TOMORROW'S TOO LATE:

Presenting the case for Regenerative Decarbonisation in build to rent developments in Australia; the frameworks for it to be achieved, and the arguments for why we have no time to waste.

October 2023

Acknowledgement of Country

We acknowledge the Traditional Owners of Country throughout Australia and the stories, traditions, and living cultures of Aboriginal and Torres Strait Islander peoples. We recognise their continuing connection to land and waters, and we pay our respects to elders past and present.

Disclaimer

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Foreword and Acknowledgements

In the unfolding narrative of human progress, our ability to work together is not just a highlight; it's a cornerstone. We're social creatures by nature and by design, a trait that has been refined over millennia. As Yuval Noah Harari would say, it's our shared stories, myths, and ability to cooperate that have enabled us to build civilisations, map the human genome, and reach for the stars. But beyond that, it's our unparalleled problem-solving abilities that give us the confidence to tackle even the most daunting of challenges, such as the climate crisis.

This white paper is a small part of that larger story. It's the result of teamwork—a collaboration with the Property Council of Australia's Sustainable Development Committee, Australia's new purpose-first build to rent group Model, and the industry mavens, pioneers, leaders and innovators listed below. These organisations and individuals have not just contributed resources; they've given this work a shared purpose as we reach for a post-carbon future that's enduring, equitable and just.

A heartfelt thank you to everyone who has lent their experience, expertise and insights. Your contributions have been more than just valuable; they've been transformative, elevating the discourse and shaping our collective path forward.

As you turn the pages of this paper, realise that the pen is now in your hands. The next chapter is yours to write. We invite you to join us on this collective journey toward a more sustainable future, a journey that, with your participation, could be a defining moment for us all.

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“It’s time to wake up and step up. It’s time to rebuild trust based on climate justice. It’s time to accelerate the just transition to a green economy.”

“There is simply too much at stake for us to be silent. There is too much at risk for us to sit on the side-lines. Now must be the time for ambition and action. The planet can’t wait.”

António Guterres
UNITED NATIONS SECRETARY-GENERAL
15th June 2023

EXECUTIVE SUMMARY

The purpose of this white paper is to make a business, societal, and ecological case for Regenerative Decarbonisation in the Build-to-Rent (BTR) sector in Australia and beyond. We began this intellectual journey with a simple question: "Is it too expensive to build sustainably?" After exhaustive research and enlightening conversations with thought leaders across the development supply chain, the answer we arrived at is not just clear, but also compelling: "It's too expensive not to."

We find ourselves at a moment of historical significance, a juncture that echoes the transformative energy of the Industrial Revolution. Yet, this is not a revolution but a 'Great Transition,' a shift towards a net zero future that is both urgent and inevitable. The climate emergency is not a distant threat but a present reality, demanding immediate action. Policy changes are not gradual but rapid, and there is a coming tidal wave of net zero capital that is not just available but eager to be deployed. In this landscape of urgency and opportunity, the BTR sector emerges as a beacon.

The traditional rental market in Australia is not just flawed but fundamentally broken, compromising both the well-being of its renters and the health of our planet. The BTR model, although in its infancy in Australia, offers a vision of what housing can be—tenant-centric, amenity-rich, and deeply sustainable. With the Federal Government's legislated climate targets and a new generation of consumers who demand more than just a roof over their heads, BTR becomes not just viable but vital.

Regenerative Decarbonisation is not a buzzword but a philosophy, a holistic approach to building that goes beyond the superficiality of green aesthetics. It is a commitment to enhancing both environmental and community well-being, a promise to leave the world better than we found it. The BTR sector has the potential to be the standard-bearer for this philosophy, setting new benchmarks in operational and embodied carbon reduction, waste minimisation, and biodiversity conservation and restoration. It has the power to influence not just the broader housing market but the very fabric of Australian society.

The economic case for embracing innovative sustainable approaches is compelling. As evidenced by the Australian commercial office market, these approaches not only reduce operating costs and improve occupant wellbeing but also increase asset value through higher multiples while reducing long term investor risks.[1] This creates a win-win scenario for policymakers, investors, and developers alike. With supportive policy settings and by adopting Regenerative Decarbonisation strategies, the BTR sector can attract a new wave of net zero capital that is not just available but eager to be deployed.

In summary, the BTR sector stands at the cusp of something monumental. Using the framework of Regenerative Decarbonisation outlined in this paper, it has the potential to be a market innovator in sustainable design, construction and living, responding to the clarion calls for climate action, the swift shifts in policy, and the evolving demands of a conscious consumer. It offers not just a pathway, but a blueprint to exceed Australia's legislated 2030 targets and 2050 net zero emissions.

In a world crying out for change, this paper hopes to offer a vision of what that change could look like—a sustainable, equitable, and regenerative future for all.

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I. MARKET OVERVIEW

1. Current Status

31% of Australian households rent according to the Australian Bureau of Statistics (ABS) which equates to approximately 7,000,000 people.[2] The rental property market is traditionally very fragmented, involving a range of players from institutional developers to small-scale, single-project operators. New apartments are generally sold off the plan to small-scale investors who then rent them out, typically aiming for long-term capital appreciation while tolerating yields of around 2-4%. This results in the vast majority of Australian renters experiencing non-professionally managed housing.

The supply of new housing, particularly apartments has been well below historical averages with the number of homes delivered in 2022 only 20% of what was delivered in 2018. The National Housing Finance and Investment Corporation (NHFIC) recently estimated that Australia currently has a housing shortfall of 106,000 dwellings.[3] With the cost of construction having increased by 20-30% over the past 18 months, and investors' ability to borrow funds reduced by 30-40% it's very difficult for build to sell apartments to make economic sense.

Net migration in Australia has rebounded rapidly post covid with an estimated 400,000 new arrivals in 2023.[4] This is set to continue with **Australia's population forecast to reach 38.4 million by 2060** based on the government's recent Intergenerational Report which is an annual population growth of approximately 360,000.[5] Based on the ABS' average household size of 2.4 persons we'll need another 150,000 homes each year between now and 2060.

In the Australian rental market, apartments are usually owned via strata title. The buildings are managed by a body corporate, which often lacks effective oversight. This governance model has implications for the quality of life for renters and the long-term sustainability of the rental market.

This supply short fall and increasing demand has resulted in some of the lowest vacancy rates in history and is resulting in rents increasing at double digit rates in many cities. With the inability for build to sell developments to make up the supply short fall a new approach is needed.

2. Broader Context

Our low performance homes

Australia has some of the worst-performing homes in terms of energy efficiency among OECD countries. Often described as 'glorified tents', these homes are far from ideal living spaces. Shockingly, the majority of Australian homes fall outside the World Health Organisation's health limits for temperature and humidity, but the situation is even graver for rentals. A staggering 80% of rental homes are either too cold and damp in winter or too hot in summer, posing serious health risks for their inhabitants.[6]

Issues with renting in Australia

The fabric of society is not made of isolated threads but a complex tapestry of interwoven lives and experiences. The rental market, often considered a mere transactional space, is indeed a microcosm of this social fabric. Yet, it's a fabric that's fraying at the edges, marred by issues that go beyond mere inconvenience to touch upon the existential anxieties of modern life.

Tenure insecurity

The notion of 'home' is deeply entwined with our sense of security and belonging. Yet, for many renters, this sanctuary is tainted by the looming shadow of instability. The fear of sudden eviction, skyrocketing rents, or the property being sold out from under them creates a perpetual state of unease. This insecurity is not just emotional but also financial, given the high costs and stress associated with moving. Moreover, this transience undermines the formation of meaningful community ties, leaving renters feeling like perpetual outsiders in their own neighbourhoods.

Limited availability

The quest for a rental home often resembles a modern-day odyssey, fraught with obstacles that range from limited supply to financial constraints. The struggle to find a suitable home is not just a logistical challenge but a deeply personal one, affecting one's quality of life and long-term well-being.[7]

Poor rental quality

The walls of a home should offer more than just shelter; they should provide a sanctuary that nurtures both physical and mental well-being. Yet, many rental properties fall woefully short of this ideal. Poor insulation and ventilation not only make these homes uncomfortable but also breeding grounds for illness and disproportionately large emitters of greenhouse gas emissions. The absence of quiet, safe, and secure spaces further erodes the mental well-being of renters. Add to this the thermal inefficiency that inflates utility bills, and you have a recipe for a life of constant stress and discomfort.

Inadequate maintenance support

In a well-functioning rental market, the relationship between landlords and tenants should resemble a partnership rather than a power struggle. Unfortunately, the reality is often far from this ideal. Tenants find themselves hamstrung by their limited ability to make repairs and the general unwillingness of landlords to invest in maintenance. This power imbalance is exacerbated by property managers who treat tenants' needs as an afterthought rather than a priority. The result is a cycle of delayed or ignored repairs, leaving tenants feeling disempowered and neglected.

In summary, the issues plaguing the rental market are not mere inconveniences but symptoms of deeper systemic failures. They reflect a market that has lost sight of its human element, focusing instead on short-term gains at the expense of long-term well-being.

It's a situation that calls not just for reform but for a complete re-imagining of what the rental market should and could be.

3. Emergence of Build to Rent

What is Build to Rent?

Build to rent (BTR) is an emerging housing model in Australia, contrasting the traditional 'build to sell' approach. In BTR, developers construct, own, and manage apartment complexes, often with institutional backing. This model has been prevalent in Europe, making up nearly 23% of the commercial market as of early 2020.[8] In Australia, the sector is nascent but growing, with approximately 23,000 BTR apartments either, or 0.2% of the entire housing market, open or in the development pipeline as of 2023.[9]

Global comparisons

The BTR sector varies significantly across different countries. In the United States, as of 2021, 12% of the housing stock was multi-family or build to rent properties.[10] By contrast, the United Kingdom, which is considered to be 5-10 years ahead of Australia in this sector, had 5.4% of housing stock in the build-to-rent market as of 2022.[11]

Benefits for tenants

BTR offers several advantages to tenants:

Flexible leases: Tenants can enjoy longer lease terms with capped price increases and more freedom to personalise their living spaces.

Security of tenure: The BTR model aims to provide tenants with stability, addressing the frequent moves and uncertainties commonly experienced in traditional rental markets.

Amenity-rich living: BTR properties often feature a range of amenities such as pools, gyms, co-working spaces, and even cinemas, which focus on enhancing the tenant experience.

In summary, the BTR model is poised to redefine the Australian rental market by offering a more tenant-centric approach, complete with flexible leases, enhanced amenities, and potentially more affordable housing options.

Potential market size

The current value of Australia's BTR market is $16 billion according to research conducted by EY for the Property Council of Australia. Using the UK market penetration figures of 5.4% of housing stock, it's not unrealistic to estimate that the number of BTR apartments in Australia in the next 5-7 years will be 350,000 with a market value of $290 billion.

4. Challenges and Opportunities

Housing crisis

Australia's housing crisis is a multifaceted issue that has been brewing for years, affecting both urban and rural communities across the country. The crisis manifests in various ways, from skyrocketing property prices and rental rates to a lack of affordable housing options, contributing to a widening gap between the haves and have-nots.

Unaffordable housing

One of the most glaring aspects of the crisis is the sheer unaffordability of housing. In major cities like Sydney and Melbourne, property prices have soared to levels that are out of reach for the average Australian. This has led to a situation where home-ownership, once a cornerstone of the Australian dream, is increasingly becoming a distant aspiration for many, particularly younger generations.

Rental market strain

The rental market is no less strained. With property prices high, more people are forced into the rental market, driving up demand and, consequently, rental prices. This has led to a situation where even renting a modest home can consume a significant portion of one's income, leaving little for other essential expenses.

Homelessness and insecurity

The crisis has also exacerbated homelessness and housing insecurity. The lack of affordable options means that those on lower incomes or facing financial hardships are at a higher risk of homelessness. Even those who manage to secure rental accommodation often face issues like tenure insecurity, poor housing conditions, and unresponsive landlords.

Economic and social impact

The housing crisis is not just a matter of bricks and mortar; it has broader economic and social implications. The strain on the housing market impacts consumer spending, contributes to rising levels of debt, and exacerbates social inequalities. Moreover, the crisis affects community cohesion, as the constant churn of residents in high-turnover rental properties undermines the formation of stable, long-term neighbourhood communities.

Opportunity for BTR

The BTR "renter-first" approach is a paradigm shift in the Australian market. This approach not only focusses on the needs of tenants, it also delivers on the needs of the owner, creating a true win-win. This alignment of interests, with the right approach, can extend to all stakeholders, including the environment and the local community. This means BTR can demonstrate a new way to live for Australian households.

Clean Energy Finance Corporation (CEFC) Director Sara Thomas says that "Australia will follow global projections of doubling the floor space required between now and 2060." A better approach will have a transformative impact.

BTR allows institutional investors to take advantage of this phenomenal growth and transition into BTR, while giving entrepreneurial developers the opportunity to build meaningful businesses. Unlike the traditional residential market, which is often short-term focused, BTR has the potential to emphasise sustainability, whole-life cycle considerations, and resilience. This requires a long-term asset ownership mindset, allowing for more pointed sustainability outcomes along-side safe, secure and healthy homes for Australians.

Aspirational institutional-calibre managers are expected to drive change across the industry. This transformation will initially affect high-end BTR apartments but will quickly cascade down to individual homes. The sector has the potential to lead the industry and drive meaningful change for all Australians.

II. INTRODUCING REGENERATIVE DECARBONISATION

1. Concept Overview

Explanation of decarbonisation

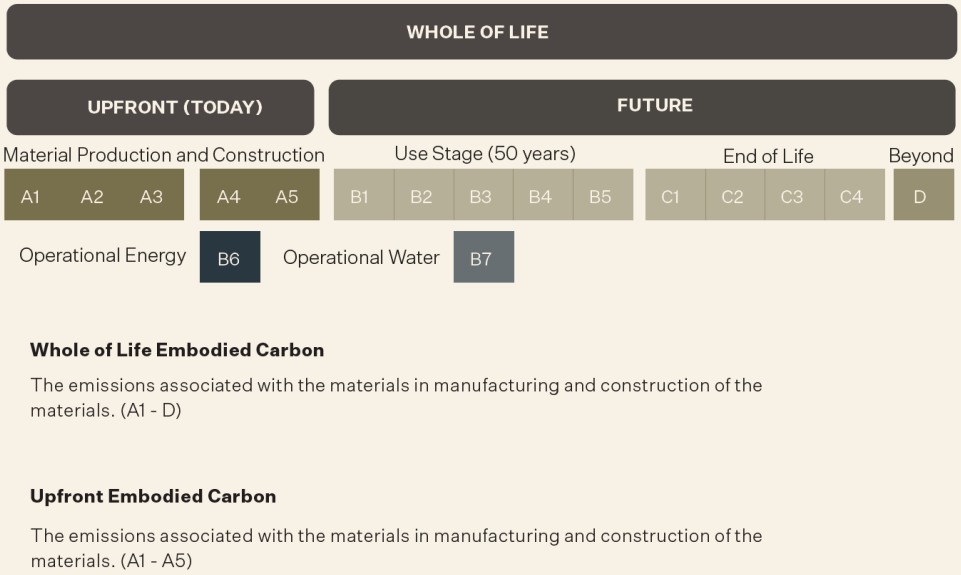
Decarbonisation in the context of buildings involves reducing emissions both in the way we use buildings (operational carbon) and in the building materials themselves (embodied carbon). The key to effective decarbonisation strategies lies in understanding the timing of emissions. Immediate solutions are crucial as climate change is a pressing issue we face today, not in 50 years.

Understanding the life cycle stages of a building is vital for identifying opportunities to reduce emissions both now and in the future. Typically, there are five life cycle stages to consider:

1. **Product manufacturing:** this stage involves the creation of materials that will be used in the construction of the building.
2. **Construction:** this is the phase where the building is constructed, involving various types of labour and machinery.
3. **Use:** this stage refers to the operational phase where the building is in use, requiring energy for heating, cooling, and other functions.
4. **End of life:** this involves the decommissioning or demolition of the building, and the disposal or recycling of materials.

5. **Beyond the life cycle:** this stage considers the long-term impact of the building, including its materials and energy usage, beyond its functional life.

Framework for carbon reduction across a building's life cycle



Source: Warren and Mahoney / EN 15978

The Federal Government's stated goal is to transition to an 82% renewable grid by 2030,[12] up from the current 38%, to further facilitate the decarbonisation process. By many estimates, we are far from on track to reach this target, which only amplifies the need for urgency to decarbonise the economy.

Explanation of regenerative development

Regenerative development is a transformative approach that goes beyond merely minimising negative impacts to actively enhancing positive outcomes for both the environment and communities. Regenerative development is defined by Laura Hamilton-O'Hara, CEO of the Living Future Institute Australia, as "leaving things better than you found them at every single level and intervention in the system. All the way from design, construction, and operations through to end of life."

As Davina Rooney CEO, Green Building Council of Australia (GBCA) aptly explains, "We're in a biodiversity and climate crisis simultaneously and we need a whole systems approach to find a solution."

This development model could manifest in various ways—be it carbon-positive designs, habitat restoration that boosts biodiversity, or community-centric projects that foster well-being, economic growth, and a just transition for workers. The essence of regenerative development lies in its systems-thinking approach, which

aims to harmonise social, environmental, and economic ecosystems through thoughtful design.

The concept of sustainability often implies a state of stability, but it falls short of addressing the significant damage already inflicted upon our planet. Regenerative design and development, on the other hand, positions humans as co-creative and mutually evolving participants in an ecosystem, not just in a built environment. The International Living Future Institute's Living Building Challenge exemplifies this by encouraging developers and designers to aim for the highest levels of holistic and regenerative design.

Introducing Regenerative Decarbonisation

Put simply, Regenerative Decarbonisation is about taking a whole-of-systems approach to decarbonising the built form. It refers to the interconnected aspects related to decarbonisation, including biodiversity loss, modern slavery, living wages, and health and well-being, alongside reductions in operational and embodied carbon as we move to a net zero future. It is not about looking at decarbonisation in a silo but ensuring that the approach has a net positive impact by looking at the problem through the lens of an ecosystem.

2. Climate change and the built environment

Climate change – the latest science

In a speech at the Investment Group on Climate Change in Sydney on 21st August 2023, Australia's Mark Howden, Vice Chair of the IPCC gave a stark wake-up call for how bad the reality on climate science is:

- **Warmest year on record:** the planet is experiencing unprecedented warming with July an order of magnitude warmer than previous years on record. This isn't just a little bit warmer. It's akin to running the 100m dash in 6 seconds!
- **Massive challenge or opportunity:** the severity of the situation depends on our response – either good or bad. To limit warming to 1.5 degrees we need to get to net zero by 2038, a whole 12 years earlier than thought when the Paris commitments were made in 2015.
- **Intergenerational inequality:** future generations will face increased risks from climate change, with children born today inheriting a world that could be greater than 4 degrees warmer.
- **Extreme events:** risks for floods and droughts are increasing faster than models predicted.
- **Climate adaptation:** adaptation strategies are becoming less effective as the climate continues to change.

- **Rate of change:** the pace of climate change is expected to accelerate, making adaptation less effective over time. We're in unprecedented times with no one really knowing just what this will mean for systemic risks like ecosystems collapse.

- **Behavioural choice:** the key message is that action on climate change is cheaper than inaction and saves money at every level. We have a choice: either ignore the problem or use the tools at hand to change the system. Do we have the courage to change?[13]

How the built environment contributes to climate change.

The world is grappling with the dual challenges of accommodating a rapidly growing urban population while simultaneously reducing carbon emissions. This complex balancing act necessitates a fundamental shift in how we conceive, design, and construct buildings and cities. Australia, one of the most urbanised countries globally, faces an even more acute version of this challenge.

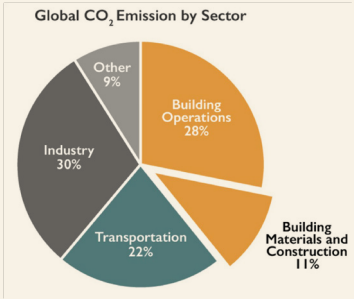
By mid-century, the global population is expected to approach 10 billion, and the built environment will likely double in size. This expansion comes with a significant carbon footprint, particularly from 'upfront carbon' emissions, called embodied carbon, generated during construction. These emissions are set to consume a large portion of our remaining carbon budget, underscoring the urgency for sustainable development.

We live in the world's eighth highest emitter of CO_2 per capita, five times the global average, with a property industry that lags behind in adopting carbon-reducing technologies.[14] Buildings account for 39% of global energy-related carbon emissions, a figure that will shift more towards embodied carbon as renewable energy adoption increases.[15]

Imapact of buildings globally

39%

of global greenhouse gas emissions from buildings



Source: Global Alliance for Buildings and Construction - http://globalabc.org/

Moreover, the challenge is not just environmental, but also social. As climate change gains political attention, issues like income inequality and poverty must also be considered. Therefore, a resilient, low-carbon development path is essential; one that can spur economic growth, while ensuring that efforts to improve global living standards do not negate climate gains.

"The complexity of making these decisions for the planet are multifaceted and there is no silver bullet. No single strategy will be enough to solve the climate crisis" explains Marius Rime Meyer, from Warren and Mahoney.

Potential impacts of climate change on the build-to-rent sector

As we approach the pivotal year of 2030 and beyond, the sense of urgency surrounding climate change will only intensify. This period is being termed as the 'Great Transition,' a shift as seismic as the Industrial Revolution, and it is already underway, often unbeknownst to the general public. Companies that fail to adapt and innovate may face a 'Kodak moment,' where they are left behind by the rapid and unexpected change that's ahead: much like how Kodak underestimated the pace and impact that digital cameras would have, and went from market leader to bankruptcy in a matter of years.

The implications for the BTR sector are profound. The future we are designing and building for will be drastically different from the past, characterised by extreme weather conditions—much hotter weather, more rain and less rain, storms, droughts, and fires. Poor air quality, biodiversity loss, potential ecosystem collapse, and sea-level rises are additional factors that will impact the sector. The world may also witness millions of climate refugees and water scarcity, along with other unforeseen changes.

The sector must, therefore, adopt a forward-thinking approach to design and construction, taking into account these multifaceted challenges. Failing to do so could result in not just financial losses, but also contribute to the exacerbation of climate-related societal issues.

3. Regenerative Decarbonisation in the Build-to-Rent sector

Operational carbon

Decarbonising the operation of the building is focused on the emissions produced through the use stage of the building during its operational lifetime. Operational decarbonisation can be achieved through a range of measures, such as: passive design, improved base building performance, all electric and the use of renewable energy, optimising the use of a building, and incorporating solar power generation on or near the building.

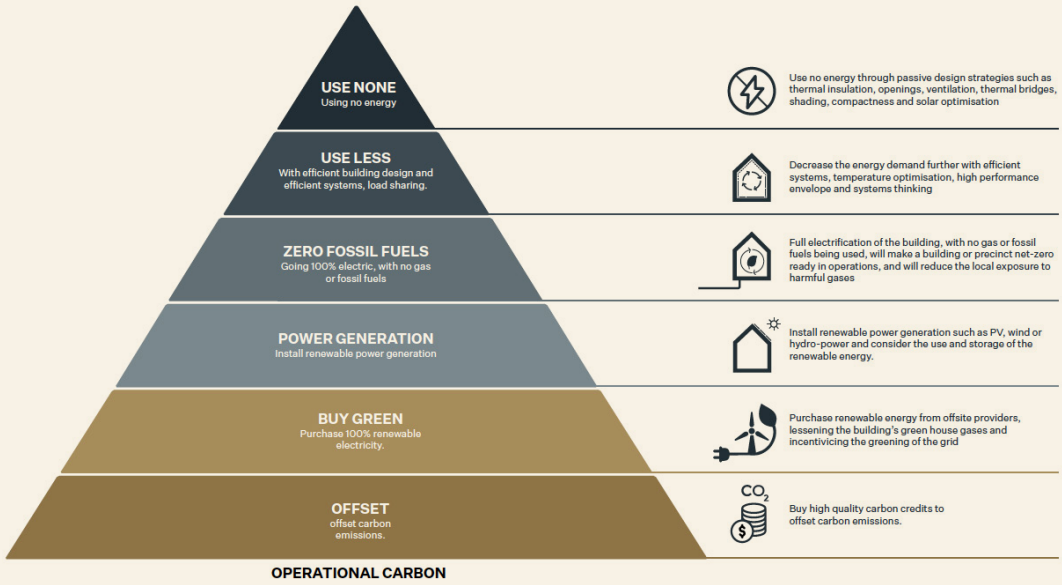
Operational energy use in buildings represents about 30% of global final energy consumption. This share jumps to 39% when including the final energy use associated with the production of cement, steel, and aluminium for the construction of buildings.

A decade ago, all our focus was on operational carbon, and reducing this as far as possible. A wide range of buildings and typologies worldwide have shown us how this can be achieved, though it has often come at the cost of an increase in the embodied carbon. Along with the emissions from operational carbon, using greenhouse gas emitting appliances poses very real health risks, specifically asthma in children, and is considered as harmful as passive smoking.[16]

The simplest way to achieve net zero operations is to ensure that a building is fully electrified, and only uses renewable energy. However, this is a simplistic way of looking at it and does not factor in how the grid is built, how renewable energy is used and what would happen if all buildings were on 100% renewable energy in a country where the electric storage capacity is limited. Therefore, part of the solution to net zero must not only be to use renewable energy, but to reduce a building's energy consumption as much as possible. This can be done through passive design strategies, such as optimising envelope performance, reducing air changes and temperature fluctuations ensuring efficiencies in services and buildings.

"We aim for operational properties to be net zero today or by 2030 at the latest and for embodied carbon to be reduced by 40% by 2030 – it's a fixed path" explains Davina Rooney, GBCA.

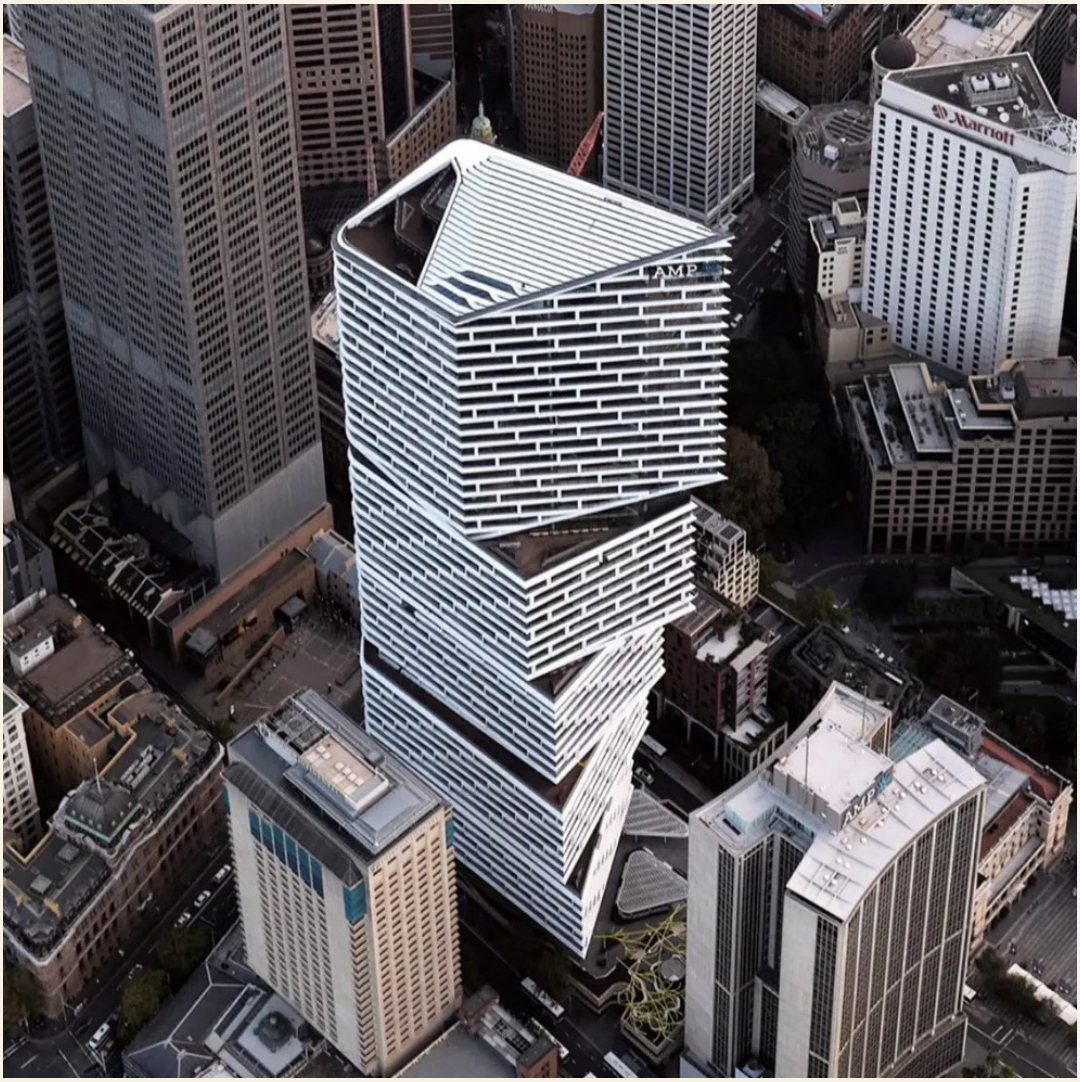
Operational carbon reduction work flow



Source: Warren and Mahoney

Embodied carbon

As the grid becomes greener, the importance of embodied carbon increases, accounting for up to 80% of all emissions. Decisions we make today "lock in" future building emissions. When looking at the impact of each building, and its upfront or embodied carbon, we need to focus on reducing emissions produced during all five life cycle stages of a building. Various mitigation strategies exist, ranging from not building at all, to reusing or repurposing existing structures. A great example of this is the Quay Quarter Tower tower in Sydney, the QQT project in Sydney exemplifies the effective reuse of an existing structure. New buildings can also benefit from using recycled or reused materials, sequestering materials like timber, or employing low-emission construction materials such a "green" concrete.



Quay Quarter Tower in Sydney's CBD doubled the size of a 46 year old building and saved 12,000 tons of embodied carbon. All credits to photographer

"Focusing on embodied carbon reduction inevitably goes hand in hand with a reduction in costs, as it places so much scrutiny on each piece of material, making the material use much more efficient" says Marius Rime Meyer. This is a significant shift, as historically, embodied carbon wasn't seen as important, or its reductions valued.

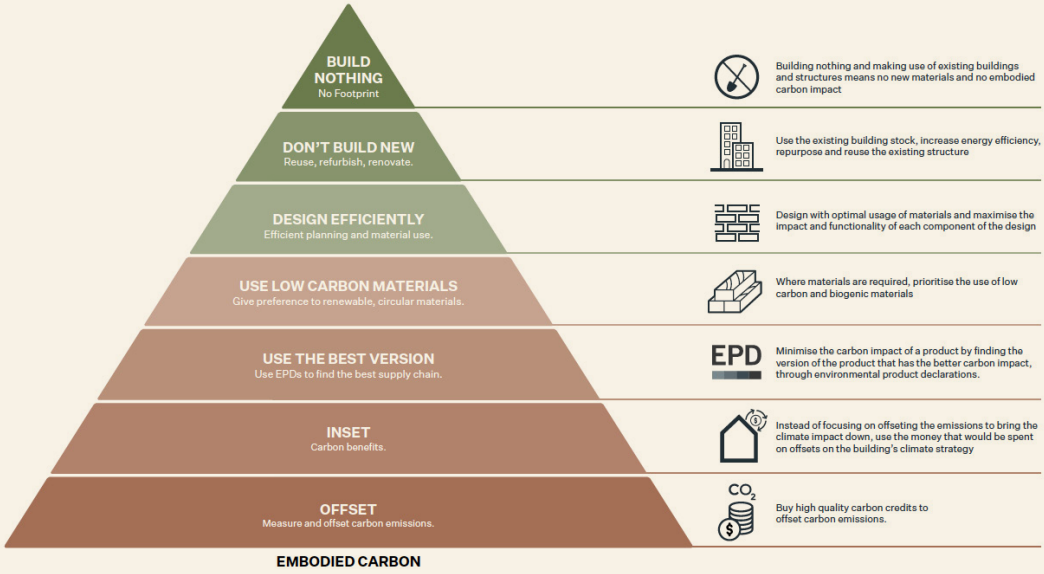
CEFC Head of Property, Michael Di Russo observes that "We've got all the technologies available today to commercially deliver net zero operational assets and the market is now well progressed in measuring and reducing embodied carbon in projects. As an industry we need to continue taking big strides right across the supply chain to enable further progression."

He goes on to emphasise that parties who aren't applying and further refining their approaches in emissions reduction won't be able to compete with those parties that

are. Frank McMahon from Multiplex adds that for the institutional side of property, decarbonisation is a “must-do” and not about cost or a question of maybe.

The quality and accuracy of data to measure embodied carbon has only been available for the past two years according to Tom Dean from Slattery, and demand has grown significantly in the last 12 months. Therefore, it’s not just about using renewable energy to reach a net zero future, but also about reducing a building’s energy consumption during the entire life cycle, as much as possible, from construction to end-of-life.

Embodied carbon reduction work flow

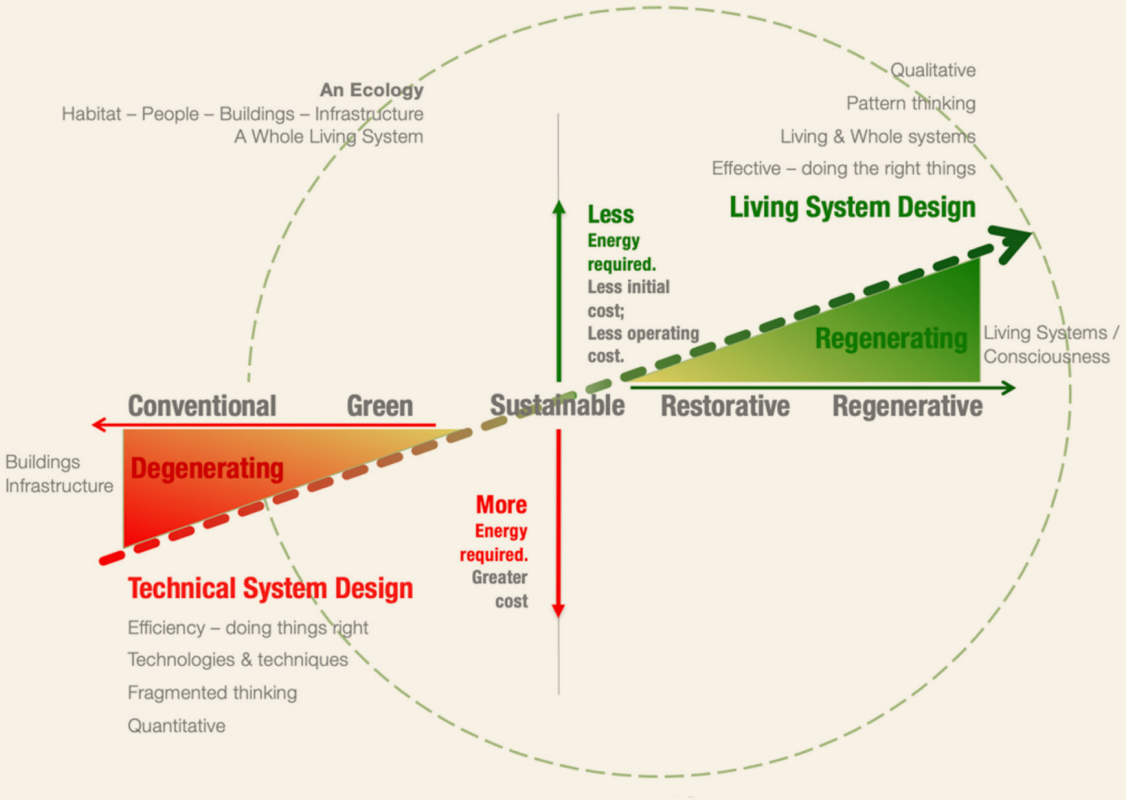


Source: Warren and Mahoney

Regenerative Decarbonisation in build to rent

Traditional rental stock in Australia was primarily sold to small-scale investors. These investors were generally unwilling to pay more for sustainable apartments and buildings. Additionally, developers who did not intend to hold onto the assets had little motivation to invest in energy-efficient homes. Although these homes would cost more upfront to build, they would be cheaper to run in the long term. Furthermore, they would be healthier to live in when designed using passive house principles and broader decarbonisation approaches. There are minimal regulations in Australia around building efficiency and sustainable practices compared to the UK or Europe, which meant market dynamics led to misalignment of stakeholder interests. Short term returns won out over what was best for the end user, the tenant, along with what was best for society and the environment.

The ecosystem of development



As BTR is owned for the long term and the needs of the end user are paramount to each building's success (the happier the tenant, the better the business), we have a chance to change the paradigm for Australian housing. This can be achieved by demonstrating that a building can serve the needs of society, and help address the ravages of climate change. These homes can provide safe and secure housing to Australians priced out of, or choosing not to own, a home while fostering a sense of community and connection. By creating an exemplar for a different model, the hope is this will cascade down into the broader housing market and lead to healthier homes, healthier Australians and a healthier planet.

The following section will go into detail for why ambitious Regenerative Decarbonisation makes sound business sense today, and the subsequent section will explain the process for how this can be achieved commercially.

III. THE CASE FOR REGENERATIVE DECARBONISATION

1. Regulatory compliance, future-proofing and policy forecasts

After limited public policy action to address climate change over the past decade, especially at the Federal level, a significant change has occurred. In September 2022, the Federal Government legislated our 2030 targets, aiming for a 43% reduction to emissions below 2005 levels. This legislation also included an aspiration for Australia to be net zero by 2050. This move aligned the Federal Government with all of Australia's states, which had previously committed to net zero targets. As a result, the wheels of government are now rapidly spinning to achieve these goals. From mandatory climate reporting to the first change to the National Construction Code in 13 years, requiring all homes to be minimum NatHERs 7-star energy efficient, to the NSW government's Sustainable Buildings SEPP which came into effect on the 1st October, and mandates embodied carbon disclosure for all new homes.

"I've never seen more political will in this area. The GBCA advocacy team submitted more policy recommendations by March 2023 than they do in an entire year" said Davina Rooney, GBCA.

In 2022, we were 25% below 2005 emissions levels, which means we're 100m tons of reduced carbon emissions away from our 2030 targets of 43% below 2005. While on first glance this looks like positive progress, those 100m tons equal 16m tons a year in reductions, and in 2022 we were only 2m tons lower than 2021. We've got a lot of work to do if we're to achieve our legally mandated reductions and policy momentum is likely to rapidly increase

"It's a magnitude and pace of change that hasn't yet permeated the collective consciousness in Australia" according to the CEO of Australia's Climate Change Authority, Brad Archer.

In a recent speech at the Investor Group on Climate Change (IGCC) in Sydney on 21st August 2023, Chris Bowen, the Federal Minister for Climate Change and Energy, underscored the urgency of the climate crisis and the policy measures being undertaken by the Australian government. "With only 76 months to go until 2030, the window for meaningful action is rapidly narrowing," he stated. To address this,

the government is doubling down on its efforts to combat climate change and transition to a more sustainable future.

Bowen highlighted the stability of Australia's policy and investment environment as a cornerstone for progress. "We are introducing reforms to safeguard mechanisms and have allocated an additional $20 billion in capital to the Clean Energy Finance Corporation (CEFC) in the recent federal budget," he said. This funding aims to accelerate the energy transition, with a target of achieving 82% renewable energy by 2030. Additionally, a $10 billion Capacity Investment Scheme has been launched, part of a broader $40 billion government commitment to renewable transformation.

"Good climate policy is also good for investment," Bowen emphasised. He announced that sectorial decarbonisation plans will be launched in 2024, focusing on various sectors including the built form. "This is a key priority for the government. We aim to lead public policy to gain a global advantage and have set interim targets for 2035 to meet our Paris commitments," he added.

Bowen also touched on the international landscape, mentioning that mandatory standardised reporting regulations are on the horizon, including the International Sustainability Standards Board's (ISSB) global standards, which Australia is embracing and will likely impact 20,000 businesses from 2024 onwards. This will follow the International Financial Reporting Standards (IFRS) and to report on climate risks and sustainability in a way that allows investors to compare a company's climate choices (including scope 1-3 emissions) in the same way financial statements allow them direct comparison. The ISSB will be administered by Australia's accounting standards board. "The ISSB will be a single source of truth across markets and across countries" according to Sue Lloyd, Vice Chair of ISSB. She goes on to say that:

> *"The ultimate aim of climate reporting standards is to support the allocation of capital towards activities that are consistent with a transition to a low-emissions, climate-resilient future."*

A federal Sustainable Finance Strategy is also in the works, with a taxonomy for sustainable finance set to be ready for consultation later this year, and likely to follow the European model. The strategy will underpin Australia's ability to finance our net zero targets and will both give businesses the confidence they need to invest, and make Australia more globally competitive.

Potential future regulations

We're running out of time to let the market choose where the solutions will be, so both carrot-and-stick policies and regulations should be expected to be the heavy lifters of mass adoption. Businesses which refuse to accept this significant policy change is coming do so at their peril. Other jurisdictions are pioneering change that will dramatically change the built form, including: the UK's Net Biodiversity Gain legislation which requires all new developments from November 2023 to increase

biodiversity by 10%; and New York's Local Law 97, a first of its kind. The New York law establishes increasingly stringent emissions caps on approximately 40,000 buildings in New York City starting in 2024 until 2050, requiring property owners to retrofit their buildings in order to comply with the law, or face a financial penalty. This means developers who don't make courageous choices today on decarbonising their buildings could face significant financial costs in the future. The choice to decarbonise is as much about risk mitigation than anything else.

Senator Jenny McAllister says, "climate change is a systemic risk that requires a systemic response."

Jim Chalmers, the Treasurer of Australia, says that the Australian government is committed to international alignment around climate change and adaptation, which will lead to policy momentum as we catch up after a lost decade.

There are enormous economic opportunities that lie ahead for those who can foresee where change is heading.

Smart developers who innovate and lead the race to decarbonise and take advantage of climate change adaptation incentives will have the winds at their backs, while laggards will be left behind, swimming in a rising sea of irrelevance.

2. Market demand

Consumer demand for eco-friendly properties is only increasing as a new generation of renters seek more sustainable lifestyles and make purchasing decisions that reflect their values. According to a recent survey, 78% of Australians consider a brand's social or environmental actions when making a purchasing decision.[17] This trend is not just limited to Australia; it's a global phenomenon that is reshaping markets and industries.

The pace of change in consumer expectations is staggering. As Christian Graham, the Head of pioneering BTR developer, Home, aptly puts it, "Customer's and capital's expectations are moving very quickly – by the time we finished our first buildings the expectations were greater than what we delivered given the pace of change." This sentiment captures the urgency for businesses, especially in the property sector, to adapt and innovate to meet these rapidly evolving consumer demands. While it's still unclear what kind of premium a consumer will pay for a sustainable lifestyle, it's clear they will have increasingly higher expectations; and that they will be more loyal, resulting in lower vacancy rates, less churn and higher word of mouth for leading BTR projects.

3. A changing investment landscape

Michael Di Russo emphasises that sustainability is not just a "bolt-on value-add but critical risk measure." He goes on to add, "It enhances the asset's quality and attractiveness, especially in terms of its relevance for future markets and its resilience to future climate positions. The focus on a whole-of-building and whole-of-life cycle requires a wider scope of risk and measures for a manager, that demonstrates they are well equipped to proactively manage the asset, regardless of the market conditions. This is what will drive the 'alpha' return."

Davina Rooney from GBCA notes: "Five to six years ago sustainability was a nice to have. It used to be a slide at the back end of a deck; now, it is the deck." Banks have signed up to the Taskforce on Climate-Related Financial Disclosures, and there is a focus on reducing risks to portfolios through climate investment to ensure they can meet their own net zero targets. ANZ offers a 5-7 basis point reduction for sustainable finance, and all major Australian banks offer "green loans" as they increasingly seek to deliver on their own climate commitments.

The market is increasingly demanding highly sustainable buildings. The more environmentally sustainable a building is, the more desirable it will be to occupy. Buildings will be a key part of investors' net zero strategy, making reduced embodied carbon crucial and efficient operational net zero mandatory. Development Victoria model their BTR projects with capitalisation rates 50 basis points lower for buildings that are more efficient and have greater sustainability principles. On a 300-apartment building with an average weekly rent of $750, this equates to an increase in the sale price of $26 million.

"The investible universe for BTR will continue to grow and achieve critical mass. Why will this BTR investment be better than another investment? This is where sustainability becomes the core differentiator through both the qualitative and quantitative overlay to benchmark and compare," says Michael Di Russo, Clean Energy Finance Corporation.

The investment landscape is changing rapidly, with sustainability and climate resilience at its core. Investors, financial institutions, and asset managers are all aligning their strategies to mitigate risks and capitalise on the opportunities presented by this shift. Once the Federal Government's Sectoral Pathways for Decarbonisation are launched next year, along with their Sustainable Finance Strategy and the taxonomy for investment, this will give capital the means to allocate significant sums to the built form. The focus is increasingly on long-term resilience and value creation, making Regenerative Decarbonisation not just an ethical choice but a sound business decision.

4. Community and stakeholder relationships

The BTR sector thrives on strong community and stakeholder relationships. These relationships not only foster a sense of belonging, but also contribute to the economic vitality of the community and drive long term value for the asset owner.

Economic impact and safety

Healthy and cohesive communities have a direct economic impact. A greater sense of safety and security can significantly reduce long-term vacancy rates, contributing to a holistically sustainable outcome for communities and investors.

Social roots and cohesion

Long-term commitments to suburbs encourage residents to put down both social and economic roots. Social connections are the cornerstone of resilient communities, especially in times of natural disasters like fires or floods.

Addressing the loneliness epidemic

The U.S. Surgeon General has declared loneliness an epidemic and in Australia over 5 million people class themselves as lonely, including 37% of young people.[18] BTR properties can help alleviate this by designing spaces that foster connection and belonging. For example, community connections can be fostered by having a reception area with staff whose brief is to create a fun and welcoming space.

Social isolation is not just an issue in one country; it's a global concern. For instance, in Japan, there are 1.5 million people who identify as Hikikomoris, preferring social isolation.[19] The challenge is to design buildings that promote quality human interaction and community.

Shared amenities and social spaces

Shared amenities such as communal laundries or social zones on different floors can enhance community interaction and social cohesion. Melbourne developer Nightingale serves as a leading example, where deliberate social spaces are designed to enhance community.

Unique places and sense of belonging

Creating unique places with a strong sense of belonging can move us away from soulless, generic buildings where proximity does not equal community. This involves designing with the local culture and stories in mind, anchoring buildings and projects in their specific places.

Planning for community

The planning of social spaces can positively affect the sense of community and relationships. Studies have shown that happiness is most strongly affected by strong ties to friends, family and neighbours. Creating these connections can lead to greater customer retention and lower vacancy rates.

Third spaces for connection

Incorporating 'third spaces,' such as ground-floor cafes, community veggie gardens or roof top terraces, can offer residents a place to meet and connect, facilitating both casual and intentional encounters.

5. Value over cost

The conversation around sustainable development is shifting from a focus on cost to a focus on value. Davina Rooney from GBCA states,

> *"There's never been more evidence that if you do things right up front, you get the return."*

Financial analysis shows that energy-efficient buildings can result in potential cost savings of 1% of total revenue. Given this flows straight through to net operating income, based on a capitalisation rate of 4.5% for every dollar saved, you add $22.22 to the valuation of the asset. Moreover, Green Star rated buildings have demonstrated a 16.4% higher market value per square meter and a 13.5% higher return with a 1-2% increase in upfront costs.

Competitive advantage

Michael Di Russo emphasises that it's not about how a project stacks up financially in the short term, but rather how value and cost are defined and taking a wider view on the longer-term positioning of the asset. The intellectual property a developer can create by leading the race to net zero will give them a significant competitive advantage, especially as the policy environment changes. Clare Parry from Development Victoria adds, "It's less about a green premium than a future brown discount—the higher quality the product, the more it will be worth in the future, and the greater the risk mitigation."

Future-proofing

The question is not whether we can afford to invest in sustainable development, but whether we can afford not to. Developers need to consider whether a building will be rentable in 20 years time, let alone sellable, in a world that is hotter, dirtier, and more expensive, let alone sellable. The lessons learned today will provide a competitive advantage for first movers.

Risk and value

The risk is that buildings not developed through the framework of Regenerative Decarbonisation could become stranded assets. This is what we're seeing in the commercial office space today and it's something we would never have expected 10 years ago. Michael Di Russo advises that "behavioural change is required and that the main drivers of hesitancy come from doing something different. There is also a perceived cost and risk build up, which often comes about through a lack of understanding about the broader, longer-term dynamics. The CEFC has seen countless examples of sponsors having conviction for an outcome and ultimately delivering the project with significant reductions in costs due to factoring the strategy in early and having the right parties at the table from the beginning.

The equation to consider for decarbonisation in BTR is ultimately about creating value and mitigating risk and shifting away from a focus on minimising upfront costs.

By taking a value-over-cost approach, developers not only stand to gain financially, but also contribute to the broader goals of sustainability and social responsibility through a just transition. This makes it even more crucial to reframe and evolve old models, paying more upfront for long-term value.

"The decisions we make today will be this generation's investment in the well-being of future generations" explains Damian Graham, CIO Aware Super.

6. Reducing waste

The concept of circularity is increasingly being integrated into construction processes and is a key aspect of Regenerative Decarbonisation. This involves designing buildings and materials for longevity, adaptability, and eventual disassembly, thereby minimising waste.

Whole of life considerations

A holistic approach that considers the entire lifecycle of a building, from construction to demolition, is essential for waste reduction. This includes the sourcing of materials, construction processes, building operations, and eventual decommissioning.

Reducing embodied carbon equals less waste

By focusing on reducing carbon emissions, waste is inherently minimised. Every choice made in the construction process is scrutinised to ensure that materials are used efficiently, and nothing is wasted. Lower carbon emissions often correlate with

a more efficient use of materials and less waste generated during construction and demolition. A low-waste strategy often emerges as a by-product of aggressive carbon reduction efforts. As efforts to minimise carbon footprint intensify, waste reduction follows suit, creating a virtuous cycle of sustainability.

7. Stronger brand

In today's competitive landscape, building a strong brand is not just a marketing strategy but a business imperative. A strong brand can serve as a powerful tool to attract talent, customers, and capital, especially those who are looking for meaning and purpose in their lives and investments. It goes beyond the sustainability team and requires engagement across all levels of the organisation.

Delivering good resident experiences

A strong brand is synonymous with delivering good resident experiences, which are also better for the environment. This aligns with the growing consumer demand for a sustainable lifestyle, where people are increasingly willing to pay a premium for benefits such as better health, sleep quality, reduced noise, and improved air quality. In essence, it's as much a branding exercise as it is about actual benefits; people make choices that make them feel good.

Inspiring change across the economy

Brands that take the lead in sustainability have the power to inspire change across the economy. They set the standard and encourage other organisations to follow suit.

Ethical and transparent choices

Making ethical and transparent choices in business operations leads to greater trust with stakeholders, which is a cornerstone for any strong brand. As the climate continues to change at an alarming rate, brands that position themselves as stewards and climate custodians are likely to be preferred by future consumers. These consumers are increasingly affected by the choices made by their parents and previous generations and are looking for responsible brands. Laura Hamilton-O'Hara, CEO of Living Future, notes that "marketing costs will be much lower for innovative projects because they are newsworthy and will resonate with the community."

Building a strong brand in the BTR sector is not about flashy marketing, but about making a real impact. It's about being a brand that people trust and want to engage with, not just today but more importantly, in the future as well. It's not just a question of 'can we afford to do it,' but rather 'can we afford not to?'

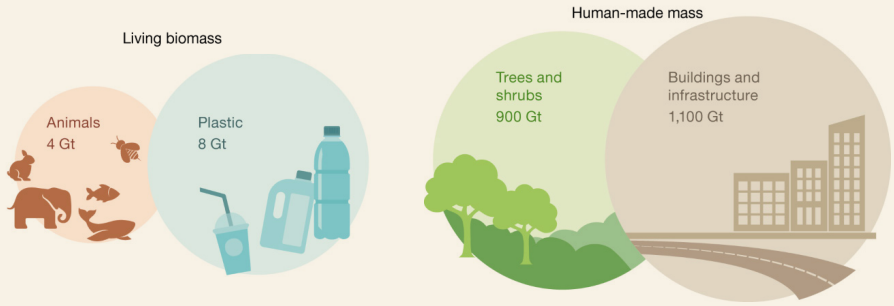
8. Biodiversity loss

Biodiversity loss is more than just the disappearance of species; it's the unravelling of the intricate web of life that sustains us. As species vanish, the complex interactions between organisms that have evolved over millennia get disrupted, leading to unforeseen consequences. For instance, the loss of a single pollinator can affect the reproduction of many plant species, which in turn impacts the animals that feed on them.

Man-made mass vs. living biomass

The stark reality that our built environment now outweighs living biomass is a testament to the profound impact humans have had on the planet.[20]

This imbalance not only signifies the rapid urbanisation and industrialisation of our societies, but also underscores the vast areas of natural habitats we've transformed or destroyed. The total weight of all the plastic in the world is more than double that of all living creatures, further emphasising the scale of human impact on the planet. Globally, new construction is equivalent to creating the entirety of Japan's current floor area every year.[21] As our global population reaches 10 billion, the loss of biodiversity is likely to increase at an alarming rate.



Source: Ron Milo et al in Nature, "Global human-made mass exceeds all living biomass".

New legislation in the UK

The UK's Biodiversity Net Gain (BNG) legislation is a pioneering effort that recognises the intrinsic value of biodiversity. By mandating a 10% net positive gain on biodiversity for all new developments, it ensures that urban expansion does not come at the expense of nature. This legislation could serve as a model for other countries, emphasising the importance of integrating biodiversity considerations into urban planning and development.

Material choices have costs

Every brick, beam, and tile in a building has an environmental footprint. From the extraction of raw materials to transportation and construction, the choices we make have cascading effects on ecosystems. Opting for sustainable, recycled, or upcycled materials can significantly reduce this impact. Furthermore, embracing nature-positive

frameworks in construction can help restore habitats, support local biodiversity, and create green spaces that benefit both humans and wildlife.

The Holocene extinction

Often overshadowed by the pressing issue of climate change, the Holocene extinction is a silent crisis unfolding before our eyes. Unlike previous mass extinctions caused by natural events, this one is almost entirely driven by human activities. From habitat destruction and pollution to overfishing and introduction of invasive species, our actions are accelerating the decline of species at an unprecedented rate.

A world without wild animals

The thought of a world devoid of the songs of birds, the sight of butterflies, or the majesty of large mammals is not just melancholic but alarming. Wild animals play crucial roles in ecosystems, from controlling pests and pollinating plants to enriching soils and shaping landscapes. Their loss would not only deprive future generations of the wonder and beauty of nature but also destabilise ecosystems, leading to a domino effect of environmental challenges.

Regenerative Decarbonisation offers a holistic approach to address the dual challenges of climate change and biodiversity loss.

By reimagining how we design, build, and live, we can not only reduce our carbon footprint but also foster a harmonious coexistence with nature, ensuring a vibrant, biodiverse, and sustainable future for all. The University of Melbourne is an exemplar in this area with their Biodiversity Pledge – which sets a 'no net loss' policy for on-campus biodiversity and identifies healthy ecosystems as a key outcome. The goal is to achieve no net biodiversity loss on any campus by 2025, and by 2030 to achieve an increase in biodiversity on every campus - that many BTR developers could learn from.[22]

9. Health and wellbeing

The health benefits of Regenerative Decarbonised BTR are manifold, ranging from improved air quality to enhanced mental well-being. This section explores the various ways in which such BTR projects can contribute to a healthier living environment.

Healthy homes research

According to a study by Sustainability Victoria, every dollar saved in energy efficiency leads to $10 in health savings. A home that's warmer in winter leads to significant improvements in the physical wellbeing of the inhabitant, leading to fewer visits to the doctor and lower stress on the health system.[23] Being warm in winter has positive effects on mental health, leading to significant health benefits, fewer sick days, greater productivity and overall happiness.

Air quality

Residents in buildings that use gas are 25% more likely to have asthma. Better air quality also leads to improved cognition, according to research from Harvard University.[24] Benefits include fewer sick days, fewer allergies, and better sleep. In Canada there is now a fifth season – Wildfire Season. In August 2023 there were 30,000 wildfires burning across the country. This leads to extremely unhealthy air quality in cities, which has resulted in dramatic uptake of Passive House buildings which control all airflow into a building and use HEPA filters to ensure the air is breathable and a building's inhabitants are safe. In 2019 the world was shocked to see the devastation from bushfires in Australia, an occurrence which will only get worse in the years ahead, and the severity of which was perhaps lost through the sleight of hand of COVID's distraction.

Acoustic performance

Improved acoustic performance in a building leads to better sleep quality, which in turn enhances physical and emotional well-being. This is supported by research from acclaimed sleep researcher Matthew Walker.[25]

Community and happiness

Residents who are happier for longer periods are more likely to refer others to their building and create great word of mouth for the brand, leading to lower vacancy rates and higher customer satisfaction. Being proud of one's home can lead to a greater sense of self-esteem.

Health choices

The curation of healthy retail and food and beverage outlets within the ground floor of a BTR development will help nudge the food choices residents make. Encouraging the use of stairs over lifts not only promotes physical activity but also offers additional points for interaction and reduces energy consumption. Shared communal spaces that provide opportunities for informal interaction amongst residents are key to the promotion of occupants' well-being.

The health benefits of Regenerative Decarbonised BTR are not just an added advantage but a necessity in tomorrow's world. They contribute to both the physical and mental well-being of the residents while also having a positive impact on the environment and give us the greatest chance of successfully adapting to climate change.

10. Enhanced resilience

According to Mark Howden, Vice-Chair of the IPCC, the impacts of climate change are likely to be more severe than initially expected. Therefore, it's crucial to design buildings that not only aggressively reduce emissions but also allow residents to live healthy, happy lives in a hotter world. This is what Regenerative Decarbonisation aims to achieve, blending climate adaptation with sustainability.

Key factors for building climate resilience

Air quality

As climate change exacerbates wildfires and pollution, indoor air quality becomes a critical concern. Buildings designed with regenerative principles often incorporate advanced air filtration systems and natural ventilation, aligning with Passive House standards to ensure cleaner air during hazardous conditions like bushfire seasons.

Insurance

Climate change is making extreme weather events more frequent, leading to higher insurance premiums. Investing in resilient building practices can mitigate this financial burden. For instance, buildings that incorporate flood-resistant design elements or fire-resistant materials may qualify for lower insurance rates.

Extreme events

The increasing frequency of extreme weather events necessitates that buildings be designed to withstand a variety of conditions. This could mean reinforced structures to handle higher wind speeds, water harvesting and storage systems to cope with droughts, or thermal insulation to maintain indoor temperatures during extreme heat waves.

Energy independence

Energy resilience is another key factor in building for resilience. Developers should aim to construct buildings that are net energy producers, incorporating renewable energy sources such as solar panels and wind turbines. This not only reduces the building's carbon footprint, but also ensures a degree of independence from the grid, which is crucial during extreme weather events that can disrupt power supply.

Community

The mental and social well-being of residents is often overlooked in building design. Regenerative Decarbonisation places a strong emphasis on community-building features, such as communal spaces, gardens, and amenities that encourage interaction and foster a sense of belonging.[26]

Whole of life cycle

Resilience and adaptation should be considered at every stage of a building's life cycle, from design and construction, to operation and eventual decommissioning.

This means using sustainable materials that are both durable and recyclable, implementing energy-efficient systems, and planning for long-term adaptability to future climate scenarios.

By integrating these key factors, Regenerative Decarbonisation offers a comprehensive framework for creating buildings that are not just sustainable but also resilient, adaptable, and conducive to healthier, happier lives. It represents a forward-thinking approach to building design, one that prepares us for the uncertainties of a changing climate while also mitigating its worst effects.

IV. THE PATH TO A POST CARBON FUTURE

This section delves into a myriad of tools and strategies that can guide us on the journey of Regenerative Decarbonisation, from exploring various ratings tools that measure and encourage sustainability, to discussing carbon reduction strategies that can be implemented at various stages of development. We also examine the crucial role of capital in driving Regenerative Decarbonisation and the transformative power of process in the design of our buildings.

We also look at innovative materials such as green concrete and mass timber that can revolutionise the way we build. We scrutinise supply chains to identify areas for improvement and discuss the importance of behavioural change in achieving our goals. Finally, we consider the role of offsets in decarbonising the built form.

We aim to provide a roadmap for developers, investors, and policymakers. It outlines actionable frameworks that can not only lead us to a post-carbon world, but also help us achieve our net zero targets.

1. Ratings tools

Accountability and transparency

In a post-truth world, ratings tools serve to demonstrate actions and build trust. As Jules Tribuzio from Multiplex explains,

> *"Ratings tools give us the drivers that will allow us to reach our goals. If we don't have the certification process we're back to square one."*

However, for some, ratings tools can simply be a "box-ticking" exercise. This section aims to outline the arguments for using these tools. It also provides details on the specific tools this paper recommends for Regenerative Decarbonisation. It's

important to note that real change and impact start with an aspiration rather than simply looking to check boxes.

Consistency and measurement

Michael Di Russo emphasises the need for a consistent approach to measurement and governance. Ratings tools act as a 'Google Translate' for sustainability, ensuring everyone is speaking the same language. For the CEFC it always comes back to measurement, ratings tools and the governance around measurement. "Getting a consistent approach to talking the language, to measuring the various bits and pieces - that's what unlocks scalable capital. The banks are very focussed on green finance, they are just building their confidence in determining what's green and what isn't. If they can get comfort on what is "green" they'll apply it across their whole funding program. They'll cut through the learning gaps and the education piece they have to do internally and the platform structuring they have to do with their systems."

Ratings tools are not an end goal, but a means to certify corporate or project targets. They help differentiate products in a competitive market.

Green Building Council of Australia (GBCA) - Green Star

Green Star is a comprehensive sustainability rating system developed by the Green Building Council of Australia (GBCA). It provides a framework for assessing the environmental design and construction of buildings and communities. Green Star certification is a mark of leadership, innovation, and environmental stewardship, and it is widely recognised in the Australian construction industry. However, for BTR projects to be regeneratively decarbonising using the frameworks outlined in this paper, anything less than 6 Star, the highest level, is insufficient.

Key features

Independent verification: Green Star offers third-party verification of a project's sustainability, ensuring that it meets high environmental standards.

Broad scope: the rating system covers a wide range of sustainability metrics, including energy and water efficiency, indoor environment quality, and sustainable transport options.

Innovation in design: Green Star encourages innovative solutions to environmental challenges, awarding points for creative approaches to sustainability.

Social Responsibility: in addition to environmental factors, Green Star also considers social and economic sustainability, promoting projects that benefit local communities.

Metrics and certification

Energy efficiency: one of the core metrics, Green Star projects aim for significant reductions in energy usage, often exceeding local and national standards.

Water efficiency: water-saving technologies and designs are integral to achieving a high Green Star rating.

Material selection: the rating system encourages the use of sustainable, recycled, and non-toxic materials.

Embodied carbon: newer versions of Green Star require projects to measure and reduce embodied carbon, making it a world leader in this aspect.

Market Impact

Increased value: Green Star rated buildings have been shown to possess a higher market value per square metre and offer higher returns compared to non-certified buildings.

International recognition: GBCA is one of the most successful offices within the Global World Green Building Council, giving Green Star a level of international credibility.

Upcoming tools: GBCA is continually innovating, with plans to release new rating tools, such as an apartment building rating tool expected in 2024.

Challenges and considerations

Cost vs. value: while achieving a Green Star rating may involve an initial cost increase of 1-2%, the long-term value in terms of operational savings, increased building value, and social benefits outweighs the investment.

Industry adoption: the Australian market is highly competitive but also sophisticated in its approach to sustainability, making Green Star a key differentiator for attracting both local and international capital.

Green Star is not just a certification, but a pathway to achieving broader corporate and project sustainability goals. It has become an industry standard in Australia and is increasingly being adopted by other countries. With its focus on comprehensive sustainability and continuous improvement, Green Star plays a pivotal role in shaping a more sustainable built environment.

Passive House

Passive House is not just a building standard; it's a holistic approach that brings together the operational systems of a building with its façade and envelope performance. This integration results in the most energy-efficient outcome, although it doesn't encompass other elements such as water, materiality and embodied carbon. As Simon Topliss from Warren and Mahoney explains, "Passive House aligns the façade and the systems in a model that drives the most energy-efficient outcome."

High-performing façade and heat recovery

Passive House buildings typically have high-performing façades and heat recovery systems, which are not standard in Australia's baseline building standards.

Wellness

Passive House design ensures continuous filtered fresh air in all environments and stable temperatures, contributing to occupant wellness. The dramatic improvement in acoustic efficiency leads to residents having better quality sleep, which leads to greater participation in society, fewer sick days, being more productive, having a better mood and generally greater economic contributions to society.[27]

Operational cost savings

According to Simon Topliss, Principal at Warren and Mahoney, buildings designed to Passive House standards can achieve "70-80% reduction in operational energy consumption cost savings."

Design process

Jules Tribuzio from Multiplex notes that Passive House is the most stringent standard and that it requires significant front-end design time to achieve a cost-effective outcome.

Climate adaptability

While more effective in climates with greater extremes, Passive House principles are universally applicable. In temperate climates like Sydney, the principles still offer benefits such as clean air, thermal efficiency, and acoustic performance, albeit with longer payback periods.

Justifiable cost increase

Clare Parry explains that a Passive House certified BTR apartment project she's working on at Development Victoria has a 3% cost increase in construction but that it was is an "absolute no-brainer" given the operational cost savings, lower vacancy rates, and higher health and well-being benefits. The global brand awareness of Passive House should add value to the asset when it is sold in ten years' time.

Passive House is not just about energy efficiency; it's about creating a healthier, more comfortable living environment. It offers significant operational cost savings and contributes to the well-being of its occupants. As we look towards a future impacted by climate change, adopting Passive House principles is a mandatory requirement for Regenerative Decarbonisation.

Living Building Challenge

The Living Building Challenge (LBC) is a holistic approach to high-performance building. It goes beyond everyday sustainability to focus on the well-being of occupants and the health of the global ecosystem by using a whole systems approach.

Energy efficiency

The starting point for LBC is energy efficiency. The goal is to use as little energy as possible, both on-site and off-site. This approach leads to a 70% reduction in operations compared to a conventional building.

Dematerialising materials

LBC emphasises the importance of using only what you need. This philosophy extends to materials, aiming to reduce waste and embodied carbon.

Water conservation

Water efficiency is another cornerstone of LBC. The goal is to use only what is necessary, thereby conserving this precious resource.

Sourcing and supply chain

LBC encourages sourcing materials as closely as possible to create local jobs and stimulate the local economy. This also adds resilience to the supply chain, a lesson learned from recent global events, such as the disruption caused by the COVID-19 pandemic, or the closure of the Suez Canal.

Transparency and trust

Transparency is at the core of LBC. This openness builds trust and helps other projects by providing accountability. For example, Frasers Property Australia published a materials list for Burwood Brickworks, consisting of 6,000 items, online for free giving future developers and builders a significant head-start for their own LBC projects.

Cost vs. value

While implementing LBC might be up to 10% more expensive upfront, the long-term value far outweighs the initial cost. This value can be seen in various forms:

- Higher valuation: LBC buildings are considered some of the most adapted to climate change risks and therefore mitigate future risk.
- Marketing: LBC-certified buildings attract more attention than less ambitious projects according to CEO of the Living Future, Laura Hamilton-O'Hara.
- Leadership: LBC-certification stakes a leadership position in the market.
- Brand Reputation: transparency and sustainability improve brand image.
- Operational Efficiencies: energy and water savings translate to financial benefits.

Resilience and self-sufficiency

LBC aims for buildings to be more self-sufficient, enhancing their resilience. This is especially important in an era where sustainability claims need to be backed by meaningful and demonstrable impact.

The Living Building Challenge is not just another rating tool; it's a comprehensive

approach to building that benefits both people and the planet. It complements other standards like GBCA's Green Star and Passive House, offering a global certification tool that provides consistency across projects.

Ratings tools are essential for standardising sustainability measures, attracting investment, and building trust. They are a critical component in the journey towards more sustainable and regenerative buildings. More specifically they should be used as inter-operable frameworks to align capital with outcomes. The best parts and principles of each tool should be incorporated into any BTR project that's to be considered a regenerative development.

2. Carbon reduction

Carbon reduction: a whole-of-system approach

Operational and embodied carbon

The conversation around carbon reduction in buildings, specifically the BTR sector, often revolves around two main categories: operational carbon and embodied carbon. Operational carbon refers to the emissions generated during the day-to-day use of a building, while embodied carbon refers to the emissions generated during the construction phase, including material production and transportation.

Whole-of-systems approach

Michael Di Russo advocates for a "whole-of-systems approach" to carbon reduction emphasising that every decision—whether in design or operations—should be made with a whole lifecycle lens. This approach aims to deliver, operate, and manage a building to the highest standard, considering factors such as local materials, energy efficiency, and occupant comfort. "Applying a whole of building and a whole of lifecycle lens, and when you're applying it to every single decision, whether its design or operations, with that framework in mind, that's when you're going to drive real change," says Michael Di Russo.

The importance of sharing

Steve Cassells from Neuron points out that shared resources could be a key to reducing carbon footprints. For example, Hong Kong consumes a low amount of energy per capita compared to other developed countries due to its density.[28] Hong Kong's energy intensity is also among the lowest in the world and has been decreasing slowly over the years. Shared cars could reduce the need for large parking spaces and basements in the future, much like hot desks have done in modern offices.

Scope 3 emissions

Scope 3 emissions are indirect emissions that occur in a company's value chain. These emissions are often overlooked but are crucial for a comprehensive carbon reduction strategy. The Green Building Council of Australia (GBCA) and National Australian Built Environment Rating System (NABERS) are currently working on joint research to

standardise methodologies for calculating Scope 3 and embodied carbon emissions. Tom Dean from Slattery suggests setting carbon targets early in the project and tracking them at each stage, benchmarked against historical data or recent projects.

Adaptive re-use

Where possible, adaptive re-use of existing buildings for BTR projects is a crucial strategy for minimising embodied carbon. Repurposing existing structures reduces the need for new construction materials, which are carbon-intensive to produce. By retaining the skeleton of a building, we can significantly cut down on waste and energy consumption associated with demolition and new construction, dramatically reducing the embodied carbon when compared to building from scratch. This approach not only preserves the architectural heritage of a community but also aligns with the principles of Regenerative Decarbonisation.

The urgency of now

The timeline for implementing carbon reduction strategies is shrinking. By 2030, these practices need to be standard across all projects. Early planning is crucial, as 80% of a building's carbon is locked in during the pre-town planning stages, particularly in the substructure, structure, and façade.

Carbon reduction is not just about transitioning for the sake of it; it's about reshaping the value proposition in the market and the world we're heading into. It requires a whole-of-systems approach, early planning, and a willingness to innovate and invest in sustainable alternatives.

3. Capital flow

The role of capital in driving sustainable building practices cannot be overstated. The pending Federal Government's Sectoral Pathway for Decarbonising the built form will be hugely influential in how investors will allocate capital. As the building sector evolves to meet the challenges of climate change, capital markets must align their investment strategies to support this transition. This section delves into the various facets of capital involvement, from super funds to banks, and how they can catalyse the move towards more sustainable building practices and finance Regenerative Decarbonisation in BTR.

The need for capital to step up

Capital needs to be more proactive in supporting sustainable building initiatives, specifically Regenerative Decarbonisation. While super funds have started looking at the BTR sector, their focus has largely been on social agendas rather than environmental ones. This needs to change. As Christian Graham from Home explains, "If the social objectives increase in BTR and the environmental performance improves then this may get Australian super funds to the point where they are inclined to come in en masse."

The role of super funds

Super funds, especially those like Rest Super and Aware, which skew towards a young demographic and are climate and socially progressive, have a significant role to play. They need to integrate environmental sustainability into their main property strategies, specifically BTR rather than relegating this strategy to impact funds. The concept of intergenerational investment is becoming increasingly relevant, and managing Environmental Social and Governance (ESG) risks is key for long-term returns.

The super funds are likely be the majority of long-term owners of BTR assets, so understanding what both the funds and their members will be looking for will be an important starting point when designing a project.

The influence of banks

Banks in Australia have pledged to support the Paris Agreement commitments. The Net Zero Banking Alliance, a UN-convened alliance representing 40% of bank capital, aims to align lending with net zero by 2030. ANZ, for instance, has set targets for its main sectors to align with a 1.5-degree scenario by 2024.

"It's not about a shortage of capital; it's about having an aligned approach that will point capital where to focus," says Michael Di Russo

Legislative changes and policy clarity

Recent legislative changes stemming from the Federal government legislating our climate targets have led to an increasing focus on the acute need to address climate change in Australia, particularly amongst the investment community. This has led to a surge in climate impact investment and transition plans. The impending Australian Sustainable Finance Taxonomy and ASIC's guidelines on avoiding greenwashing are steps in the right direction.

The future

The market is still evolving, and as Michael Di Russo explains, "the exciting part is we don't yet know what the ultimate answer is." However, what is clear is that a level of sophistication and aspiration is required to navigate this changing landscape. A more resilient, less risky asset will be worth more in the long run.

Capital has a pivotal role to play in shaping the future of sustainable building. From super funds to banks to investment managers, the need for aligned investment strategies is urgent. With the right policy frameworks and a focus on long-term sustainability, capital can be a powerful force in driving the transition to a more sustainable built environment and enabling Australia to meet our 2030 emissions targets.

4. The power of process

The process by which a building is designed, constructed, and operated is as crucial as the end result. This importance extends to new approaches and integrated, systems-based methods that can lead to more sustainable and efficient buildings. Marius Rime Meyer, from Warren and Mahoney, emphasises this by stating, "This is an evolution in the way we build buildings—getting the right team, skillsets, and the right people together before we even start designing the building is key to ensuring we're working towards the right outcomes."

Why the process matters is encapsulated in the idea that "how you do it is just as important as what you do."

> *"Planning a building should begin with alignment on sustainability targets and certifications with the whole design team at the very outset, working together as a whole for the desired outcome from the get-go."*

Marius Rime Meyer further elaborates. "The expert knowledge is limited at the moment —not a lot of companies fully understand embodied carbon, thermal comfort, not just temperature range, wellbeing—air purity, rates and flow and movement. More importantly, no one has a clear understanding of the full picture, and each of the team members have their own process for optimisation. Assembling the right team is key to the project success."

An integrated design process is:

- Inclusive: engages all stakeholders.
- Upfront: early planning avoids costly changes later.
- Decisions influenced by a broad team: diverse input leads to better outcomes.
- Whole systems thinking: considers all aspects of a building's lifecycle.
- Life-cycle costing: takes into account long-term costs and benefits.

"An integrated and optimised approach to building design for improved sustainability performance yields positive returns on investment. Different systems have different payback periods based on system utilisation and a building-specific assessment is required in each instance to achieve an optimised outcome" says Liam Wallis from Hip V Hype.

Design and build for the future

Designing and building for the future involves seeking synergies and optimising solutions through an integrated approach. Laura Hamilton-O'Hara from Living Future captures this sentiment by saying, "Cascading implications—by being thoughtful in

your choices, you can take action on a raft of issues at the same time. This is what I find so exciting about regenerative design." The idea is to look for ways that one decision can have multiple positive impacts, allowing for full optimisation of the project.

The role of contractors

The role of contractors is pivotal in achieving the desired outcomes. Frank McMahon from Multiplex advises, "As an industry, how can we get to net zero? The builder is at the end of the property cycle chain but more often than not we're getting involved too late.

> *"My advice would be to get contractors in early, so they can share the building knowledge they've already gained with the rest of the design team."*

This emphasises the importance of involving contractors and all key parties early in the process, as they bear risks around procurement and delivering on time. Choosing a partner who shares your sustainability goals and has the expertise to meet them is crucial for the project's success.

The role of technology in building design

The advent of new technology in the field of building design is a game-changer, especially when it comes to modelling different building outcomes. Steve Cassells from Neuron explains, "There's no building without the architect—but the latest technology can provide the design team with real-time data before they move to plans. Our platform generates the total cost and total carbon for myriad design decisions. Looking at the massing plan for any building, we can provide Total Cost + Total Carbon plus suggestions that would lead to improvement within two seconds." This technology allows for instant, informed decisions before committing to designs, offering a revolutionary way to save both cost and carbon.

Data-driven decisions

Data-driven decisions are becoming increasingly important in the construction industry. Access to real-time data enables all stakeholders to make informed decisions based on a common dataset. Slattery's Tom Dean elaborates, "This allows them to then look at options and decide on the best win/win—less cost and less carbon." The availability of such data is not just a convenience but a necessity for making sensible decisions that benefit both the environment and the bottom line.

The importance of process in Regenerative Decarbonisation

The process of building design is not just a means to an end but a critical component of Regenerative Decarbonisation. By taking a systems-based, integrated approach from the outset developers, designers, and contractors can create buildings that are not

only more sustainable, but also more cost-effective in the long run. Embracing new technology like Neuron's platform can significantly contribute to this goal, making it an essential tool to cost effectively decarbonise our buildings.

5. Energy

Efficiency: the first renewable resource

Energy efficiency is often referred to as the 'first renewable resource.' Before considering alternative energy sources, the primary focus should be on making buildings more efficient. Efficient buildings not only consume less energy but also set the stage for the effective use of renewable resources.

All-electric and 100% renewable

Transitioning to an all-electric and 100% renewable energy system is the logical step after achieving high levels of efficiency. This approach not only reduces greenhouse gas emissions but also mitigates future risk.

The health benefits of thermal efficiency

Thermal efficiency in buildings is not just about saving on energy bills; it also has direct implications for human health. Studies have shown that maintaining optimal indoor temperatures can positively affect sleep quality, cognition, mood, relationships, and even professional success.

The paradox of renewable energy costs

As we move towards a more renewable energy future, the marginal cost of energy is expected to approach zero. However, this comes with a paradox. The cost to consumers is likely to increase in the medium term due to the massive investment required to upgrade our grid, estimated at around $370 billion.[29] As a result, energy costs as a proportion of household expenses are likely to rise. As household energy becomes more expensive the efficiency of BTR buildings will be key differentiators, particularly ones that are Passive House or LBC certified, as they will save their residents up to 80% on electricity bills. This shift could influence consumer behaviour and expectations, making energy-efficient and renewable energy-powered buildings more attractive to potential tenants and attract a higher rental premium.

6. Building better

In the quest for a more sustainable future, the focus often lands on energy-efficient systems and renewable resources. While these are undoubtedly crucial, another equally important aspect is the embodied carbon in the materials we use to construct our buildings. Embodied carbon refers to the carbon dioxide and other greenhouse gases, such as refrigerants, emitted during the production, transport, and construction of building materials. These emissions are then converted into CO_2 equivalent for carbon accounting purposes. Embodied carbon can make up a significant portion of a building's overall carbon footprint, making it a critical factor to consider in sustainable construction and development. By making informed choices about the materials we use, from the structural elements to the finishes, we can dramatically reduce the environmental impact of new constructions. This section delves into the nuances of building better by selecting materials that not only meet functional and aesthetic requirements but also align with the imperative to lower embodied carbon.

Mass timber

Mass timber, including Cross Laminate Timber and Glulam, is gaining recognition in Australia as a sustainable and structurally sound construction material. However, the journey toward best practices in mass timber design and construction is still a work in progress. Simon Topliss, from Warren and Mahoney, who designed Australia's first Mass Timber, Passive House apartment building notes, "The more IP you can bring along the better—greater understanding of everything from logistics, manufacturing, supply, what happens on site, connections—there's 20 different parts that go into how you design the panels, fire engineering strategy, etc. We're still on the journey to achieve best practice mass timber design and construction." He also points out that the "sweet spot" for mass timber construction is four-to-five levels in a building, where it becomes cost-comparable to concrete. This is a sentiment echoed by Jules Tobruzio, who advises to keep below 25m for timber to be cost-effective.

Frank McMahon, Regional Director at Multiplex, highlights a cultural shift in the perception of timber buildings. "There's a shift in the market. Timber buildings have been built for centuries in Europe. The preconception is timber burns quickly—it doesn't, given the charring effect under fire load. Whilst there is a cultural shift underway, a more consistent and unified approach to fire engineering in timber buildings is required. Behavioural change is a large part of the hurdle." This change in perception is crucial for the broader adoption of mass timber, especially given its potential for reducing carbon emissions.

A project by Development Victoria, The Ballarat GovHub, achieved a 46% reduction in upfront carbon by using mass timber, with a "non-significant" difference in cost versus concrete.

Design considerations are also pivotal when opting for mass timber. Converting a concrete building to timber can result in a cost increase because it wasn't designed for mass timber. The key to sustainable mass timber construction lies in balance. "If we use too much timber, it will lead to society chasing 'carbon figures' and could lead to broader issues," warns Dayne Davis from BG&E.

"The key, like everything in life, is balance. We should aim for a 40% building carbon reduction with a focus on quality so that our buildings can last for hundreds of years. If they must be deconstructed, then using timber components allows us to recycle materials into other future projects and reuse beams and slabs over and over again."

Design choices: the power of procurement and standardisation

In the BTR sector, design standardisation is emerging as a critical factor for achieving sustainability goals. Frank McMahon from Multiplex emphasises the importance of this approach: "In Build to Rent, there should be one kitchen type, one bathroom type—standardise and modularise so you can control emissions and embodied carbon to hone in on the most efficient solutions, just like the car industry does—the bespoke path is not the right approach." This strategy allows for bulk procurement of materials, which not only reduces costs but also minimises waste, carbon and transportation emissions.

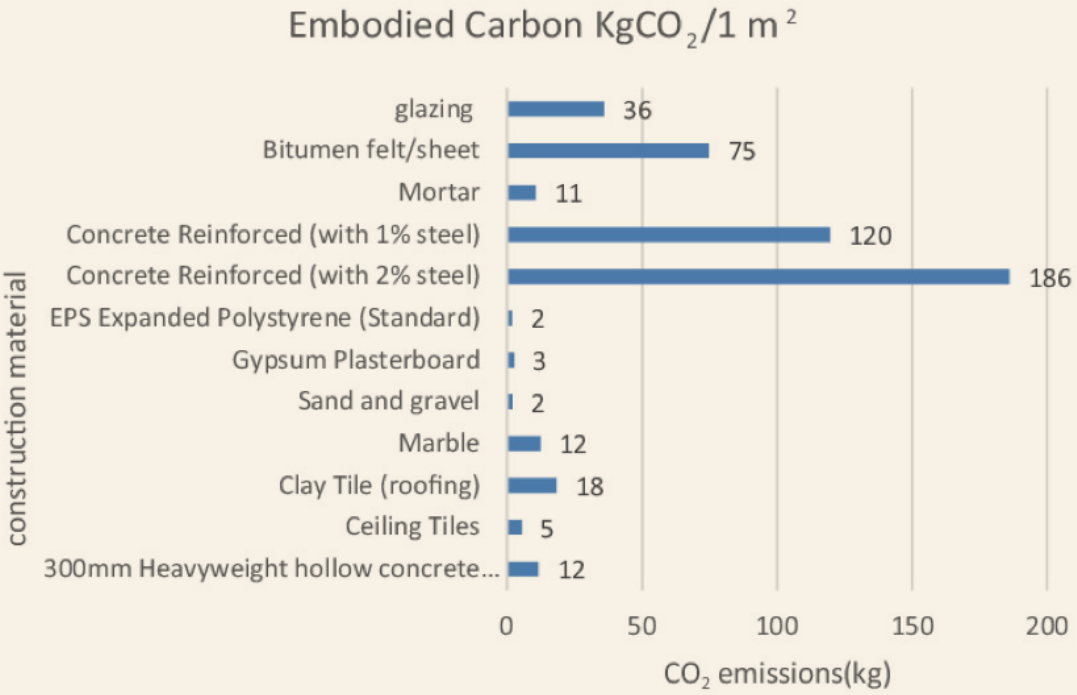
Standardisation also enables the use of modular construction techniques, where building components are manufactured in a controlled environment and then assembled on-site. This approach reduces construction time and minimises the environmental impact associated with traditional building methods. Jules Tribuzio, also from Multiplex, adds,

> *"Material selection goes a long way to achieving embodied carbon outcomes."*

By standardising material choices, developers can focus on eco-friendly options that have a lower carbon footprint, such as sustainably sourced timber or recycled steel.

The choices made at the design stage can have a ripple effect on a building's overall carbon footprint. By adopting a standardised, modular approach, developers can make more informed decisions in the procurement process, selecting materials and methods that align with a project's sustainability objectives.

Embodied carbon for main construction inputs of an apartment building



Source: Ahmed, Noha, et al., December 2020, "Impact of sustainable design in the construction sector on climate change." Ain Shams Engineering Journal 12(2) DOI:10.1016/j.asej.2020.11.002.

Concrete: a double-edged sword

Concrete is one of the most widely used construction materials globally, but its environmental impact is often overlooked. The production of cement, a key ingredient in concrete, is responsible for approximately 8% of global CO2 emissions. This is due to the energy-intensive process of transforming limestone into clinker, the main component of cement. Additionally, the extraction of raw materials such as sand and gravel for concrete production can lead to habitat destruction and water pollution.

Tom Dean, from Quantity Surveying firm Slattery, highlights an important point "By using green cement, a 1-2% increase in total construction cost leads to a reduction in up to 30% embodied carbon." This suggests that even small investments in alternative, eco-friendly concrete mixes can yield significant environmental benefits. The concrete industry itself is undergoing rapid changes, with innovations like carbon capture and storage (CCS), and the use of alternative binders to replace traditional Portland cement. These advancements aim to reduce the carbon footprint of concrete production substantially.

The future of concrete

Very soon, eco-friendly options are expected to become the industry standard without any additional cost. Companies are exploring the use of recycled materials such as fly ash, slag, and even plastic waste as partial replacements for cement. These not only

reduce the carbon footprint but also help in waste management. Moreover, green concrete options that incorporate recycled or renewable materials and require less energy to produce are gaining traction.

Informed choices for a sustainable future

The quest for sustainable construction extends beyond energy efficiency to include the embodied carbon in building materials. Mass timber is emerging as a viable, sustainable alternative to concrete, especially in Australia's BTR sector. Experts such as Simon Topliss and Frank McMahon advocate for design standardisation and modular construction to control emissions effectively. Meanwhile, the concrete industry is also evolving, with small investments in green cement mixes leading to significant reductions in embodied carbon. These developments underscore the importance of informed material choices and innovative design approaches in reducing a building's overall environmental impact.

7. Supply chains

The supply chain plays a pivotal role in the sustainability of building projects. How you source and manage materials is just as important as what you build. This section explores why supply chains matter, the current trends, and how they are evolving to support sustainable building practices.

Supply chains are crucial for several reasons:

- they determine the environmental footprint of the materials used in construction.
- efficient supply chains can significantly reduce costs.
- local sourcing can stimulate local economies and reduce scope 3 transportation emissions.

Environmental Product Declarations

Environmental Product Declarations (EPD) are gaining traction as they provide a comprehensive, internationally harmonised report that documents the ways in which a product affects the environment throughout its lifecycle. The concrete industry has particularly high-quality EPDs, while some sectors like furniture are still catching up. The number of available EPDs is doubling every year, indicating exponential growth and adoption which will result is continued cost reduction of materials. One Click, the world's leading Life Cycle Assessment (LSA) software now have over 150,000 verified datapoints (EPDs).[30]

Economies of scale

As more sustainable materials are embraced, economies of scale come into play, reducing costs. For example, windows for passive houses are now being manufactured onshore in greater numbers, bringing costs down.

Local manufacturing

Australia now has multiple mass timber plants, providing a local alternative to concrete and supporting local economies rather than having to import from Europe.

Jules Tribuzio, from Multiplex says "We've made tremendous headway with green concrete using composite type structures. The more we use it the price gap will close. Right now, we can get a 35-40% reduction in carbon and over time it will get much cheaper. The more the materials are embraced, the greater the demand, the greater the efficiency." The closer we get to 2030 the more exponential the adoption curve and supply chain efficiency.

The supply chain is an often-overlooked aspect of sustainable building but is crucial for both environmental and economic sustainability. As we move closer to 2030, the adoption of sustainable materials and practices within supply chains is expected to grow significantly, making sustainable building more accessible and cost-effective.

8. The role of planning

Planning, particularly at the local council level in Australia, could play a pivotal role in the decarbonisation of buildings. To incentivise bold and courageous developers to embark upon impactful projects, it's crucial for local governments to offer incentives such as additional floor space or increased building height, in exchange for sustainable practices. These incentives can make BTR projects more energy-efficient and reduce embodied carbon through innovative material and design choices. "Faster planning, additional floor space, and reduced tax rates can encourage the industry to make a transition" says Christian Graham, from Home.

Every building counts

The policy toolkit 'Every Building Counts: A Practical Plan for Emissions Reduction' was jointly developed by the Property Council of Australia and the Green Building Council of Australia (GBCA).[31] Launched by the federal Minister for Energy and Emissions Reduction, the Hon Angus Taylor MP, the package includes 75 recommendations aimed at transforming Australia's built environment to achieve net zero emissions by 2050. Buildings currently account for a significant portion of Australia's electricity use and nearly a quarter of our carbon emissions. The following are the key areas of this policy which are relevant to this paper.

Incentivise high performance

- Accelerate the shift to high-performance buildings with targeted incentives.
- Improve the business case for electrifying buildings with targeted incentives.
- Leverage Australian Renewable Energy Agency (ARENA) and the CEFC to encourage innovation through funding for R&D, pilots, and commercialisation.
- Incentivise NABERS and Green Star ratings for buildings not currently covered by the Commercial Building Disclosure program.

- Introduce and harmonise energy efficiency and electrification obligation schemes across jurisdictions.
- Support the creation of industry leadership groups in priority sectors to champion best practice and collaboration.

Towards zero-carbon - resilient building plan

- Set out a long-term strategy for zero-carbon-ready buildings by reforming the *Trajectory for Low Energy Buildings* and extending it to 2050.
- Develop a long-term strategy for climate-resilient buildings.
- Develop a plan for a just transition by prioritising support for low-income households and vulnerable Australians.
- Grow the workforce and invest in a skills, research, and education agenda.
- Towards zero embodied carbon
- Adopt a credible national framework for measuring embodied carbon.
- Introduce embodied carbon targets into the National Construction Code.
- Create an embodied carbon national database for products and materials.
- Introduce embodied carbon reduction requirements for government projects.
- Support Australian product manufacturers and overseas importers to calculate and disclose embodied carbon content.[32]

9. Behavioural change

The urgency to address climate change and its impacts has never been greater, but sadly, change is something we humans struggle with. The built environment plays a significant role in carbon emissions, and changes in behaviour can lead to more sustainable choices in building design, materials, and energy use.

Innovation adoption curve

Visionary BTR projects have the potential to be at the forefront of this behavioural change, leading the way for broader societal shifts. By adopting innovative and sustainable practices, BTR can set new housing standards that will eventually cascade down to all forms of housing.

Learning to love apartments: a cultural shift

The importance of density

Higher density living, often in the form of apartments, is crucial for sustainable urban development. It allows for more efficient use of resources and infrastructure, including public transport, thereby reducing our carbon footprint per capita.

Long-term living solution

In places such as Hong Kong, apartment living is not just a temporary arrangement but a long-term solution. Families grow and thrive in apartment settings, debunking the myth that quality family life can only exist in detached homes with yards.

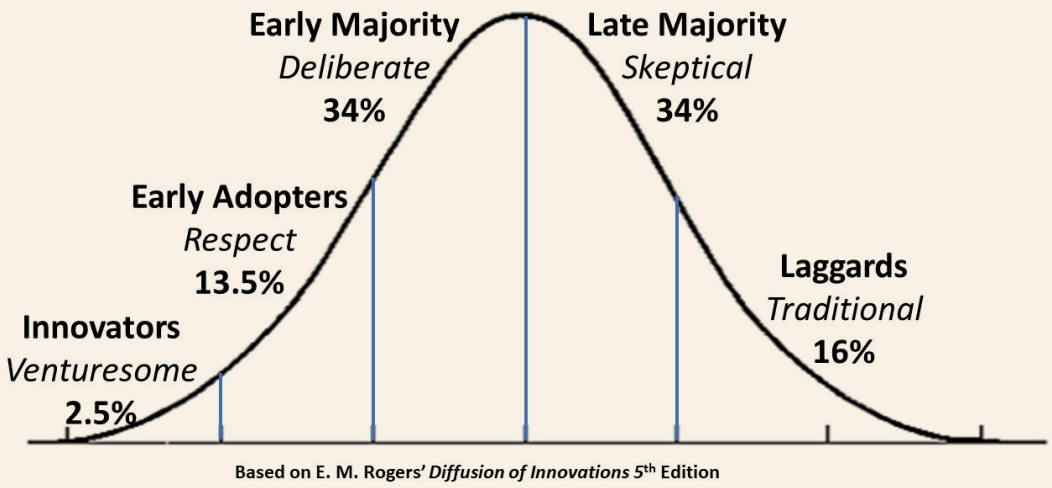
From landowners to apartment dwellers

There's a need for a cultural shift in how we view living spaces. Australian society values land ownership above all else, and needs to evolve to see the benefits of apartment living. This change is not just about the individual advantages but also about the collective good, particularly in terms of sustainability and community well-being.

By embracing these changes, we can make strides in reducing the environmental impact of our buildings while also creating communities that are more resilient, inclusive, and sustainable.

BTR is at the very beginning of the Innovation Adoption curve

10. Service excellence



Based on E. M. Rogers' *Diffusion of Innovations* 5th Edition

In the rapidly evolving BTR sector, service excellence is not just an add-on; it's a core

differentiator that sets successful projects apart from the rest. As the BTR model gains traction, it's crucial to recognise that residents are not just tenants; they are long-term customers who seek a living experience, not just a place to stay. This shift in perspective necessitates a service model that goes beyond the traditional landlord-tenant relationship, aiming for a standard of service that rivals the hospitality industry.

Hotels have long mastered the art of customer service, community engagement, and operational efficiency. They understand that the key to customer loyalty lies in the details: a seamless check-in process, high-quality amenities, responsive service, and a sense of community. These are not just 'nice-to-haves' but essential elements that contribute to the brand's value and customer retention rates.

The BTR sector has much to learn from the hotel industry's success. By adopting a high-service model akin to hospitality, BTR can achieve greater levels of community engagement and social cohesion. This approach also allows for better alignment of incentives between asset owners, management, and occupants, thereby creating a more sustainable and profitable business model.

In the following sections, we will delve deeper into the various facets of service and managerial excellence in the BTR sector, exploring how an operational focus can make or break the success of a BTR project.

The high-service model

"An approach to BTR steeped in a high service model akin to a hotel/hospitality is likely to enable greater levels of community engagement and social cohesion through closer management and the better alignment of incentives between asset owner, management, and occupants compared to traditional divestment asset class" says Liam Wallis, from Hip V Hype.

Managing key metrics

Managing turnover, resident retention, vacancy rates, and rental rates compared to competitors is a key way to manage the 'value' of the brand. These metrics serve as indicators of the brand's health and its ability to attract and retain residents.

Upskilling for operational excellence

The operational skill set still needs to be built in Australia, with skill development a priority. The ideal skill set is a blend of commercial acumen, hospitality, residential management, and the skills to operate Purpose-Built Student Accommodation (PBSA).

The importance of vertical integration

Vertically integrated platforms are a focal point in these early days. They are attractive because they allow for learning from development and operations, which can then be built into the pipeline for next developments.

Picking the winner

"Bold sustainability plans differentiate the managers that have a very sophisticated approach to investing. When you're going into an emerging market with a lot of unknowns you want to be backing someone who's got the capability not to leave any stone unturned and make sure they're not exposed. For me, that's a big thing for capital, that's where they're looking at. How much comfort can they get that they are picking the winning strategy?" explains Michael Di Russo.

The role of operations

Operational focus is paramount, according to Michael Di Russo. Those who underestimate its role will be disadvantaged, given how integral it is in driving enhanced returns. Sustainability has become the core differentiator in investments. It has become a platform for differentiation, especially in emerging sectors.

11. Offsets

Carbon offsets are a form of trade. When you buy an offset, you're essentially funding projects that sequester greenhouse gas emissions. These projects can range from reforestation initiatives to renewable energy installations.

Are they the answer?

According to Laura Hamilton-O'Hara of Living Future, offsets should be the last step in your sustainability journey, used only when you've reduced all possible emissions. They are not a starting point but an endpoint.

Reliability and equality

Not all offsets are created equal. The reliability of offsets can vary, and they are still under-regulated. It's crucial to opt for biodiverse, nature-based offsets that contribute both to carbon reduction and biodiversity.

Insets as an alternative

Insets involve local initiatives such as building a local park or planting trees. They serve as a biodiversity enhancer and have a more visible and local impact.

Financial product vs. sustainability tool

Currently, offsets are primarily a financial product. The focus should instead be on getting the basics of sustainability right before considering offsets.

Legal risks

Companies such as KLM and Energy Australia have faced legal challenges for claiming their products are carbon-neutral due to offsets. The concept of 'net zero based on offsets' is increasingly seen as misleading and we will likely see further litigation against companies using off-sets to greenwash.

The future of offsets

As the cost of emitting greenhouse gases becomes internalised in the global economy, the financial viability of offsets will increase. However, with the built environment growing at an unprecedented rate, questions arise about whether we even have enough biomass to offset all carbon emissions.

Offsets should not be the first line of defence in achieving sustainability. They are a last resort to be used only when all other avenues for reducing emissions have been exhausted. The focus should be on making substantial reductions in carbon emissions today to avoid the future costs of offsets, which are forecast to increase dramatically.

V. CONCLUSION

As we navigate the complexities of the 21st century, marked by a climate emergency and rapid societal changes, the question we began this white paper with has never been more pertinent: “Is it too expensive to build sustainably?” Our research, backed by in-depth interviews with experts across the building supply chain, leads us to a resounding conclusion: It’s simply too expensive not to.

The ‘Great Transition’ we are entering—an era of rapid change akin to the Industrial Revolution—demands that we rethink our approach to housing and sustainability. The BTR sector emerges not merely as an alternative but as a necessity, offering a pathway to address Australia’s fragmented rental market, rising construction costs, and the urgent need for sustainable living solutions.

Our findings indicate that BTR has the potential to revolutionise the Australian housing market by using the framework of regenerative development, providing a more sustainable, equitable, and community-focused solution. With a wave of net zero capital ready for deployment and significant government incentives on the horizon, BTR stands as a prime candidate to lead this transformation. The sector offers a unique alignment of market demand, financial viability, and policy support, making it an ideal conduit for sustainable innovation.

However, the journey towards a sustainable future is not without its challenges. Rapid policy changes, the urgency of the climate crisis, and evolving consumer expectations require a multi-faceted, agile approach by developers. It’s not just about constructing buildings but about constructing a future that is resilient, inclusive, and harmonious with the planet.

As we approach the pivotal year of 2030, the need for immediate and substantial action is clear. Carbon offsets and minor reforms are not enough; what is required is a complete overhaul of our current systems and priorities. The BTR sector has the opportunity to set a new standard for sustainable living, influencing not just the rental market but the broader housing market as well, by embracing the regenerative development frameworks set out in this white paper.

In conclusion, the BTR sector has the potential to be more than just a housing solution; it can be a cornerstone for a sustainable future for all Australians. The time for action is now. The risks of inaction are too great, and the opportunities for positive change too numerous to ignore. Let this white paper serve as both a call to action and a roadmap for those ready to invest in a more sustainable, equitable future.

VI. CASE STUDIES

While there aren't any case studies of Regeneratively Decarbonised BTR developments in Australia, following are several examples of similar projects that demonstrate the approach, its benefits and how it can be applied to other sectors, specifically BTR.

Photographer: Peter Clarke

1. Case Study - Gillies Hall Passive House and mass timber

Project overview

Gillies Hall is a multi-residential building comprising 150 studio apartments at Monash University's Peninsula Campus. With a focus on nursing, physiotherapy, paramedicine and occupational therapy programs, the project set out to demonstrate best practice

in indoor environment quality, wellbeing and community as well as deliver on the University's net zero goals. To achieve this the building successfully targeted Passive House certification and utilised cross laminated timber as the primary structural element. The project was built by Multiplex, one of the contributors to this paper.

Key objectives

- **Zero carbon operations for energy:** in line with the University's Net Zero Target the building was designed and delivered to be super energy efficient, all electric and powered through a combination off roof top solar and a remote wind power purchase agreement.

- **Low upfront carbon:** to reduce the construction emission and to utilise the building as a long-term store of sequestered carbon, cross laminated timber was used as the primary structural element and interior finish of the building.

- **Operational efficiency:** through air-tight, super insulated design and construction the building was able to meet the Passive House Standard and end up using half as much energy per apartment compared to equivalent accommodation buildings at Monash's Clayton Campus.

- **Indoor environment quality (IEQ):** exemplar occupant experience was targeted through a combination of a high-performance thermal envelope, heat recovery ventilation, operable windows, timber surfaces, sunlight and views over the campus's native gardens and trees. Post occupancy IEQ studies demonstrated that the building out-performs equivalent accommodation for thermal comfort and air quality.

- **Passive design and efficient systems:** In addition to delivering on the occupant experience, the Passive House design and construction utilising Cross Laminate Timber (CLT) enabled high quality construction and a high-performance thermal envelope, dramatically reducing thermal loads on the building and making it easy to eliminate natural gas and source the buildings energy requirements from renewable electricity.

- **Role of integrated design:** to achieve these outcomes the design and construction team adopted an integrated design approach to tackling the many design innovations required to deliver Australia's first large scale Passive House building, and integrate CLT into the construction. This involved collaboration between the architects, engineers, and builders to find solutions that worked across the many ambitious project goals including budget and program.

- **Lifecycle cycle assessment:** analysis of the building's construction and operation concluded that the use of CLT significantly reduced construction carbon emission compared to concrete, and with low energy demand a lower total cost of ownership over 30 years. The building would also allow for potential disassembly and re-use of the mass timber structure.

- **Community and place:** The building was designed to fit into the native gardens of the Peninsula campus and respect the natural waterflows of the site including

a dry creek-bed to manage significant rain storms, as well as create a diversity of communal spaces and sanctuaries to support student wellbeing and study.

- **Construction phase sustainability:** the adoption of CLT and Passive House principles precipitated an approach that was more sustainable. While there were no direct targets on waste reduction during construction, what became very apparent very early in the construction phase was that significantly less waste was generated on site, owing to the mass timber and façade elements prefabricated and cut to size in a factory environment. This resulted in zero waste from the timber superstructure. When compared to a typical concrete structure the approximate waste reduction was 20-30%. This is accounting for lost formwork, reinforcement off cuts, concrete slurry etc.

Outcomes

Not only did Gillies Hall achieve its goal of using half as much energy as equivalent student accommodation, but it also delivers better indoor environment quality for its occupants. Further to this through the combination of roof top solar and renewable energy from the grid the building demonstrated that large multi-residential buildings can be entirely powered from zero carbon renewable energy. The use of cross laminated timber not only significantly reduced the construction carbon it also allowed the construction program and quality assurance required to achieve the Passive House Standard and meet the incredibly tight 19-month project schedule from design commencement to handover of the building (nine months design and tender, ten months construction) enabling students to move in on time at the start of semester.

As a first of its kind, with a tight construction program and very ambitious innovation and sustainability goals, the 150-studio apartment building was more expensive per apartment than a 1,000 studio apartment project completed at the Clayton campus prior to commencement of Gillies Hall. The studio apartments at the Clayton campus had substantial economies of scale benefits and were designed to significantly different performance parameters, as the brief was developed years in advance of the Monash Net Zero Strategy.

The additional expense was the result of high-performance operable windows and thermal insulation, a striking architectural façade and associated scaffolding (required to meet the tight construction program) and the addition of a full fresh air ventilation system, where the comparison building relied on operable windows for air supply.

Gillies Hall was also designed in accordance with NCC 2016. With the building code now being closer aligned to the performance requirements of Passive House (i.e., thermal bridging), the escalation of concrete pricing, improved supply chain options with mass timber production in Australia and improved maturity in the contractor market, the cost premium of mass timber and Passive House today is expected to be closer to a business-as-usual construction.

Lessons learned from the building have subsequently been applied into office and teaching buildings at Monash's Clayton Campus that were able to achieve Passive House Certification and/or performance at typical construction costs.

2. Case study: Burwood Brickworks - Living Building Challenge

Project overview

The Burwood Brickworks project exemplifies the transformative potential of sustainable design, anchored by its adherence to the Living Building Challenge framework. This innovative project undertook a holistic approach to sustainability, reimagining retail architecture through the lens of environmental responsibility. As the project embraced the principles of the Living Building Challenge, it pursued comprehensive strategies to improve upfront carbon outcomes, enhance adaptability, reduce waste, and foster a culture of durability. By prioritising adaptive reuse, material selection, passive design, and responsible construction practices, the Burwood Brick Works project sets a new standard for retail development that balances both consumer needs and ecological well-being.

Key objectives

- **Living Building Challenge integration:** the Burwood Brickworks project championed the Living Building Challenge framework, aligning its design and execution with the highest standards of ecological and social performance.
- **Upfront carbon reduction:** the project team tackled carbon emissions by employing lower-strength concrete where feasible, curbing the use of carbon-intensive materials, embracing carbon-sequestering alternatives, and meticulously reviewing Environmental Product Declarations (EPDs).
- **Salvaged and recycled materials:** by incorporating a significant number of salvaged and high-recycled content materials, the project upheld the principles of circular economy and reduced the demand for virgin resources.
- **Adaptive reuse and appropriate durability:** during the design phase, the project adopted the ethos of "adaptive reuse and appropriate durability." The focus on flexibility, disassembly, and tenant-fitout guidance set the stage for long-term viability and material efficiency**.**
- **Passive design and efficient systems:** passive design strategies informed the reduction of additional systems and services. The project prioritised daylight maintenance, modular components, and differential wear and tear to optimise occupant comfort and operational efficiency.
- **Flexibility and deconstruction:** clear spans, standardised structural grids, and strategic floor-to-floor heights promote interior flexibility, allowing for multiple uses without extensive structural alterations. Inter-tenancy walls were designed for ease of movement, avoiding wasteful demolition.
- **Natural "honest" finishes:** the project's emphasis on natural finishes enhances the feasibility of salvage and recycling in the future. Minimising superfluous coatings preserves materials' intrinsic value and reusability.
- **Construction phase sustainability:** contractors committed to reducing environmental burdens through responsible material handling, minimal packaging, and over-ordering for future projects. Repeatable mechanical connections facilitated maintenance and deconstruction.
- **End-of-life adaptability:** the project's design considered the end-of-life phase by prioritising adaptability and equitable access. Flexible building services ensure viability, while responsible deconstruction strategies allow for future uses without costly structural alterations.

Outcomes

The Burwood Brickworks project stands as a testament to the harmonious convergence of sustainable design principles and pragmatic retail functionality. Its alignment with the Living Building Challenge framework underscores its commitment to creating a regenerative and ecologically responsible environment. By emphasising upfront carbon reduction, material reusability, passive design, and adaptability, the project not only sets a new standard for retail architecture but also paves the way for a more sustainable retail industry. The Burwood Brickworks project exemplifies the potential of reimagining consumer spaces as spaces that respect the environment and the future generations they serve.

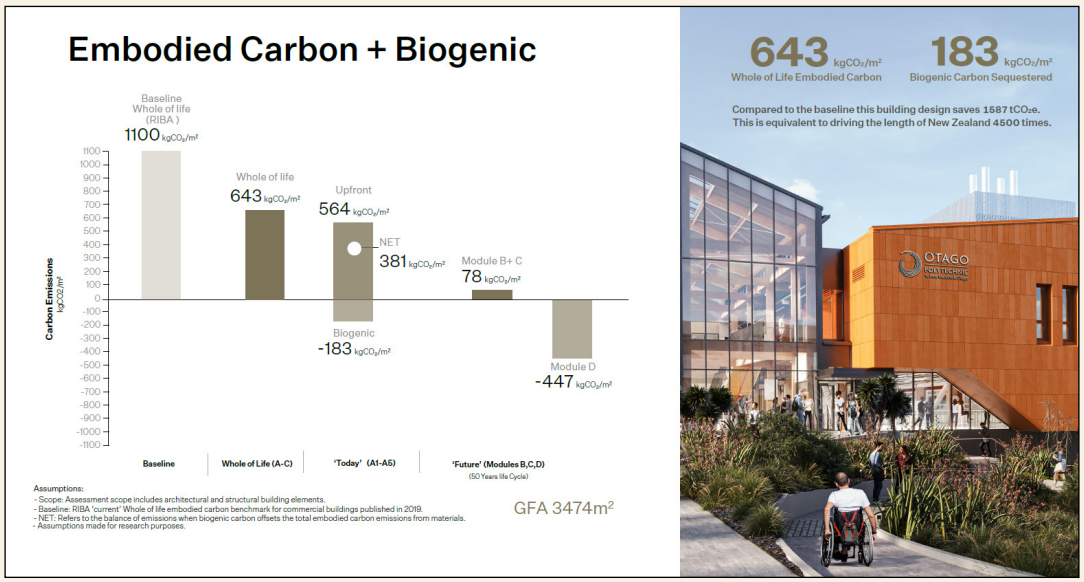
3. Otago Polytech – Living Building Challenge

Project overview

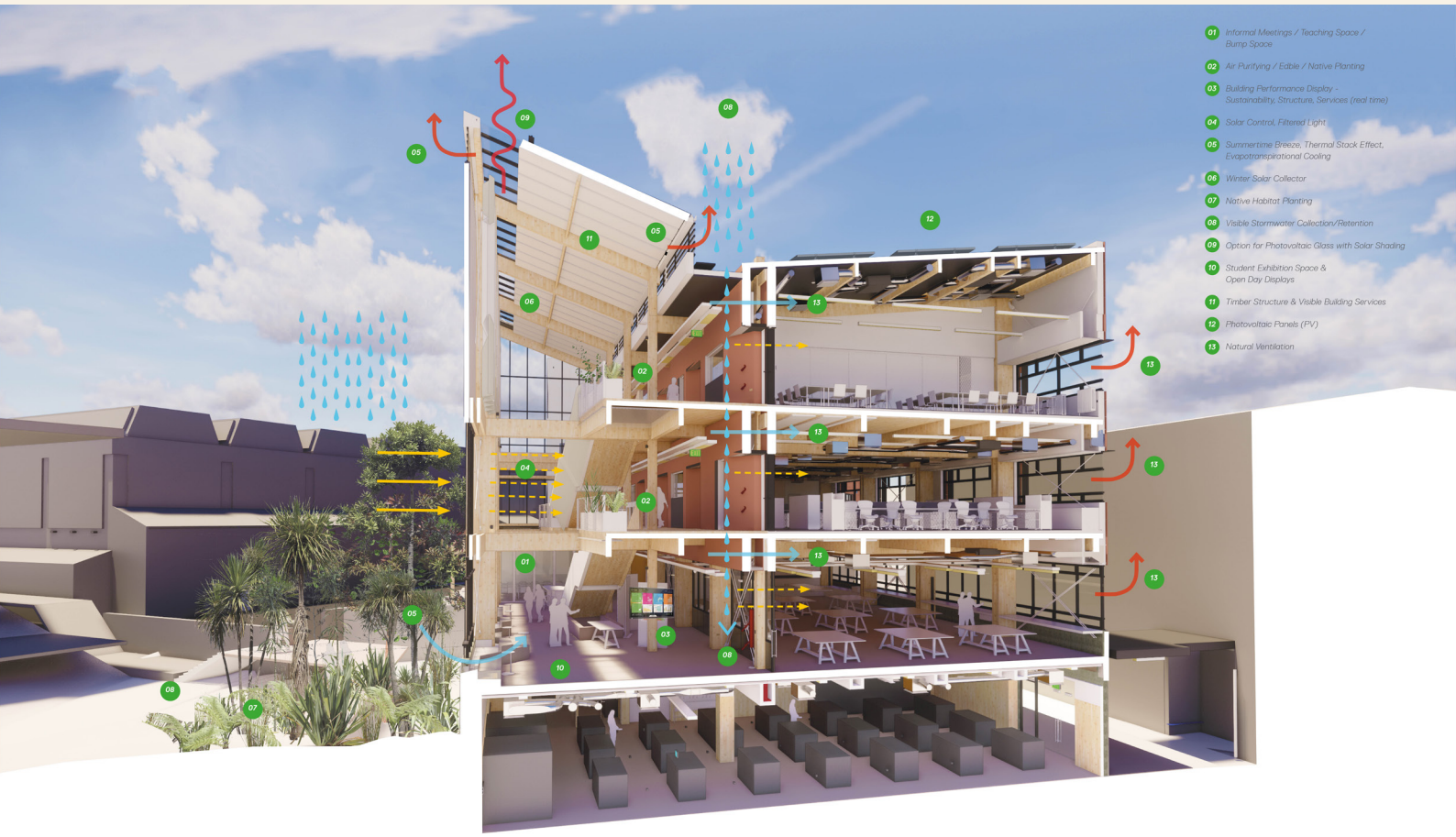
The Otago Polytechnic Campus Development project exemplifies sustainable design principles by embracing the Living Building Challenge framework. Notably, it stands as the eleventh project globally to be registered under the Living Community Challenge. The project's fundamental approach revolves around fostering a culture of well-being, preserving cultural and social values, exploring resource efficiency, and mitigating our ecological impact. The design sets new benchmarks for sustainability, with innovative features that include: a photovoltaic array, an intelligently designed stormwater collection and irrigation system integrated into the campus environment, passive solar design with efficient ventilation, biophilic design elements, a carbon-negative timber superstructure, comprehensive cradle-to-cradle product and system analysis, and an unwavering commitment to using extensively researched, non-toxic materials.

Key objectives

- **Living Building Challenge integration:** the project seamlessly integrates the principles of the Living Building Challenge, emphasising regenerative design, health, and ecological stewardship.
- **Cultural and social integration:** the design respects and integrates cultural and social values, creating spaces that enhance the well-being of occupants while fostering a sense of community and identity.
- **Resource efficiency and experimentation:** a core aspect of the project is the encouragement of resource efficiency through experimentation. The campus serves as a living laboratory for sustainable practices.



- **Reduced environmental footprint:** by adopting innovative strategies, the project minimises its overall impact on the environment, setting new standards for sustainability within its region.
- **Renewable energy generation:** a prominent photovoltaic array harnesses solar energy, contributing to the campus's renewable energy generation and reducing dependence on traditional power sources.
- **Innovative stormwater management:** the project implements visible stormwater collection and irrigation systems, serving as an educational tool while efficiently managing water resources.
- **Passive solar and ventilation:** the design maximises natural daylight and passive solar heating, supplemented by an efficient ventilation system that enhances indoor air quality.
- **Biophilic design elements:** the project incorporates biophilic design elements, fostering a connection between occupants and the natural environment, promoting well-being and productivity.
- **Carbon-negative timber superstructure:** a carbon-negative timber superstructure contributes to the project's low embodied carbon footprint and sustainable material selection.
- **Cradle-to-cradle analysis:** materials and systems undergo thorough cradle-to-cradle analysis, ensuring that they align with circular economy principles and minimise waste.
- **Research-based material selection:** the project prioritises toxic-free materials, emphasising extensive research to ensure the health and safety of occupants.



Outcomes

The Otago Polytechnic Campus Development project stands as a beacon of sustainable innovation and environmental responsibility. By embracing the Living Building Challenge framework, the project has achieved a remarkable synergy between ecological stewardship, cultural enrichment, and resource efficiency. Its integration of renewable energy, visible stormwater management, passive solar design, biophilic elements, and research-based material selection demonstrates a holistic approach to sustainability. The carbon-negative timber superstructure and commitment to cradle-to-cradle analysis exemplify the project's dedication to minimising its ecological footprint. Ultimately, the Otago Polytechnic Campus Development project serves as a testament to the power of sustainable design in shaping a resilient and regenerative future.

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