessness – but how are they doing it? *World Habitat*, 6 October 2022. Available from: https://world-habitat.org/news/our-blog/helsinki-is-still-leading-the-way-in-ending-homelessness-but-how-are-they-doing-it/ [Accessed 23 October 2023].

Harper, P. (2023). Britain is addicted to the wrecking ball. It's trashing our heritage and the planet. *The Guardian*, 10 February 2023. Available from: https://www.theguardian.com/commentisfree/2023/feb/10/britain- [Accessed 5 June 2023].

Harriss, H., Hyde, R. and Marcaccio, R. (2020). *Architects after Architecture: Alternative Pathways for Practice*. Routledge.

Hart, M. and King, R. (2019). To Fix City Slums, Don't Just Knock Them Down: Involve Residents in Upgrading Efforts. *World Resources Institute*, 13 November 2019. Available from: https://www.wri.org/insights/fix-city-slums-dont-just-knock-them-down-involve-residents-upgrading-efforts.

Hasan, A., Baroudi, B., Elmualim, A., Rameezdeen, R. (2018). Factors affecting construction productivity: a 30-year systematic review. *Engineering, Construction and Architectural Management*, 20 August 2018, 25, 7, 916-937.

He, C. et al. (2022). The effects of night-time warming on mortality burden under future climate change scenarios: a modelling study. *The Lancet Planetary Health*, 6, 8, August 2022.

Heath, D. (2020). *Upstream: The Quest to Solve Problems Before They Happen*. Heath Brothers.

Highfield, A. (2023). Councils are sitting on 'enough empty property for 19,500 affordable homes. *Architects Journal*, 22 June 2023. Available from: https://www.architectsjournal.co.uk/news/councils-are-sitting-on-enough-empty-property-for-19500-affordable-homes.

Hill, D. (2012a). *Dark Matter and Trojan Horses: A Strategic Design Vocabulary*. Strelka Press.

Hill, D. (2012b). The Garage of Small Things; nanotechnology, biomimicry and design practice. *Medium*, 4 October 2012. Available from: https://medium.com/dark-matter-and-trojan-horses/the-garage-of-small-things-nanotechnology-biomimicry-and-design-practice-b8c22e5f5b67.

Hill, D. (2019a). *Strategic design for public purpose*. IIPP Blog at Medium, 8 March 2019. Available from: https://medium.com/iipp-blog/strategic-design-for-public-purpose-33c3899dba5e [Accessed 10 July 2023].

Hill, D. (2019b). Team of Teams, Railways not Sandwiches. *Medium*, 31 October 2019. https://medium.com/dark-matter-and-trojan-horses/teams-of-teams-railways-not-sandwiches-4e901ce92787. [Accessed 10 July 2023].

Hill, D. (2020). Architects Without Architecture: How Transdisciplinary Studios Reposition for 21st- Century Challenges. *Architectural Design*, 90(3):108-113, DOI: 10.1002/ad.2576.

Hill, D. (2021). The suburbs as they are, and could be. *Architecture Australia*, 2 November 2021. Available from: https://architectureau.com/articles/the-suburbs-as-they-are-and-could-be/.

Hill, D. (2022a). *Designing Missions: Mission-oriented innovation in Sweden – a handbook from Vinnova*. Vinnova, Stockholm.

Hill, D. (2022b). *Interview with Diana Rodriguez Franco*, 27 September 2022. Council on Urban Initiatives. Available from: https://www.youtube.com/watch?v=AdlNk0adDAk.

Hill, D. (2023a). Autumn to Spring. Or, a 'new metabolism' for a circular society with Japanese characteristics. *Medium*, 18 January 2023. Available from: https://medium.com/a-chair-in-a-room/spring-to-autumn-or-a-new-metabolism-for-a-circular-society-with-japanese-characteristics-1afb26851814.

Hill, D. (2023b). Harbinger: Sowing Seeds amidst Systems Collapse in Australia. *Making & Breaking, 3,* Avans University Centre of Applied Research for Art, Design and Technology (Caradt). Available from: https://makingandbreaking.org/article/harbinger/.

Holland, B. et al. (2023). *Urban Land Use Reform: The Missing Key to Climate Action*. Rocky Mountain Institute. Available from: https://rmi.org/insight/urban-land-use-reform/.

Housing Development Board. (2023). *Public Housing – A Singapore Icon*. Available from: https://www.hdb.gov.sg/about-us/our-role/public-housing-a-singapore-icon.

Hugentobler, M., Hofer, A., Simmendinger, P. (2015). *More than Housing: Cooperative Planning – A Case Study in Zurich*. Birkhäuser.

Hyde, R. (2012). *Future Practice: Conversations from the Edge of Architecture*. Routledge.

Hyde, R. (2017). *A New Practice for the Fringe*. Architect Victoria.

Ichikawa, K. (2023). A Generation that Questions the Conditions. In: Shinohara, Y. and Ruby, A. (Eds.). (2023). *Make Do With Now: New Directions in Japanese Architecture*. Swiss Architecture Museum/Christoph Merian Verlag.

IEA. (2019). *The Critical Role of Buildings*. IEA, Paris. Available from: https://www.iea.org/reports/the-critical-role-of-buildings. Licence: CC BY 4.0.

Ingold, T. (2013). *Making: Anthropology, Archaeology, Art and Architecture*. Routledge.

Ingold, T. (2020). On Building a University for the Common Good. *Philosophy and Theory in Higher Education*, 2, 1, 2020, 45-68(24). Available from: https://doi.org/10.3726/ptihe.2020.01.03.

IPCC. (2022). *Climate Change 2022: Mitigation of Climate Change: Working Group III contribution to the WGIII Sixth Assessment Report of the Intergovernmental Panel on Climate Change*.

Jay, O. et al. (2021). Reducing the health effects of hot weather and heat extremes: from personal cooling strategies to green cities. *The Lancet: Heat and Health*, 398, 10301, 21 August 2021.

Johar, I. (2022). *Financing City Transitions: a public/civic 'Deep Code' innovation challenge?* Dark Matter Laboratories, 4 November 2022. [Online]. Available from: https://provocations.darkmatterlabs.org/financing-city-transitions-a-public-civic-deep-code-innovation-challenge-9f2ef55b4bda [Accessed 5 June 2023].

Jones, F. (2023). Hydrogen buzz or meaningful change? The steel industry goes green. *Mining Technology*, 17 July 2023 Available from: https://www.mining-technology.com/features/hydrogen-buzz-or-meaningful-change-the-steel-industry-goes-green/?cf-view [Accessed 22 October 2023].

Karakusevic, P., Althorpe, M. and Batchelor, A. (2021). *Public Housing Works*. Lund Humphries.

Kattel, R. (2022). *Dynamic capabilities of the public sector: Towards a new synthesis*. UCL Institute for Innovation and Public Practice, Working Paper Series (IIPP WP 2020-07). Available from: https://www.ucl.ac.uk/bartlett/public-purpose/publications/2022/mar/dynamic-capabilities-public-sector-towards-new-synthesis.

Kattel, R. and Mazzucato, M. (2018). Mission-oriented innovation policy and dynamic capabilities in the public sector. *Industrial and Corporate Change*, 27(5), 787-801.

Klinenberg, E. (2018). *Palaces for the People: How Social Infrastructure Can Help Fight Inequality, Polarization, and the Decline of Civic Life*. Penguin Random House.

Koehnken, L. and Rintoul, M. (2018). *Impacts of Sand Mining on Ecosystem Structure, Process and Biodiversity in Rivers*. WWF.

Kotzé, L.J. and Kim, R.E. (2019). Earth system law: The juridical dimensions of earth system governance. *Earth System Governance*, 1, 100003.

Lefebvre, H. (1968). *Le Droit à la Ville*. Anthropos, Paris.

Leighninger, R. D. (1996). Cultural Infrastructure: The Legacy of New Deal Public Space. *Journal of Architectural Education (1984-),* 49(4), 226–236. Available from: https://doi.org/10.2307/1425295.

Lenton, T.M., Xu, C., Abrams, J.F. et al. (2023). Quantifying the human cost of global warming. *Nature Sustainability, 6*, 1237–1247. Available from: https://doi.org/10.1038/s41893-023-01132-6.

Leopold, A. (1943). *A Sand County Almanac: And Sketches Here and There*. Oxford University Press.

Liboiron, L. (2021). *Pollution is Colonialism*. Duke University Press.

Lokko, M. (2022). *Living Cities Forum 2022 – Material Flows – Keynote by Mae-ling Lokko*. Available from: https://www.youtube.com/watch?v=W82Y3uPS0no.

Lokko, L. (2023). Introduction by Lesley Lokko, Curator of the 18th International Architecture Exhibition. Available from: https://www.labiennale.org/en/architecture/2023/introduction-lesley-lokko [Accessed 6 June 2023].

Machida, K. and Sakai, Y. (2021). Development of Novel Construction Material from Food Waste. *Preprints 2021, 2021050740*. Available from: https://doi.org/10.20944/preprints202105.0740.v1.

Mack, C. (2022). *Digesting Metabolism: Artificial Land in Japan 1954–2202*. Hatje Kantz Verlag.

Mahtani, N. (2020). Torrential Urbanism and the Future Subjunctive. *e-flux Journal*, 7 September 2020. Available from: https://www.e-flux.com/architecture/accumulation/345108/torrential-urbanism-and-the-future-subjunctive/ [Accessed 22 October 2023].

Májà-Pearce, A. (2023). Nothing without water. *Places Journal,* October 2023. Available from: https://placesjournal.org/article/lagos-nigeria-and-climate-crisis/ [Accessed 18 November 2023].

Malterre-Barthes, C. (2021). The Devil Is in the Details – Who Is It That the World Belongs To? In Space Caviar (Ed.). (2021). *Non- Extractive Architecture – Designing without Depletion*. Sternberg Press, Berlin.

Mant, A. (2019). Why construction is still getting the circular economy wrong. *Building*. 14 May 2019. Available from: https://www.building.co.uk/comment/why-construction-is-still-getting-the-circular-economy-wrong/5099456.article [Accessed 3 June 2023].

Material Cultures and Arup. (2021). *Circular Biobased Construction in North East and Yorkshire*. Available from: https://materialcultures.org/2021-circular-biobased-construction-in-the-north-east-and-yorkshire/.

Material Cultures. (2022). *Material Reform*. Mack Books.

Material Cultures and Bauhaus Erde. (2023). *Wetlands and Construction: An Opportunity for Berlin-Brandenburg*. [Online]. Available from: https://materialcultures.org/2023-wetlands-and-construction-report/.

Mayor of London. (2023). *Mayor launches major new programme to convert private housing into council homes – with an aim for 10,000 additional council homes in the next decade*. [Online]. Available from https://www.london.gov.uk/mayor-launches-major-new-programme-convert-private-housing-council-homes-aim-10000-additional#.

Mazzucato, M. (2013). *The Entrepreneurial State: Debunking Public vs. Private Sector Myths*. Anthem Press.

Mazzucato, M. (2018). *The Value of Everything: Making and Taking in the Global Economy.* Allen Lane.

Mazzucato, M. (2020). *Mission-oriented public procurement: Lessons from international examples*. UCL Institute for Innovation and Public Purpose, Policy Report (IIPP WP 2020-20). Available from: https://www.ucl.ac.uk/bartlett/public-purpose/wp2020-20.

Mazzucato, M. (2021). *Mission Economy: A Moonshot Guide to Changing Capitalism*. Allen Lane.

Mazzucato, M. (2022). *Rethinking the social contract between the state and business: A new approach to industrial strategy with conditionalities.* UCL Institute for Innovation and Public Purpose, Working Paper Series (IIPP WP 2022-18). Available from: https://www.ucl.ac.uk/bartlett/publicpurpose/wp2022-18.

Mazzucato, M. (2023). *Governing the economics of the common good: from correcting market failures to shaping collective goals*. UCL Institute for Innovation and Public Purpose, Working Paper Series (IIPP WP 2023-08). Available from: https://www.ucl.ac.uk/bartlett/public-purpose/wp2023-08.

Mazzucato, M. and Collington, R. (2023). *The Big Con: How the Consulting Industry Weakens Our Businesses, Infantilizes our Governments and Warps our Economies*. Allen Lane.

Mazzucato, M. and Farha, L. (2023). *The right to housing: A mission-oriented and human rights-based approach*. Council on Urban Initiatives (CUI WP 2023-01). UCL Institute for Innovation and Public Purpose, Working Paper Series (IIPP WP 2023-07). Available from: https://www.ucl.ac.uk/bartlett/public-purpose/publications/2023/may/right-housing-mission-oriented-and-human-rights-based-approach.

Mazzucato, M. and Rodrik, D. (2023). *Industrial Policy with Conditionalities: A Taxonomy and Sample Cases*. UCL Institute for Innovation and Public Purpose, Working Paper Series (IIPP WP 2023-07). Available from: https://www.ucl.ac.uk/bartlett/publicpurpose/wp2023-07.

Michaux, S. (2021). *Assessment of the Extra Capacity Required of Alternative Energy Electrical Power Systems to Completely Replace Fossil Fuels*. Geological Survey of Finland Open File Work, Report 42/2021. Available from: https://tupa.gtk.fi/raportti/arkisto/42_2021.pdf.

Miller, W. (2017). Why bad housing design pumps up power prices for everyone. *The Conversation*, 3 January 2017. Available from: https://theconversation.com/why-bad-housing-design-pumps-up-power-prices-for-everyone-22651.

Mora, C., Dousset, B., Caldwell, I. et al. (2017). Global risk of deadly heat. *Nature Climate Change*, 7, 501–506 (2017). Available from: https://doi.org/10.1038/nclimate3322.

Morrison, T. quoted in Needham, A. (2015)., Toni Morrison: We used to be called citizens. Now we're called taxpayers. *The Guardian*, 5 October 2015. Available from: https://www.theguardian.com/books/2015/oct/05/toni-morrison-writing-race-media-new-yorker-festival [Accessed 5 June 2023].

National Energy Action. (2023). *Fuel poverty charity reveals 45 people per day die from cold homes. 20 January 2023*. Available from: https://www.nea.org.uk/news/fuel-poverty-charity-reveals-45-people-per-day-die-from-cold-homes/.

Neate, R. (2015). Scandal of Europe's 11m empty homes. *The Guardian*, 23 February 2014. Available from: https://www.theguardian.com/society/2014/feb/23/europe-11m-empty-properties-enough-house-homeless-continent-twice.

Nelson, R. (1977). *The Moon and the Ghetto*. W. W. Norton & Company.

Nursey-Bray, M., Palmer, R., Smith, T.F. and Rist, P. (2019). Old ways for new days: Australian Indigenous peoples and climate change. *Local Environment*, 24:5, 473-486.

O'Connor, J. (2024). *Culture is not an Industry*. Manchester University Press.

Peacock, A. (2023). Municipal waste used to form low-carbon brick for Design Museum Gent extension. *Dezeen*, 19 January 2023. Available from: https://www.dezeen.com/2023/01/19/gent-waste-brick-design-museum-extension/ [Accessed 22 October 2023].

Perucca, J., Freeman, S. and Farha, L. (2023). The True Cost of Financialization: Housing, Human Rights, and Climate Change. *Journal of City Climate Policy and Economy*, 2023 2:1, 20-36.

Plumwood, V. (2008). Shadow Places and the Politics of Dwelling. *Ecological Humanities*, Issue 44, March 2008.

Purchase CK et al. (2021). Circular Economy of Construction and Demolition Waste: A Literature Review on Lessons, Challenges, and Benefits. *Materials* (Basel). 23 December 2021;15(1):76.

Pooler, M. (2023). 'Green steel': the race to clean up one of the world's dirtiest industries. *Financial Times*, 15 February 2021. Available from: https://www.ft.com/content/46d4727c-761d-43ee-8084-ee46edba491a [Accessed 22 October 2023].

Power, J. (2022). The architect setting an example in the suburbs with her award-winning home: Architecture shouldn't be only for the elite, says the new national president of the Australian Institute of Architects. *Sydney Morning Herald*, 8 July 2022. Available from: https://www.smh.com.au/national/the-architect-setting-an-example-in-the-suburbs-with-her-award-winning-home-20220704-p5ayx7.html.

Purchase, C. K. et al. (2021). Circular Economy of Construction and Demolition Waste: A Literature Review on Lessons, Challenges, and Benefits. *Materials* (Basel), 15(1):76. Available from: https://doi.org/10.3390/ma15010076.

Purves, A. (2023). Singapore's Imminent Expiration of Land Leases: From Growth and Equality to Discontent and Inequality? *Tijdschrift voor economische en sociale geografie*. Available from: https://doi.org/10.1111/tesg.12547.

Rand, A. (1943). *The Fountainhead*. Bobbs Merrill.

Rasmussen, L. and Nanavatty, R. (2023). Really cool roofs: How breakthrough materials can save lives, carbon, and money in a warming world. *Third Derivative*, 18 October 2023. Available from: https://www.third-derivative.org/blog/really-cool-roofs-how-breakthrough-materials-can-save

Reece, N. (2019). Spreadsheets in the sky are putting Melbourne's liveability at risk. *The Age*, 5 December 2019. Available from https://www.theage.com.au/national/victoria/spreadsheets-in-the-sky-are-putting-melbourne-s-liveability-at-risk-20191203-p53gek.html.

Renell, A. (Ed.). (2023). *Huussi – Death to the flushing toilet*. Arvinius + Orfeus Publishing.

Robertson, H. (2019). Caring for Country: how remote communities are building on payment for ecosystem services. *The Conversation*, 17 June 2019. Available from: https://theconversation.com/caring-for-country-how-remote-communities-are-building-on-payment-for-ecosystem-services-116737 [Accessed 19 October 2023].

Stanley Robinson, K. (2020). *The Ministry for the Future*. Orbit Books.

Röck, M. et al. (2020). Embodied GHG emissions of buildings – The hidden challenge for effective climate change mitigation. *Applied Energy*, 258, 2020, 114107. Available from: https://doi.org/10.1016/j.apenergy.2019.114107.

Ruby, I., Ruby, A., Kries, M., Müller, M. and Niggli, D. (Eds.). (2017), *Together! The New Architecture of the Collective*. Vitra Design Museum.

Ryan-Collins, R. (2017). *Why Can't You Afford a Home?* Wiley.

Ryan-Collins, J., Lloyd, T. and MacFarlane, L. (2017). *Rethinking the Economics of Land and Housing*. Bloomsbury.

Saheb, Y. (2022a). Architecture "'lagging behind all other sectors"' in climate change fight says IPCC report author. Interviewed by Jennifer Hahn. *Dezeen* 6 April 2022. Available from: https://www.dezeen.com/2022/04/06/ipcc-climate-change-mitigation-report/ [Accessed 5 June 2023].

Saheb, Y. (2022b). IPCC report paints damning portrait of architecture: Our buildings are 'wrongly designed'. Interview by Elissaveta M. Brandon. *Fast Company*, 4 August 2022. Available from: https://www.fastcompany.com/90739228/ipcc-report-paints-damning-portrait-of-architecture-our-buildings-are-wrongly-designed. [Accessed 5 June 2023].

Samuel, F. (2023). *Housing for Hope and Wellbeing*. Routledge.

Sassen, S. (2013). Does the City Have Speech? *Public Culture*, 25 (270): 209–221.

Sawin, E. (2018). The Magic of 'Multisolving'. *Stanford Social Innovation Review*. Available from: https://doi.org/10.48558/W5D4-6430.

Schwartz, Y., Raslan, R. and, Mumovic, D., (2022). Refurbish or replace? The Life Cycle Carbon Footprint and Life Cycle Cost of Refurbished and New Residential Archetype Buildings in London. *Energy*, Volume 248: 123585.

Shaw, K. S. and Hagemans, I. W. (2015). 'Gentrification Without Displacement' and the Consequent Loss of Place: The Effects of Class Transition on Low-income Residents of Secure Housing in Gentrifying Areas. *International Journal of Urban and Regional Research*, 39: 323-341.

Sendra, P. and Sennett, R. (2022). *Designing Disorder: Experiments and Disruptions in the City*. London: Verso.

Sennett, R. (2012). *Together: The Rituals, Pleasures and Politics of Cooperation*. Yale University Press.

Sennett, R. (2019). *Building and Dwelling: Ethics for the City*. Penguin Press.

Shinohara, Y. and Ruby, A. (Eds.). (2023). *Make Do With Now: New Directions in Japanese Architecture*. Swiss Architecture Museum/Christoph Merian Verlag.

Shire, W. (2011). *Teaching My Mother How to Give Birth*. Flipped Eye.

Shoup, D. (2011). *The High Cost of Free Parking*. Routledge.

Smithson, A. and Smithson, P. (1990). The 'As Found' and the 'Found'. In: D. Robbins (Ed.). (2018). *The Independent Group: Postwar Britain and the Aesthetics of Plenty*. The MIT Press.

Solnit, R. (2023). What if climate change meant not doom – but abundance? *The Washington Post*, 15 March 2023. Available from: https://www.washingtonpost.com/opinions/2023/03/15/rebecca-solnit-climate-change-wealth-abundance/ [Accessed 5 June 2023].

Spring, E. (2021). Breathing life into Vindmøllebakken, co-living homes in Norway. *Assemble Papers*, 3 February 2021. Available from: https://assemblepapers.com.au/2021/02/03/living-infrastructure/.

Stenberg, E. (2013). *Structural Systems of the Million Program Era*. KTH Arkitekterskolan, Stockholm.

Sullivan, W. (2022). Spain Restricts Use of Air Conditioning in Public Places. *Smithsonian Magazine*, 8 August 2022.

Swanson, A. (2015). How China used more cement in 3 years than the U.S. did in the entire 20th Century. *Washington Post*, 24 March 2015.

Taiwan Sugar Corporation. (2021). *Taisugar Circular Village in Shalun, Tainan*. [Online]. Available from https://www.taisugar.com.tw/circular/english/CP2.aspx?n=12428.

Tabassum, M. (2020). *Khudi Bari housing*. [Online]. Available from: https://marinatabassumarchitects.com/khudi-bari.

Thackara, J. (2005). *In the Bubble: Designing in a Complex World*. MIT Press.

Thompson, D. (2020). Why Manhattan's Skyscrapers Are Empty. *The Atlantic*, 16 January 2020. Available from: https://www.theatlantic.com/ideas/archive/2020/01/american-housing-has-gone-insane/605005/.

Turner, J. (1967). Quoted by Alex Lifschutz in: Introduction Long Life, Loose Fit, Low Energy. In Lifschutz, A. (Ed.). (2017). Loose-Fit Architecture: Designing Buildings for Change. *Architectural Design*, September/October 2017, Profile 249, Volume 87(No 5). Wiley.

UCL Institute for Innovation and Public Purpose (2023). *Mission-led procurement: Early insights from exploratory work in Camden*. UCL Institute for Innovation and Public Purpose, Policy Report No. 2023/01. Available from: https://www.ucl.ac.uk/bartlett/public-purpose/2023-01.

UNEP. (2022a). *Global Status Report for Buildings and Construction: Towards a Zero-emission, Efficient and Resilient Buildings and Construction Sector*. UNEP, Nairobi.

UNEP. (2022b). *Sand and sustainability: 10 strategic recommendations to avert a crisis*. GRID-Geneva, United Nations Environment Programme, Geneva, Switzerland.

UNEP. (2023). *The problem with our dwindling sand reserves*. 5 February 2023. Available from: https://www.unep.org/news-and-stories/story/problem-our-dwindling-sand-reserves. [Accessed 23 October 2023].

UN-Habitat. (2022). *Housing Rights*. [Online]. Available from: https://unhabitat.org/programme/housing-rights.

United Nations. (2019). *The Sustainable Development Goals Report*. Available from: https://unstats.un.org/sdgs/report/2019/The-Sustainable-Development-Goals-Report-2019.pdf [Accessed 3 June 2023].

United Nations Human Rights Council. (2017). Report of the Special Rapporteur on Adequate Housing as a Component of the Right to an Adequate Standard of Living, and on the Right to Non-Discrimination in This Context: note/by the Secretariat. *United Nations General Assembly Human Rights Council, Thirty-fourth session*, 18 January 2017. Agenda item 3, A/HRC/34/51. Available from: https://digitallibrary.un.org/record/861179.

Urban Radicals. (2023). *A Brick for Venice*. [Online]. Available from: https://urbanradicals.com/project/a-brick-for-venice/.

Wakabayashi, D. and Fu, C. (2023). Once a Symbol of China's Growth, Now a Sign of a Housing Crisis. *New York Times*, 25 May 2023.

Ward, C. (1990). *Talking Houses: Ten Lectures*. Freedom Press.

Watson, J. (2019). Lo-TEK: *Design by Radical Indigenism*. Taschen, Cologne.

Watson, S. D., Lomas, K. J., Buswell, R. A. (2019). Decarbonising domestic heating: What is the peak GB demand? *Energy Policy*, Volume 126, 2019, Pages 533-544, Available from: https://doi.org/10.1016/j.enpol.2018.11.001.

Watts, J. (2019). Concrete: the most destructive material on Earth. *The Guardian*, 25 February 2019.

Wigley, M. (2021). In: Space Caviar (Eds.). (2021). *Non-Extractive Architecture: On Designing Without Depletion*. Sternberg Press/MIT Press.

Willis, C. (1995). *Form Follows Finance: Skyscrapers and Skylines in New York and Chicago*. Princeton Architectural Press.

Wong, N., Gittelsohn, J., Sidders, J. and Kwan, S. (2023). The World's Empty Office Buildings Have Become a Debt Time Bomb. *Bloomberg*, 23 June 2023. Available from: https://www.bloomberg.com/news/articles/2023-06-23/commercial-real-estate-reset-is-causing-distress-from-san-francisco-to-hong-kong.

WWF. (2018). *Uncovering sand mining's impacts on the world's rivers*. 24 April 2018. Available from: https://www.wwf.mg/?333451/Uncovering-sand-minings-impacts-on-the-worlds-rivers.

Yao, X., Dewancker, B., Guo, Y., Han, S. and Xu, J. (2020). Study on Passive Ventilation and Cooling Strategies for Cold Lanes and Courtyard Houses – A Case Study of Rural Traditional Village in Shaanxi, China. *Sustainability* 2020, 12, 8687. Available from: https://doi.org/10.3390/su12208687.

Zhang, L., Wu, J. and Liu, H. (2018). Policies to enhance the drivers of green housing development in China. *Energy Policy*, 121, 225-235. Available from: https://doi.org/10.1016/j.enpol.2018.06.029.

Zuboff, S. (2018). *The Age of Surveillance Capitalism*. Profile Books.

zu Ermgassen, S. et al. (2022). A home for all within planetary boundaries: Pathways for meeting England's housing needs without transgressing national climate and biodiversity goals. *Ecological Economics*, Volume 201, 107562.

Endnotes

1 See: http://www.laborda.coop/en/

2 See: https://sostrecivic.coop/en/

3 See: https://www.wikihouse.cc/product

4 See also examples of other emerging Japanese architectural practices collected in Shinohara and Ruby (2023). Japan, home to a tradition of architectural innovation and advanced 'slowdown' dynamics (Dorling, 2020), is likely to demonstrate leading-edge examples of these new forms of practice. For a broader discussion, see Hill (2023a). Further Japanese circular systems innovation is being explored by the project Circular Design Praxis. Available from: https://www.circulardesignpraxis.org/

5 IBA evolved from Weisssenhofseidlung for Deutscher Werkbund in Stuttgart (1927) to Interbau '57 in Berlin (1957) to the many Internationale Bauausstellung examples (from Berlin 1979 onwards). Available from: https://www.internationale-bauausstellungen.de/ Related examples include Malmö's Bo01 'City of Tomorrow' Expo (2001). See Förster, W. and Mekning W. (Eds.). (2018). The Vienna Model 2: Housing for the 21st century city. Jovis.

6 For example, the documentary Push (2023), directed by Fredrik Gertten and featuring Leilani Farha. Available from: https://www.pushthefilm.com/about/.

7 For some further pointers: Hyde (2012); and Harriss et al. (2021).

8 It is estimated that 80 per cent of all product-related environmental impacts are determined during the design phase of a product (Thackara, 2005).

9 See: https://www.nightingalehousing.org/approach/principles#red.

10 In a Nordic context this is known as "public luxury" (ArkDes, 2019).

11 See: https://design.hel.fi/en/design-stories/central-library-oodi/.

12 See: http://www.participatorycity.org/14-design-principles-for-inclusive-participation.

13 Documented in the Museum of Modern Art exhibitions Latin American Architecture since 1945 (1955) and Latin America in Construction: Architecture 1955–1980 (2015).

14 Reduction Roadmap numbers have been updated since publication, because since releasing the Roadmap 1.0 in September 2022 the global carbon budget has been halved.

15 The numbers for the UK are even more challenging, with the RIBA 2030 Climate Challenge (Available from: https://www.architecture.com/about/policy/climate-action/2030-climate-challenge) noting that "business as usual" for UK domestic new-build is 1200 kg CO_2eq/m² – almost three times that of Denmark's average – so the challenge to halve that (to 625 kg CO_2eq/m²) simply leaves the UK goal 50 per cent above Denmark's business-as-usual starting point.

16 Similar research finds that, overall, Denmark is only "4 per cent circular" (Circle Economy, 2023).

17 Green Star ratings are the Green Building Council of Australia's sustainability rating and certification system for buildings. International equivalents would include LEED rating system from the US Green Building Council, BREEAM in the UK, or Eurocode across much of Europe.

18 See: https://www.habitatforhumanity.org.uk/emptyspacestoolkit/.

19 See: https://www.claybens.com

20 See: https://rotordc.com

21 See: https://www.varvsstaden.se/materialbanken

22 See: https://civic-ai.org/

23 Olkola Aboriginal Corporation, in partnership with the University of Melbourne, Centre for Appropriate Technology, Arup, Kerstin Thompson Architects, Six Degrees Architects and a further team of volunteers.

24 See: https://new-european-bauhaus.europa.eu/about/about-initiative_en [Accessed 28 May 2022].

25 These principles build upon and extend the 'slowing, closing and narrowing' principles of (Bocken, 2016).

COUNCIL ON
URBAN
INITIATIVES

The Council on Urban Initiatives is a research and advocacy platform supporting international, national and local actors to deliver transformative shifts towards a better urban future. The council's work is centred on three interrelated themes: environmental sustainability (the green city), health and well-being (the healthy city) and social justice (the just city). Co-organised by UN-Habitat, UCL Institute for Innovation and Public Purpose (IIPP) and LSE Cities, the council comprises of mayors, academics and practitioners, and is co-chaired by Ricky Burdett (LSE) and Mariana Mazzucato (IIPP).

Organising Partners

UN HABITAT
FOR A BETTER URBAN FUTURE

The UN-Habitat's vision of "a better quality of life for all in an urbanizing world" is bold and ambitious. UN-Habitat works with partners to build inclusive, safe, resilient and sustainable cities and communities. UN-Habitat collaborates with governments, intergovernmental, UN agencies, civil society organizations, foundations, academic institutions and the private sector to achieve enduring results in addressing the challenges of urbanization.

UCL IIPP Institute for Innovation and Public Purpose

The UCL Institute for Innovation and Public Purpose (IIPP) aims to develop a new framework for creating, nurturing and evaluating public value in order to achieve economic growth that is more innovation-led, inclusive and sustainable. We intend this framework to inform the debate about the direction of economic growth and the use of mission-oriented policies to confront social and technological problems. Our work will feed into innovation and industrial policy, financial reform, institutional change, and sustainable development.

LSE Cities

LSE Cities is an international centre that investigates the complexities of the contemporary city. It carries out research, graduate and executive education, outreach and advisory activities in London and abroad. Extending LSE's century-old commitment to the understanding of urban society, LSE Cities investigates how complex urban systems are responding to the pressures of growth, change and globalisation with new infrastructures of design and governance that both complement and threaten social equity and environmental sustainability.

Knowledge Partner

Impact on Urban Health

Impact on Urban Health is a place-based funder, focused on improving health in inner-city areas by understanding and changing how inequalities impact our health. Rooted in the London boroughs of Lambeth and Southwark, some of the most diverse areas in the world, it invests, tests and builds understanding of how cities can be shaped to support better health. Impact on Urban Health is committed to achieving health equity by helping urban areas become healthier places for everyone to live.