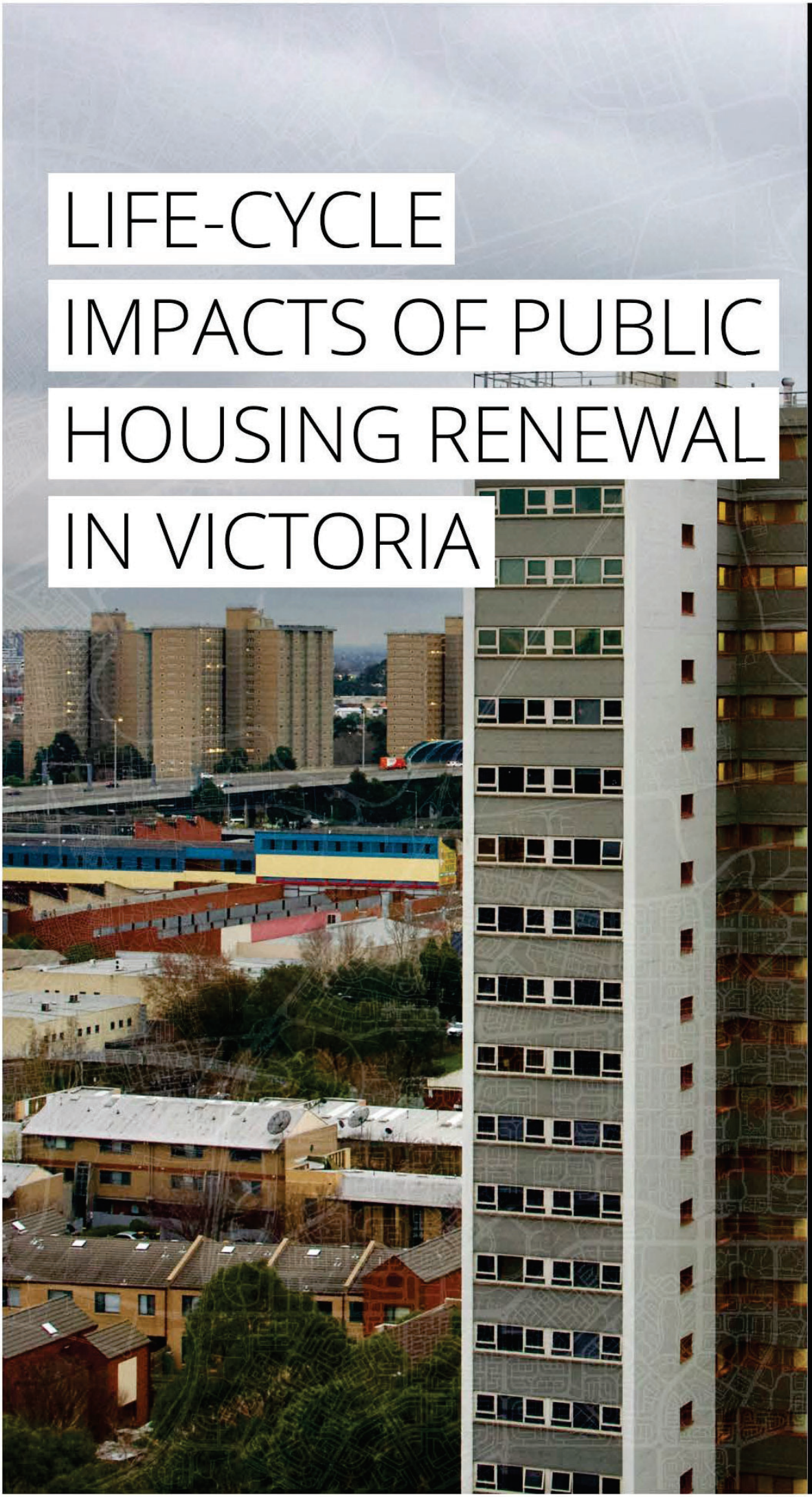
LIFE-CYCLE IMPACTS OF PUBLIC HOUSING RENEWAL IN VICTORIA



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LIFE-CYCLE IMPACTS OF PUBLIC HOUSING IN VICTORIA

A REVIEW OF THE EVIDENCE OF HOUSING RENEWAL IMPACTS ON CLIMATE RESILIENCE AND THE HEALTH AND WELLBEING OF COMMUNITIES

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INTRODUCTION

The renewal of public housing estates to meet the needs of current and future generations is a high priority for housing policy in Victoria and around the world. Public housing plays an important role in contributing to Victoria's total housing stock, and renewal programs provide opportunities to enhance neighbourhoods, increase housing supply and improve housing quality, performance, and sustainability, which is especially important for low-income and vulnerable households. Decisions about public housing renewal are complex. The needs of current and future tenants and residents, the benefits and costs of re-development, the total number of homes provided or improved, the quality of the building stock and landscapes, finance and economics, tenure mix, impacts on local neighbourhoods, infrastructure provision, and timeframes for undertaking work are amongst the many factors that must be considered in individual renewal projects and broader policy frameworks. Housing policies and projects have implications for public health, community development, climate change, urban sustainability and resilience, employment and skills, water management and more. These factors and implications mean public housing decisions cannot be made in isolation from other social, environmental and economic objectives.

Renewal of public housing estates in Victoria is an area of growing importance, and should be comprehensively considered if increased housing numbers, improved quality and performance, and positive neighbourhood outcomes are to be achieved.

This report reviews evidence relating to the environmental and social impacts of public housing renewal in Victoria. It aims to assist high-level decision-making processes relating to estate renewal by outlining the need for a life-cycle approach to climate resilience and the health and wellbeing of communities. It considers three high level strategies for estate renewal—Demolition and Rebuild, Retrofit, Retrofit and Infill—and presents international case studies for each approach.

PUBLIC HOUSING IN VICTORIA

Public housing is government subsidised rental housing designed for low-income people who are most in need. Public housing rents are calculated at 25% of the total household's income and are managed by the state government. The umbrella term social housing in Victoria consists of both public housing and community housing, the latter is operated by registered housing associations and providers (AHURI 2023). In 2022, Victoria had 64,256 public housing dwellings (73.95%), 20,605 community housing dwellings (23.71%) and 2,056 Indigenous community housing dwellings (2.33%). (DFFH 2022, ABS 2022) This evidence review addresses specifically public housing related renewal strategies in Victoria and their environmental and social implications.

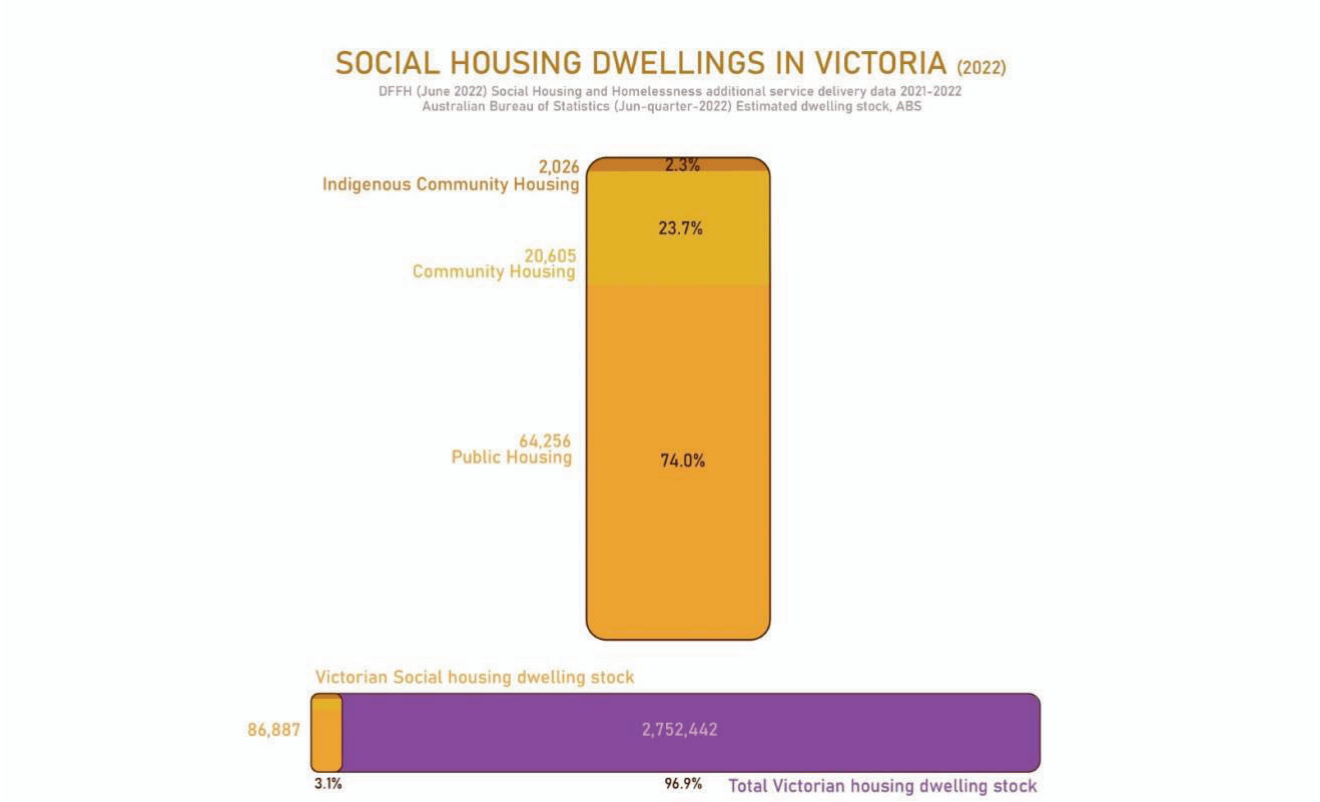

Figure 1: Social housing dwellings in Victoria and total Victorian dwelling stock in 2022. DFFH (June 2022) and Australian Bureau of Statistics (Jun-quarter-2022)

Image: Cité du Grand Parc, Bordeaux, France. Lacaton & Vassal. Via Philippe Ruault

A LIFE-CYCLE APPROACH

Public housing is a long-term investment. International best practice for buildings is to consider the whole life-cycle of a home and its occupants. Life-cycle assessment considers the impacts of housing from material extraction and construction, through to operation and maintenance, and final demolition. This data-informed approach helps to identify opportunities for public housing to become part of a circular economy, and in turn to radically reduce climate impacts, resource use, biodiversity loss and other environmental impacts. This includes extending the life of buildings and design for reuse of materials and components when a building is demolished. A whole of life approach to homes also allows for broader consideration of the impacts of renewal strategies on residents. This includes accounting for the value of place-based community connections, the relationships between health and housing quality, and the disruptive impacts of displacement of residents arising from demolition of homes.

CLIMATE RESILIENCE

Climate resilient development considers the connections between three key considerations in climate policy and action: operational carbon emissions, embodied carbon emissions, and adaptation to a changing climate. Operational emissions come from the energy and materials used when living in a home (heating, cooling, cooking, laundry, bathing, and other activities).

Embodied emissions are associated with the processes of material extraction, manufacturing, and transportation used to construct, renovate, or retrofit a building (concrete, bricks, timber, glass, insulation, etc.). In a changing climate, homes need to be adapted to be resilient to extreme events such as storms, floods, heatwaves, bushfires, and drought. Resilience has flow on benefits for social, affordability and community outcomes, such as reduced health impacts of extreme events, and lower costs associated with rebuilding or repair after natural disasters.

HEALTH, WELLBEING, AND COMMUNITY

Good quality housing is a foundation for good public health. Housing can facilitate connection to communities and a sense of place which are important for individual wellbeing and social cohesion. Strategies for public housing renewal must consider both short- and long-term implications for health, wellbeing, and community. There are numerous opportunities to increase community empowerment, avoid displacing existing communities, and create greater social bonds between residents.

ESTATE RENEWAL STRATEGIES

What to do with existing public housing stock is a central question in renewal projects and policies. Should existing buildings be retained and refurbished, or should they be demolished to make space for new, and potentially more, homes? There are three high-level approaches to public housing estate renewal, each with lifecycle benefits and costs for climate resilience and health, wellbeing and community. The three models are: Demolition and Rebuild, Retrofit, and Retrofit and Infill. International case studies demonstrate the feasibility for each approach.

PURPOSE

This report is intended to strengthen the evidence-base for a life-cycle approach to social and environmental outcomes of public housing renewal strategies. It aims to support alignment between public housing renewal policy and broader policy objectives to achieve sustainable, healthy communities and a climate resilient economy.

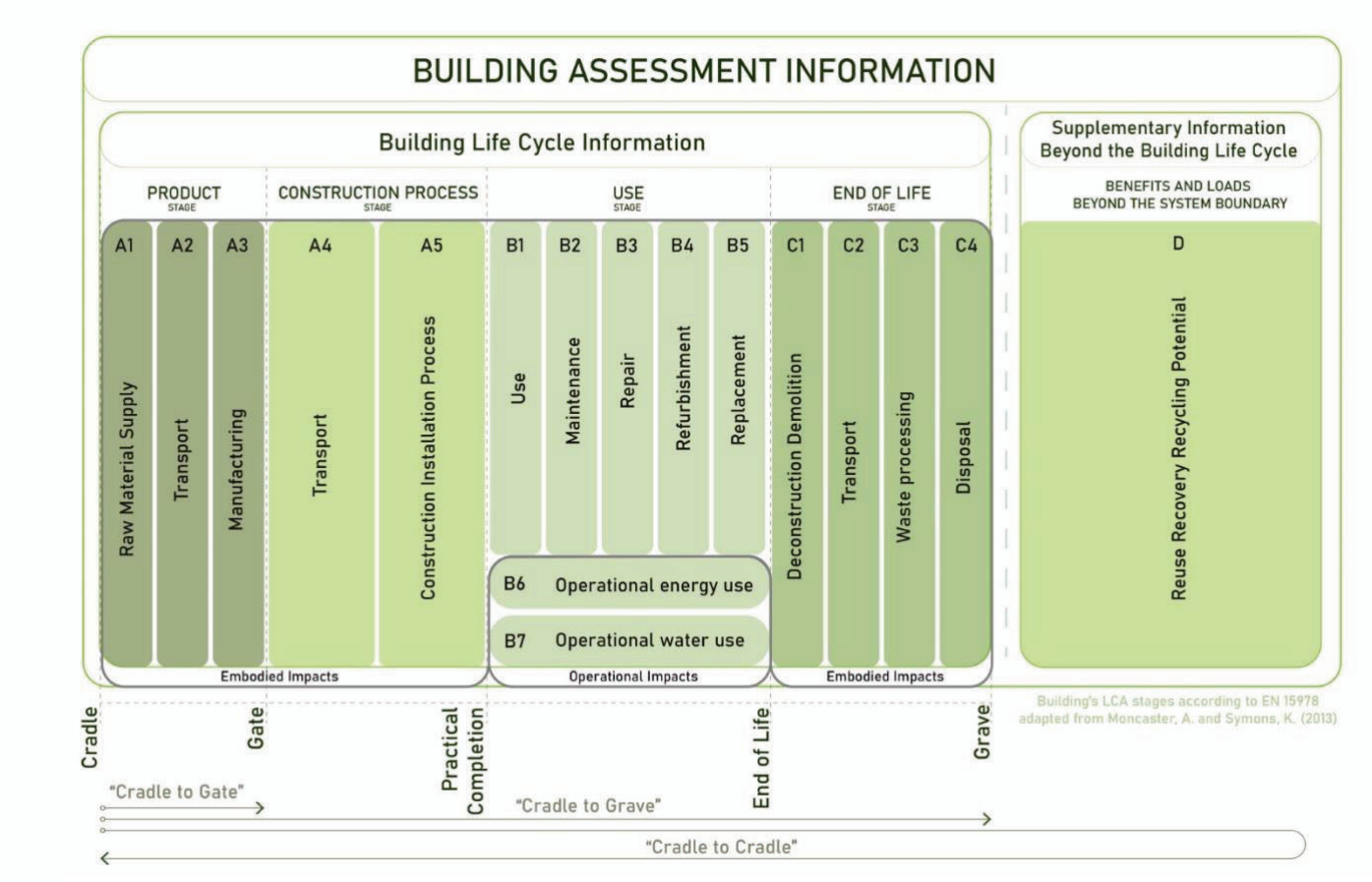

Figure 2: Building Lifecycle Stages according to EN 15978 adapted from Moncaster, A. and Symons, K. 2013

A LIFE-CYCLE APPROACH

A life-cycle approach to housing enables assessment of the longer-term impacts and benefits of different renewal options, beyond the immediate imperative to increase housing supply and performance. This approach considers impacts and benefits through the life-stages of construction, operation, maintenance, renewal, reuse and disposal. A life-cycle approach is useful to account for carbon emissions, pollution, resource demand and costs, as well as social and health implications. It can help avoid unintended environmental, social, and economic consequences while addressing the urgency to expand and improve housing provision. Comparing the full, often externalised environmental, social, and economic costs of alternative estate renewal strategies can ensure that approaches to public housing renewal are aligned with policies for health and wellbeing, environmental targets, and most effective long term economic spending.

Life-cycle assessment (LCA) is the most recognised tool for assessing the environmental performance of products and processes and is becoming increasingly used in the built environment sector (Marique and Rossi, 2018). A life-cycle approach accounts for embodied and operational impacts.

Embodied emissions include those occurring during the extraction, processing, manufacturing, transportation, assembly, maintenance, repair, replacement, refurbishment, deconstruction and disposal of the building (Figure 2) (Schmidt et al. 2020, Röck, M. et al. 2020). Operational impacts arise from the water, energy and materials used when inhabiting a building. The end of life of a building creates further emissions through the process of demolition and the reuse or disposal of materials.

Housing contributes embodied carbon emissions from materials and construction, operational emissions through fossil energy and embodied carbon materials in retrofit, and through end-of-life or deconstruction (Gosling, Towill et al. 2015; Horne et al., 2023). In 2021, the Victorian residential sector was responsible for 43% of Scope 1 (direct) plus Scope 2 (indirect) emissions (28.3 Mt CO2-e), the largest share of all economic sectors (ANZSIC) in the state (DEECA 2023).

HOUSING IN THE CIRCULAR ECONOMY

The circular economy (CE) is a policy concept that aims to reduce the materials and emissions impact of development, based on a life-cycle approach to products and services. The central idea is to eliminate waste by extending product lifetimes, reusing and repurposing products at the end of their life, and recycling constituent elements and materials. A CE also dramatically reduces energy consumption and carbon emissions by reducing the need to produce new materials.

Circular approaches to public housing renewal have the potential to significantly reduce emissions, material consumption and waste, and provides a model for the wider housing industry to simultaneously address the housing and climate crises. The housing construction and retrofit industry in Australia is currently characterised by resource-intensity, bespoke and on-site working, and splintered, subcontractor arrangements for delivery.

CE debates have entered the construction industry mainly through ideas of recycling waste materials onsite or diverting materials at end-of-use/demolition (Horne et al., 2023). However, the potential economic and environmental benefits of focusing on retrofitting and reuse of buildings, and construction methods using low carbon and recycled content are believed to be significantly greater (Eberhardt, Birgisdóttir et al. 2019; Dalton, Dorignon et al., 2023). Indeed, emissions are most efficiently minimised 'by slowing, closing, and narrowing material and energy loops' (Geissdoerfer, Savaget et al. 2017: 759).

CE housing is achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and related strategies that extend the lifespan of products and parts in both new and existing buildings. CE housing necessitates closed-loop processes, attention to universal access to quality housing, prioritising local employment, resilient and functional design, and carbon-neutral or energy-efficient operation (Horne et al., 2023). It is designed to avoid negative trade-offs, where, for example, recycling is pursued at the expense of energy efficiency, or energy efficiency is achieved using materials that are energy intensive to produce.

Recent research has explored how CE is considered within the public and social housing sector in Victoria and across Australia (Baker et al., 2023). The research found that there is limited capacity for public or social housing providers to engage with deep CE principles (e.g., refurbish or repurpose) due to competing interests such as the need to provide more housing, restricted budgets and a need to maintain and upgrade existing housing. This results in a focus on a small number of sustainability actions rather than applying a wider CE framing. Availability of funding also influences decisions, and certain funding streams direct the focus, for example, on technologies like solar panels.

New public housing in Victoria has been required to meet design and performance requirements above minimum standards for a number of years (e.g., minimum 7 star performance when wider requirement was minimum 6 star) demonstrating some consideration of CE principles in terms of improved quality and performance. However, less attention has been paid to existing public housing. There are significant opportunities for CE to be applied in current and future renewal projects. For example, CE principles could determine that existing public housing estates be retained but undertake deep retrofit, which could improve quality and performance outcomes while reducing consumption of materials and generation of waste.

PUBLIC HOUSING AND ECONOMIC TRANSFORMATION

The benefits of CE social and public housing extend well beyond lower bills and better-quality housing for residents; they include lower medical costs, better health outcomes, and radically reduced environmental impacts through embodied and operations emissions (Moore & Doyon, 2023). Moreover, due to the structure and scale of public housing, there is a prima facia case for using this asset class to build experience and demonstrate CE housing practice and lead change across the wider construction industry. Three areas stand out as opportunities for leadership in this regard:

1. Material and service supply chains: In an era where the policy imperative is to reduce carbon emissions, the redesign of supply chains has become a research focus (Bressanelli, Perona et al. 2019; Sarkis 2019). This literature advocates for new forms of strategic conduct by businesses through 'looping' supply chains so that materials and goods are brought back into the forward supply chain. Bressanelli, Perona et al. (2019: 7395) look for 'challenges that may hamper a supply chain redesign'; Shi, Zhang et al. (2018) examine the way firms in supply chains shape sustainability outcomes; Rezaei (2019) considers how to develop criteria for selecting suppliers that support sustainability objectives; and Isaksson, Johansson et al. (2010) examine the relationship between supply-chain innovation and sustainable development. However, the challenge is how research of this nature might inform the development of housing industry CE strategies.

2. Industry skills and capacities: Movement towards a more resource-efficient and circular economy will change economic activity and patterns of employment—particularly in the materials-intensive industries (Laubinger, Lanzi et al. 2020). Inevitably there will be tensions about CE and labour-market change (Dufourmont and Brown 2020). Some of these changes and tensions can be assisted by distinguishing two main types of 'circular' jobs:

A. core circular jobs (i.e., directly engaged in working with materials and processes such as renewable energy, repair, managing waste and supporting reuse
B. enabling circular jobs (i.e., creating and expanding CE though management, designing and digitising (Burger, Stavropoulos et al. 2019).

3. Digitalisation for sustainability: A significant challenge facing the housing industry, and the construction industry more generally, is the use of digital technology in building construction. This industrial use of technology is often referred to as Industry 4.0. The evidence suggests that the take-up of Industry 4.0 in the construction industry has been partial and slow (Hasan, Elmualim et al. 2018; Leviäkangas, Mok Paik et al. 2017; Newman, Edwards et al. 2020). Multiple benefits can be realised through greater use of Industry 4.0, including greater realisation of sustainability objectives (Müller, Kiel et al. 2018). There are two distinct benefits for the construction industry. Industry 4.0 can be used to:

A. measure the carbon footprint of materials and products used to create new buildings or to undertake significant retrofits (BPIE 2021)
B. create accurate, systematic and easily accessible 'track and trace' systems, as well as digital building records that can be used by owners, users and emergency services to find out how their building is constructed and what utility services have been installed (Shergold and Weir 2018).

CLIMATE RESILIENCE

Understanding climate resilience in the context of public housing estates can inform renewal approaches. A climate resilience framework simultaneously deals with both mitigation of and adaptation to climate change for sustainable development outcomes, and it can be applied at many scales, including the renewal of publicly owned housing assets. The Climate Resilient Development framework promoted by the Intergovernmental Panel on Climate Change addresses impacts of renewal choices, promoting the reduction of emissions and impacts throughout every stage of a building life-cycle (IPCC, 2022). Accounting for both the embodied and operational impacts of public housing, opportunities arise for estate renewal that can simultaneously help mitigate and adapt to climate change sustainably (Simpson 2023).

A combined climate mitigation and adaptation strategy aims to address trade-offs associated with renewal approaches. If either strategy is approached in isolation, it can be at the expense of the other. Adaptation to extreme events, droughts, heatwaves and flooding can undermine mitigation objectives by requiring significantly more whole life-cycle emissions, increasing material, energy, and waste requirements throughout the upgrading or rebuilding process (IPCC 2022). Mitigation strategies can also neglect future climate building requirements that are required to adapt to a changing climate, leading to obsolescence, greater vulnerability to adverse climate impacts, and associated disaster recovery and rebuilding costs (IPCC 2022).

The current approach to improving energy efficiency in Victoria's public housing stock deals with some issues related to poor operational performance as well as social implications of energy hardship and thermal comfort. Though there is a strong emphasis on reducing operational energy demand in public housing and Victorian programs working to improve energy efficiency, these discussions neglect embodied energy and emissions. Quantifying embodied energy and emissions implications of public housing renewal projects is likely to reorient decisions around demolition of current stock and emphasise broader considerations of CE approaches.

Addressing climate change requires coordinated effort across Australia to achieve the commitment to a 43% emissions reduction below 2005 levels by 2030. The State of Victoria recognises shared responsibility of all levels of government and, legislated in the Climate Change Act 2017, is also committed to achieving net zero by 2050 in line with the Federal Government targets. Public housing renewal decisions play a key role in the achieving these targets, and promoting effective approaches to climate resilient housing across Victoria.

This section considers climate mitigation through energy and whole-life greenhouse gas emissions, and adaptation strategies in the context of public housing renewal decisions. Renewal of existing state-owned and operated housing presents significant opportunities to reduce operational energy usage and embodied greenhouse gas emissions throughout their life-cycle to achieve carbon targets and adapt to increasing climate risks. It is also imperative that public housing estates are safe, comfortable and affordable in a changing climate. Comprehensive considerations of the range of environmental implications associated with estate renewal can help to assess trade-offs in Victoria's existing and future public housing stock.

OPERATIONAL ENERGY AND EMISSIONS

An aging public housing stock, together with high operational energy demands frequently leads to the decision to demolish homes. In 2016, it was estimated the average age of Victoria's public housing stock was 35 years, with 60% of public housing stock being over 30 years old (AHURI 2020). The quality and condition of Australian public and social housing more broadly is extremely variable, with poor energy efficiency and un-healthiness being well-documented (AHURI 2023). It has also been estimated that between 17-45% of Victorian public housing is without ceiling insulation (AHURI 2020), contributing to poor comfort and high energy usage. Across Victoria's total housing stock, a correlation has been documented between age and performance. All housing tenure types built between 1990-2005 are estimated to average a House Energy Rating of 3 stars, and housing built before 1990 around 1.5 stars, both remaining well below 7 stars required under current National Construction Code

Standards for energy efficiency (Sustainability Victoria 2019). Old and poorly functioning buildings can pose significant risks in the context of climate change, reducing the resilience of cities and communities, and are known to contribute to a range of other issues such as affordability and poor health and wellbeing (Hales et al. 2007).

It is understood that lack of maintenance impacts a building's lifespan (Grunning et al. 2020, de Brito and Silva 2020, Akomolafe 2018). Maintenance backlogs, and unaddressed building issues in Victoria's public housing has been widely reported (VAGO 2017, AIHW 2021, HV 2022), impacting the longevity of the existing housing stock, and the health and wellbeing of residents. This is of particular concern to government housing agencies, as they hold large stocks of old, energy-inefficient dwellings, a social responsibility to provide adequate and healthy housing for all (AHURI 2020) and increases the frequency and associated costs of public housing renewal.

ENERGY HARDSHIP

Energy hardship describes an inability or difficulty to pay energy bills, particularly related to heating and cooling homes (Churchill and Smyth 2020, Brown and Ver-Toscano 2021). For public housing residents, this can often mean a choice between financial stress from falling behind on energy bills, or turning off heaters on cold winter nights. It is estimated that 18-23% of households experience a form of energy stress, with public and community housing renters experiencing the highest rates of energy stress in Australia (Bryant et al. 2022). Total household expenditure has seen an increasing portion of household income spent on domestic fuel and power in Australia, meaning more are at risk of energy hardship particularly public housing residents (AHURI 2020). As energy costs continue to increase, this situation is becoming worse for low-income households.

Inability to pay energy bills or meet comfort needs is common in public housing tenants. In Victoria, space and water heating make up 60% of the average Victorian household bills in 2019 (Sustainability Victoria 2019). 7.3% of all households had persistent difficulty paying their energy bills and 1.8% of people are persistently unable to heat their homes (Sustainability Victoria 2019). Among renters, Public Housing tenants are overrepresented in having persistent inability to heat their homes (VCSS 2018). As climate change is increasing the number and severity of extreme weather events, providing measures that can reduce energy hardship are important, particularly energy efficiency and electrification.

ENERGY EFFICIENCY

The energy efficiency and general quality of social and public housing is a longstanding topic of concern (Daly et al., 2021; Evans et al., 2023; Halldorsson et al., 2020; Moore et al., 2017). Understandably, given that it is low-income households who have limited capacity to pay energy bills, the Victorian government has tried to ensure new social housing is built to a higher standard than minimum regulations. However, other key resilient and circular economy housing parameters such as durability, passive design, extending the life of dwellings, and material loops are not yet established in public and social housing procurement or management (Baker et al., 2023).

There are a range of approaches for improving the energy efficiency of public housing estates. These may include, improving thermal performance of external building fabric, changes to building services, or demolition and rebuilding with higher performance buildings. Reduction of energy usage is important for reducing energy bills, contributing to energy security and affordability, reducing greenhouse gas emissions, and lowering peak demand (COAG 2019). Importantly however, a climate resilient decision should account for improvements to not only operational energy, but also the embodied energy and emissions, and resources required to improve public housing efficiency. Energy efficiency is of particular importance to residents, marked as the second highest amenity important to social housing tenants in Australia (nominated by 96% of Public Housing tenants) (AIHW 2018). The importance of improving the energy efficiency of public housing stock has been recognised, through schemes such as the $112 million Victorian Social Housing Energy Efficiency Program (EESHP) to support the upgrading of 35,000 public, community and Aboriginal housing properties through retrofitting (Victoria State Government, 2020), expanded in 2023 by a $46 million contribution from the Commonwealth Government.

ELECTRIFICATION

To meet Victorian climate commitments, decarbonisation requires households to transition away from natural gas consumption. Transitioning housing from gas to electric alternatives of building systems and appliances is the process of electrification. Victoria has the highest residential gas usage in Australia, which is underpinned by an expansive gas network and high rates of gas-fired space heating. Shifting to electricity as the grid decarbonizes is key to the mitigation of climate change (MCCCRH 2023). However, moving off gas to all-electric homes is host to a number of barriers for low-income renting households, who commonly reported a low level of involvement and consultation in decisions by their housing provider (Chandrashekeran et al. 2023). The Victorian Government is currently taking steps to transition off gas usage, outlined in Victoria's Gas Substitution Roadmap (DELWP 2022), recently announcing that all new housing from 2024 will be required to be all-electric, although there are no requirements yet for existing housing to engage in the electrification transition. Public housing estate renewal is an opportunity to transition away from gas and demonstrate how existing housing assets can cost-effectively switch to all-electric operational energy, and build examples of best practise for new infill, and rebuild construction.

EMBODIED ENERGY AND EMISSIONS

Building-related emission mitigation strategies have largely been focused on reducing operational emissions, despite significant emissions coming from the other stages of a building's life. Up to 45% of a new building's emissions will be embodied emissions, but this can be even greater for buildings with low to zero operational emissions (Röck et al., 2020). As energy efficiency improves and renewable energy provides a higher proportion of the energy used in building operations, embodied emissions used in the construction of a building are becoming a larger proportion of a building's life-cycle impacts. Accounting for these emissions is critical in decisions to demolish or retain and improve existing housing. Using reliable and comprehensive data and tools to calculate embodied emissions and other environmental impacts, is becoming increasingly important as policy makers look to address the broader implications of housing development decisions (Pomponi and Moncaster, 2016).

Numerous approaches to reduce embodied emissions exist, several promoting the retention of materials and structures. A systematic review presented seventeen mitigation strategies to reduce embodied emissions in buildings and promoted a pluralistic approach to reducing embodied emissions (Pomponi and Moncaster 2016), among them refurbishment of existing buildings, better design, policy and regulations, use of local materials, and increased use of prefabricated elements/off-site manufacturing. Reducing embodied emissions is also highlighted in the IPCC's recent 2022 mitigation report which states 'established cities will achieve the largest greenhouse gas emissions savings by repurposing, or retrofitting the building stock, strategic infilling and densifying, as well as through modal shift and the electrification of the urban energy system'. Retrofitting too has embodied emissions implications, however major differences between retrofit and rebuild projects can be attributed to the construction and demolition impacts of the end-of-life stage of the existing building. Studies using LCA to compare embodied emissions of rebuild and retrofit projects have found that retrofitting has 30-50% lower embodied emissions than a rebuild approach (Marique and Rossi 2018). Furthermore, retrofit holds considerable potential of reusing and recycling materials, reducing construction waste (Li and Yang 2014).

ADAPTATION

Public housing tenants are particularly vulnerable to the effects of climate change, such as urban heat island effect which was found to disproportionately impact lower income neighbourhoods in Melbourne (Chakraborty et al. 2019). Climate adaptation, adjustments to actual or expected climate effects, is of importance to housing estate renewal to reduce the vulnerability of public housing tenants (IPCC 2022, AHURI 2023). Increasing adaptation measures is a strategy that reduces risk and provides numerous social and environmental benefits (Global Commission on Adaptation 2019). Housing has the potential to protect residents from increased climate impacts, or expose them to climate related harms, increasing the risk to their health and wellbeing (Lander et al. 2019), and also have implications on resident's costs of living such as energy hardship (Brotherhood of St. Laurence 2022, VCOSS 2018).

Image: Wellington Street, Collingwood Housing Commission High Rise Building

HEALTH, WELLBEING AND COMMUNITY

Good quality, affordable housing is essential for positive life outcomes for individuals and families, and the foundation for resilient communities and a fair society. Public housing estates are home to diverse communities and social networks, including some of the most vulnerable people in society

HEALTH

Housing is an important social determinant of health. Existing studies recognise a variety of ways in which lack of housing or poor-quality or performing housing can negatively affect a person's mental and physical health (Bonnefoy et al. 2003, Baker et al. 2014 , Ziersch et al. 2017). 7.3% of all Victorian households had persistent difficulty paying their energy bills and 1.8% of people are persistently unable to heat their homes. (VCOSS 2018) In Victoria, only 61% of Public Housing tenants believe their thermal comfort needs were being met (AIHW 2019) and were overrepresented among renters who have a persistent inability to heat their home, often forgoing the use of their heating appliances to afford rent and bills. (VCOSS 2018, Brotherhood of St. Laurence 2022). The range of decisions in public housing renewal have implications on health of residents and their future wellbeing as well as having wider social implications across communities.

A history of underspending on adequate maintenance (identified in government reports and audits since 1993) to ensure protection of the building assets, thermal comfort and suitable living conditions has contributed to detrimental health and wellbeing impacts for public housing residents. In Victoria, maintenance backlogs in both social and public housing were found to be 'producing unacceptable conditions for many tenants' (Social Housing Regulation Review, 2021). The Australian Housing Condition Dataset, a survey of 4,501 households found the proportion of respondents reporting major building problems was higher for renters than owner-occupiers across almost all categories (cracking, mould, rising damp, wall or windows out of plumb, roof defects) (AHURI 2020, Kim et al. 2015)

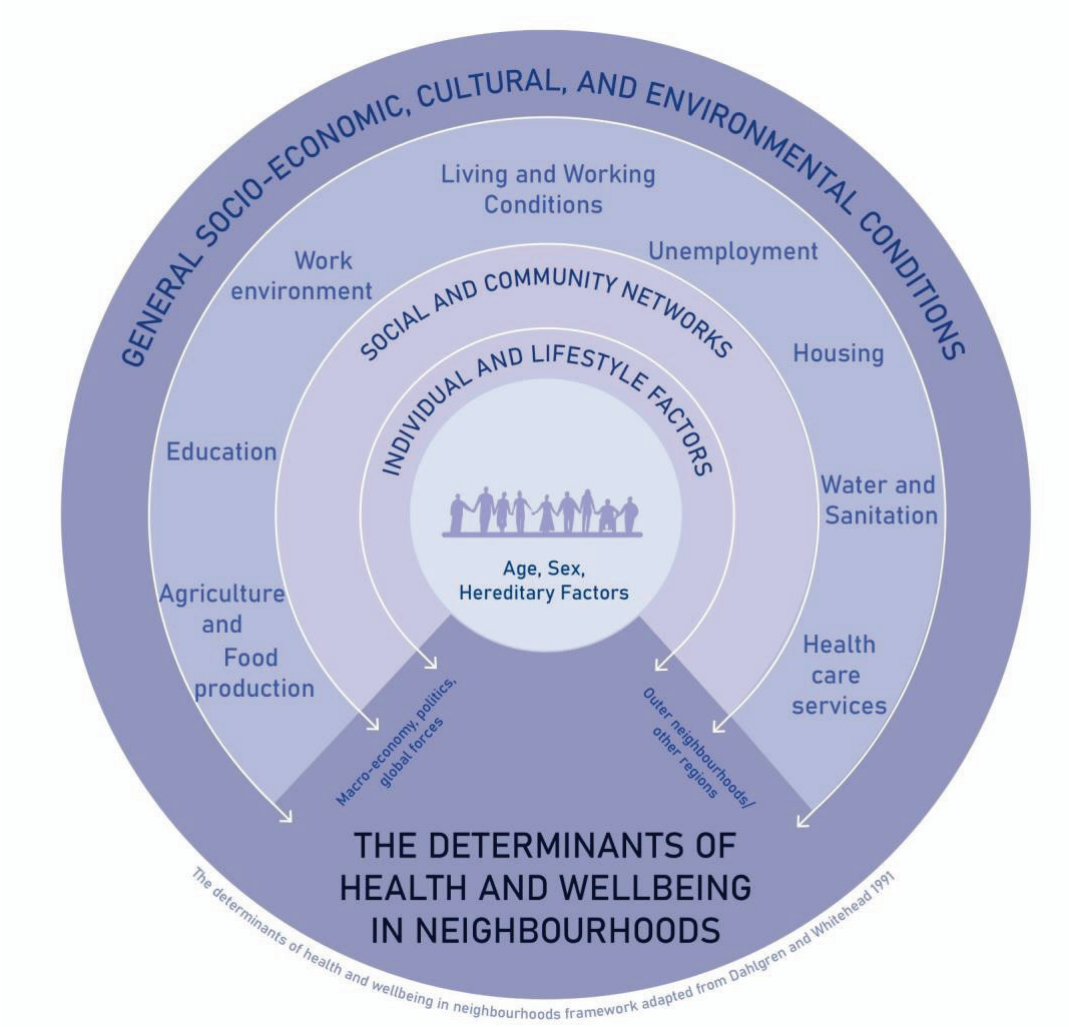

Figure 3: The determinants of health and wellbeing in neighbourhoods framework adapted from Dahlgren, G. and Whitehead, M. 2021

WELLBEING

The importance of home and security in housing tenure has long been recognised. The most basic of physiological needs require, after food and water, shelter and safety. Once these are fulfilled, two other levels of need must be satisfied for personal well-being: psychological, often summarised as esteem and belonging, and self-actualisation, involving achieving potential and enabling creativity (Maslow 1943, 1954). The United Nations Declaration of Human Rights (2023) extends this typology as follows:

- Cognitive needs – knowledge and understanding, curiosity, exploration, need for meaning and predictability;
- Aesthetic needs – appreciation and search for beauty, balance, form, etc.
- Transcendence needs – A person is motivated by values that transcend beyond the personal self (Maslow 1970 a,b, 1987).

In order to flourish, all of these require security and sense of place. The meeting of these fundamental needs is important not only to personal wellbeing but to society as a whole (Seligman 2011, Wilkinson & Pickett 2009). Public housing is a vital element in the range of housing options, providing security to those on low-incomes who would otherwise be in the poorly regulated and much more expensive private rental market. For these reasons, in addition to the many economic and environmental arguments, it is of critical importance there are careful and considered approaches to estate renewal, which acknowledge the impact on public housing residents. Findings from the Greater London Authority identify that the impact of regeneration schemes on residents physical and mental health are 'unlikely to be effectively evaluated and their significance may be under-estimated' (2015).

COMMUNITY

Public housing estates are characterised by concentrations of low-income households. Households in public housing are less vulnerable to the effects of poverty as those still on waiting lists and trapped in the private rental market. Housing for public tenants is subsidised and contains strong support structures, and there are many case studies in the literature of lasting community bonds and social networks that develop in this context of relative adversity (Allen 2008, Tyler and Slater 2018).

One of the arguments for the demolition of public housing and reconstruction in a public-private mix is that they are concentrations of disadvantage. Melbourne's inner- and middle-suburban estates are typically small and surrounded by private housing. That is, public housing blocks are already in close proximity to private dwellings. These communities have good access infrastructure and local services including public transport, pools, schools, libraries, community health centres and sports centres, with plentiful opportunities for social interaction. Most public housing estates are highly diverse in culture, religion and ethnicity. (Shaw 2012b)

Overcoming negative 'neighbourhood effects' may also be used as an argument in favour of demolition and reconstruction of public housing estates. 'Neighbourhood effects' refers to the idea that living in a poor area compounds the effects of poverty. It is a concept drawn from the rust-belt cities of the US and parts of the UK, with race as the major factor in segregation combined with poverty. The idea of 'neighbourhood effects' has been repeatedly challenged in far-reaching international research (Watt and Smets 2017, Tyler and Slater 2018, Manley et al 2012). Racial segregation has been reduced in public housing in the UK and US and 'negative neighbourhood effects' are not relevant to the Victorian policy context. Inner- and middle-Melbourne public estates do not suffer negative 'neighbourhood effects' borne of segregation and massive concentrations of poverty (Shaw 2012b).

DISPLACEMENT

Displacement describes 'what happens when forces outside the household make living there impossible, or hazardous, or unaffordable' (Hartman et al 1982). It is a feature of structural inequality, and has been driven by state-based renewal programs. Displacement includes both direct displacement, through eviction or other forms of forced relocation, and indirect displacement. Indirect displacement occurs when households become so marginalised or isolated in a neighbourhood they feel they have little choice but to move, if they are able, and if not, can find themselves in the invidious position of being fixed in place while suffering a profound sense of loss of place and community (Shaw and Hagemans 2015, Porter et al. 2023).

The effects of displacement on physiological, psychological and emotional health, and therefore on wellbeing, social connection and life opportunity, are well-documented (Davidson 2009, Allen 2008, Marcuse 1986, Hartman 1984). Displacement of low-income communities is known internationally to cause serious harm and even death. This creates high costs to the economy and health systems, with serious broader social effects and those on individuals. (Porter et al. 2023)

Scholarly and community-based work over the past 50 years has shown that the impacts of all these kinds of displacement are overwhelmingly negative. Displacement is described as grief, 'rootshock' and 'domicide'. The kinds of psycho-social, health and economic impacts experienced by people suffering displacement include loss of sense of home and community, loss of access to key long- standing social networks on which they relied, loneliness, loss of identity, loss of security and ownership, loss of job and livelihood, despair, depression and anxiety, and loss of access to vital services or facilities. (Porter et al. 2023) These impacts have wider effects than on those directly displaced. Families, friends and communities are all affected as social, economic, and health effects ripple out.

Displacement is widely justified in state-based renewal programs as necessary to achieve a public good, and sometimes as a direct benefit to the displaces themselves. This justification can reinforce a stigmatisation of neighourhoods and residents, depicting public housing estates and residents as socially and environmentally dangerous. Stigmatising language is deployed in political and public discourse to create a justification for socially unjust displacement (Porter et al. 2023).

EMPOWERING RESIDENTS

Resident involvement in regeneration decisions should lead to better outcomes. Involvement can take many forms, from engagement over which model of renewal is most appropriate for that estate: Demolition and Rebuild, Retrofit, or Retrofit and Infill, to tokenistic consultation that has little to no effect on decisions already made.

Public housing estates are different and in differing states of repair, depending on when and how they were built, the attention and funding that has gone into maintenance, and the general culture of care towards and within the communities that reside there. Therefore, different strategies for renewal must be employed. There is no one size fits all.

Involving residents in the design of replacement housing has a long history in community planning and development. The benefits are extensive, not least through the resultant community ownership of the process. The Victorian government runs an engagement process on all major policy initiatives, estate renewal amongst these, but residents and communities are rarely asked whether an initiative should proceed. If there is agreement from all parties that a project should proceed, then the next stage in consultation should occur – namely, what form it will take and how it will be managed. In the public housing renewal program, these questions are rarely asked of those most affected.

RESIDENT EMPOWERMENT CASE STUDY: MAYOR OF LONDON RESIDENT BALLOT REQUIREMENT

Since 2018, social housing landlords seeking funding from the Greater London Authority for estate renewal projects that involve demolition of homes and construction of more than 150 new homes have been required to demonstrate support from residents by conducting a ballot. This requirement is supported by the Mayor's Good Practice Guide for Estate Regeneration which promotes full and transparent consultation and involvement of residents in design and decision-making (Mayor of London, 2018b). The policy is intended to increase the supply of good quality, safe and affordable housing for local people, and to improve the quality of the local environment and public realm. It includes the right for residents to remain or return to estates after regeneration and like-for-like replacement of affordable homes. These policies have supported stronger resident engagement and community-led regeneration planning, providing tools for residents to participate more actively in shaping the future of their estates and neighbourhoods (Sendra and Fitzpatrick, 2020).

Image: Dight St, Collingwood. PROV/State Library Vic. Housing Commission Victoria, Collection of Slides H2015.15/545 113 Box 1-3

ESTATE RENEWAL STRATEGIES

Housing estate renewal may be required for a number of reasons, including the age of the building stock, lack of maintenance over time, or opportunities to optimise the use and value of public land and assets. Decisions around how to upgrade existing public housing are not always supported by transparent, evidence-based process, partly due to commercial and political sensitivities. As a study into 'demolition or refurbishment' from University College London describes (Crawford et al., p.5):

Decisions to demolish or refurbish buildings are often taken by professional experts and developers, without adequate engagement with local residents and communities. Demolition or retention decisions can not only cause conflict between residents and regeneration authorities, but can also cause conflict within communities. Where some people see dilapidated, unhealthy, antisocial buildings that should be knocked down, others see homes, communities and opportunities for renovation and refurbishment.

The report also found that 'decisions to demolish or refurbish building are rarely clear cut and will invariably involve trade-offs between different objectives and values' (p.5).

In 2023 the Victorian government announced a major package of investment and reform. Among other measures, the Victorian Housing Statement reinvigorates the Public Housing Renewal Program (PHRP) and the Ground Lease Model (GLM) which collectively have been in operation for the last decade. Both models have prioritised demolition and rebuild as the preferred method for estate renewal. The approach involves the relocation of residents, demolition of existing buildings, and the redevelopment of the site under a Private-Public-Partnership with typically 30% social housing and 70% private housing delivered.

Previously these policies had concentrated on demolition and replacement of the walk-up buildings on inner-city estates – three to four storey blocks which were predominately built in the 1960s. The 2023 statement expands this program to the distinctive towers on public housing estates across Melbourne, all 44 of which are planned to be demolished over the next 27 years. If the remaining walk-up blocks are also included, this will result in the replacement of almost the entirety of Melbourne's large public housing estates established from the 1950s to the 1970s.

This section details the benefits, costs and potential implications of three different approaches to estate renewal, to identify the trade-offs, and identify hidden costs. The three models discussed here are:

1. Demolition of existing public housing and the new build of a mix of private and community housing
2. Retrofitting of existing public housing
3. Retrofitting of existing public housing and introduction of new infill housing to increase dwellings

Additionally, each of these models has a range of variations (e.g., financing models, or specific community needs) and should be considered as broad strategies that are adaptable to site-specific conditions and requirements. There is scope for this approach to be applied to feasibility studies for a range of building typologies, including tower blocks, walk-ups, and single-story dwellings. These three models are then illustrated through international case studies, to demonstrate the costs and advantages of each model.

While the regeneration decision making process is necessarily context and site specific, in order to reflect the relevant legislation, policies and objectives of the site (as well as the conditions of the public housing buildings); the tables below outline how each approach generally delivers against built outcomes and environmental, social, and economic impacts. Each table below details the benefits and limitations of the three models, against four key areas of analysis:

- Built outcome
- Climate resilience
- Health, wellbeing and community
- Economic impacts

The specific economic value of each model is not detailed, as the financial viability of the approaches are informed by the condition of the estate, supply chain and market dynamics, investment models, and level of retrofit or new build required. In addition to typical CAPEX, OPEX and capital investment appraisal analysis; this report advocates for capturing the true costs of demolition, loss of public land, temporary rehousing costs, and impacts on resident health and wellbeing.

DEMOLISH AND REBUILD (MODEL 1)

National and international trends in regenerating public housing have seen existing estates demolished, and then replaced by private, public and community dwellings. The mechanisms for achieving these outcomes differ, but can include sale of public land, long-term leasing of public land, and other land-use and management agreements between the government, developers and community housing managers. Table 1 below outlines the associated benefits and costs of the Demolish and Rebuild approach to public housing renewal, taken from a range of government strategies and objectives (including from the United Kingdom, Victoria and NSW) and a number of academic papers.

TABLE 1 – COSTS AND BENEFITS OF DEMOLISH AND REBUILD (MODEL 1)

KEY AREA	BENEFITS OF THIS APPROACH	COSTS OF THIS APPROACH
BUILT OUTCOME	• Contemporary design: - Meeting contemporary spatial requirements - Provision of specialist disability apartments (Wiesel 2020) - Incorporating ageing in place principles • Meeting universal access requirements (Wiesel 2020) • Increased number of apartments (Homes Victoria 2023)	• Reduction in number of social housing bedrooms (Arthurson et al. 2014, Parliament of Victoria 2018) • Loss of architectural and social history (Mazzarella, L. 2015) • Loss of mature landscaping, vegetation, and other biodiversity (Opoku 2019)
CLIMATE RESILIENCE	• Potentially improved community facilities – parks, playgrounds, gardening, recreation. (Homes Victoria 2023) • Achieve green energy ratings such as natHERS (Sayce et al. 2022, UKGBC 2019) • Energy efficient buildings (COAG 2019) • Decreased operational costs (COAG 2019)	• High upfront energy requirements • Increasing embodied emissions (UCL 2014, Dorr et al. 2022) • Existing hazardous materials (contaminated site) (Paton et al. 2022, Victoria State Government 2020) • Increased material extraction and biodiversity loss off-site (Opoku 2019)
HEALTH, WELLBEING AND COMMUNITY	• Potentially improved community facilities - parks, playgrounds, gardening, recreation (Rao 2021) • Reduced energy stress (Brotherhood of St. Laurence 2022, VCOSS 2018)	• Relocation of residents: - impact on wellbeing, health and community connections (Levin et al. 2014, Parliament of Victoria 2018, Porter et al. 2023)) - removal of houses from the public sector during construction (ACT Auditor-General 2017) • Increased rental payments for tenants in the transition from public to social housing (Porter et al. 2023) • Low return rates for relocated residents (Arthurson et al. 2014, Parliament of Victoria 2018)
ECONOMIC IMPACTS	• Job creation in the building industry (SGS 2020) • Aligned with public-private partnership delivery model (Homes Victoria 2023) • Disaster risk reduction (de Vet et al. 2019) • Avoiding obsolescence (Buitelaar et al. 2021)	• Potential loss of public land and assets (Pawson and Pinnegar 2018) • Financial cost to relocate and house residents (Atkinson et al. 2011) • Volatility of construction and property markets • Gentrification effects, and tendency towards unaffordable housing market (Atkinson et al. 2011, Porter and Kelly 2019) • Construction time length and delays

DEMOLISH AND REBUILD CASE STUDY: HEYGATE ESTATE (LONDON, ENGLAND)

Eastern Perimeter Block, Heygate Estate, South London 2011 Stephen Richards via Wikimedia Commons

The 'slum demolition' (Lees and Ferreti, 2016) of Heygate Estate in Elephant and Castle (South London) was part of a 2004 masterplan developed by the Southwark Council. The Estate was sold to Australian developer LendLease for £50 million to establish a 'mixed income community', after the council spent £44 million in relocating the 3,000 council tenants and leaseholders from the site, and £22 million in redevelopment plans (Lees, 2014). Reports by London Assembly and the Twentieth Century Society advocated for the refurbishment of the Estate rather than the sale of the land, demolition and rebuild model; and found that buildings were 'structurally sound.'

The existing 1,200 dwellings on the site were demolished, after council housing residents were relocated and owner-occupiers had their properties compulsorily purchased. Southwark Council planned for the site to be rebuilt with 2,500 homes, of which 500 would be social housing units. However, LendLease's plans delivered only 82 social housing dwellings, resulting in a loss of over 350 social-rented homes. Additionally, the private units which were promoted in plans as for local families and essential workers, were primarily purchased by international investors, and were made available in Singapore to speculators before being advertised to London families. All 51 properties in the South Gardens section were sold to foreign investors (Transparency International, 2017). This 'state-led gentrification of council estates' resulted in only one in five council tenants living in the local postcode after being relocated for the demolition (Lees and White, 2019).

Images above: Heygate Estate, Heygate Street (London, England) before demolition. Bradley/Stephen Richards via Wikimedia Commons

RETROFIT (MODEL 2)

A Retrofit approach (Model 2) to estate renewal sees public housing buildings retained and brought up to 'contemporary living standards' through upgrades in energy efficiency, general design and fit-out, and accessibility elements. An initial feasibility study should be conducted to see if this approach is appropriate, through analysis of the structural engineering, environmental benefits, and economic savings, and if it is aligned with the needs of residents.

TABLE 2 – COSTS AND BENEFITS OF RETROFIT (MODEL 2)

KEY AREA	BENEFITS OF THIS APPROACH	COSTS OF THIS APPROACH
BUILT OUTCOME	• Retain public land and public housing (Porter, L. and Kelly, D. 2019) • Custom design for individual residents in existing homes • Potential replicable, circular design process (Baker et al. 2014) • Retained architectural and social history (Mazzarella 2015) • Potential to increase bedroom numbers within existing building footprint	• No significant increase in dwellings • Limited density increase • Spatial and infrastructural limitations with existing buildings
CLIMATE RESILIENCE	• Improved thermal comfort and reduced bills for residents through improved energy efficiency (Sustainability Victoria 2019) • Embodied carbon savings (Moncaster and Symons 2013) • Ability to meet environmental standards through retrofit (LCLCRC 2020, Grynning, S. et al. 2020) • Retention of mature landscaping, vegetation and other biodiversity (Opoku 2019)	• Existing hazardous materials (Paton et al. 2022, Victoria State Government 2020)
HEALTH, WELLBEING AND COMMUNITY	• Improved resident well-being by being able to stay in their homes (Sendra et al. 2020) • Avoided displacement impacts (Porter et al 2023) • Reduced energy stress (Brotherhood of St. Laurence 2022, VCOSS 2018)	• Disruption during construction on site (UKGBC 2019)
ECONOMIC IMPACTS	• Construction cost savings • Job creation and skill development in retrofit (LCLCRC 2020) • Retain public land and public housing • Reduced construction time • Reduce ongoing maintenance costs • Disaster risk reduction (de Vet et al. 2019) • Avoiding obsolescence (Buitelaar et al. 2021)	• Potential to reduce demand for construction labour during times of labour shortage • Infrastructural upgrades (fire, HVAC) • Unforeseen construction costs (UCL 2014)

RETROFIT CASE STUDY: LACATON VASSAL (BORDEAUX, FRANCE)

Architect: Frédéric Druot, Completed: 2017

The project at the 'Cité du Grand Parc' in Bordeaux involves the retrofit of three modernist social housing buildings containing 530 dwellings constructed in the early 1960s. The primary aim was to improve the quality and comfort of these dwellings and enhance building performance. The renovation strategy centred on preserving existing attributes while introducing new features such as wintergardens and balconies, bathroom upgrades, and lifts. It stands as an exemplary model of retrofit achieving economic, environmental and social benefits. A crucial advantage of this approach was that residents could remain in their homes during the renovation, eliminating the need for disruptive relocations. Each of the 530 apartments underwent refurbishment in just 12 to 16 days. With a cost of approximately €50,000 per unit, the renovation proved to be significantly more cost-effective than constructing entirely new buildings, and allowed for reinvestment of the savings back into other state-owned housing. Half of the budget was allocated to facades, with the remainder dedicated to more comprehensive upgrades.

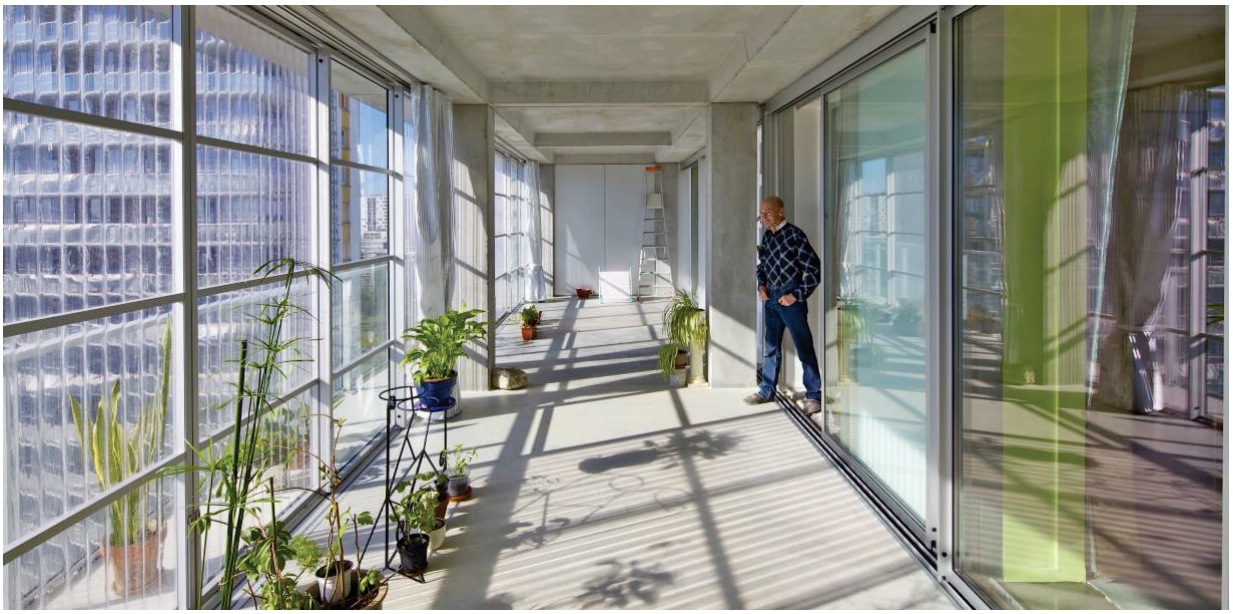

Image (top): Extended balcony and winter garden, Cité du Grand Parc, Bordeaux, France. Lacaton & Vassal. Via Philippe Ruault
Image (below): Exterior post-retrofit, Cité du Grand Parc, Bordeaux, France. Lacaton & Vassal. Via Philippe Ruault

RETROFIT AND INFILL (MODEL 3)

The Retrofit and Infill approach (Model 3) expands upon the key benefits of the retrofit strategy, to include additional housing on the site around existing buildings. There are a range of benefits to this approach – chiefly the introduction of additional housing. However, this approach is not always appropriate due to site constraints, as well as the views of estate residents.

TABLE 3 – COSTS AND BENEFITS OF RETROFIT AND INFILL (MODEL 3)

KEY AREA	BENEFITS OF THIS APPROACH	COSTS OF THIS APPROACH
BUILT OUTCOME	• Increase in number dwellings (new build) and standard of dwellings (retrofit and new build) • Custom design for individual residents (retrofit) (UKGBC 2019) • Retained architectural and social history (Mazzarella, L. 2015)	• Loss of green open space • Spatial and infrastructural limitations with existing buildings
CLIMATE RESILIENCE	• Embodied carbon savings (Moncaster and Symons 2013) • Ability to meet environmental standards (LCLCRC 2020) • Improved durability to extreme weather events (Grynning, S. et al. 2020) • Improved thermal comfort and reduced bills for residents through improved energy efficiency (AHURI 2023, Bryant 2022)	• Existing hazardous materials (existing buildings) (Paton et al. 2022, Victoria State Government 2020)
HEALTH, WELLBEING AND COMMUNITY	• Residents stay in homes through staging of building works (Sendra et al. 2020) • Avoided displacement impacts (Porter et al 2023) • Reduced energy stress (Brotherhood of St. Laurence 2022, VCOSS 2018)	• Changes to patterns of movement and activity within the estate • Disruption during construction on site (UKGBC 2019)
ECONOMIC IMPACTS	• Job creation in the building industry • Job creation and skill development in retrofit (Brown et al. 2019) • Maintaining public land and public housing • Construction time length • Disaster risk reduction (de Vet et al. 2019) • Avoiding obsolescence (Buitelaar et al. 2021)	• Limit on density increase • Infrastructural upgrades for existing buildings

RETROFIT AND INFILL CASE STUDY: ELLEBO GARDEN ROOM, COPENHAGEN

Architect: Adam Khan Architects, Completed: 2018

The Ellebo Garden Room, north of Copenhagen, is a regeneration project of a 1950s public housing estate. The square blocks of 284 dwellings were originally designed around open green space and have been upgraded with wintergardens and balconies on the garden-facing side of the blocks. The renovations have improved the environmental and sustainability ratings of the buildings, as well as thermal comfort and quality of both private and communal spaces for residents. The sustainable retrofit model has retained the existing structure and introduced minor interventions for energy efficiency through passive energy strategies and ventilation solutions with heat recovery. Studio flats have been replaced by a mixed typology of dwellings, including larger flats to encourage family living and generational stability. The retrofit has also been designed to minimise impacts on residents through avoiding rehousing during renovations.

In addition to retrofitting the existing dwellings, the architects have extended one of the blocks to create an enclosed and protected interior garden, as well as added a penthouse level to provide additional housing. The garden space has been transformed into a productive and ecologically diverse shared communal space. The retrofitting project has been designed with a low-embodied energy focus and projected lifespan of 80-100 years for the concrete panel system.

CONCLUSION

Public housing renewal is a high priority for housing policy makers in Victoria and around the world. Public housing plays an important role in contributing to the overall total housing stock, and renewal programs provide opportunities to increase housing supply, improve housing quality, performance and sustainability, and enhance neighbourhood outcomes, particularly for vulnerable households.

This review has outlined key environmental and social considerations to inform public housing renewal decision making in Victoria. A whole life-cycle approach to estates accounts for a broad set of environmental impacts of each renewal strategy and can drive circular economy practices. In order to meet Victoria's carbon emissions reductions targets decisions should account for embodied carbon and resources as well as operational emissions from building us. Climate resilience can also inform decisions of public housing renewal that mitigate and adapt to climate change, creating safe, comfortable homes in an increasingly uncertain environment. Public housing, including renewal programs, can act as an enabler of the transformation to a circular economy in Victoria, creating value for communities while reducing resource and environmental impacts. Community health and wellbeing are of utmost importance in any estate renewal decision, with many opportunities for improvement, empowerment and avoiding negative effects of displacement.

Estate renewal typically follows one of three models – Demolish and Rebuild, Retrofit, and Retrofit and Infill. Demolish and Rebuild can appear to be the most straight-forward strategy to deliver more homes with higher performance standards and levels of comfort. It is associated with the highest embodied carbon and resource impacts, harmful disruption and displacement of communities, and longest delivery times. Retrofit strategies aim to achieve improvements in the performance and comfort of existing homes, with lower embodied impacts. This approach doesn't typically deliver additional homes, but can be achieved at lowest disruption to existing residents. Retrofit and Infill can involve complex design and planning to deliver more homes and retain and improve existing buildings. Existing residents may be able to stay in their homes, while the layout and density of the estate is changed to accommodate new buildings. Each estate renewal strategy comes with costs, benefits, and risks to different parts of the Victorian economy and community. Life-cycle assessment of plans and policies reveals trade-offs, unintended consequences and added value that might otherwise be unaccounted for.

Housing policy and strategies are essential to deliver safe, affordable homes for all Victorians. They also have direct impacts on wider policy objectives including carbon emission reduction, climate resilience, health, and community well-being.

A life-cycle approach to public housing renewal provides the basis for decisions that can meet the urgent demands for higher quality and more affordable homes, while ensuring the long-term resilience of communities and the environment.

Image: Mural by Matt Adnate on social housing tower in Collingwood. Image by Rob Deutscher

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