

Auckland Plan 2050 Evidence Report Update

Homes and Places

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Table of Contents

1	Summary of updates.....	2
2	Introduction.....	4
2.1	Purpose	4
2.2	The case for updating the Homes and Places outcome	4
2	Context	5
2.1	Recent changes to legislation	5
2.2	Te-Tāruke-ā-Tāwhiri: Auckland’s Climate Plan.....	7
2.3	Auckland’s climate change challenges and opportunities.....	12
3	Evidence.....	13
3.1	The role of cities in climate change action.....	13
3.2	Compact urban form and the link to transport.....	15
3.3	The role of urban green space in climate change mitigation and adaptation	17
3.3.1	Crucial urban green space and its benefits	17
3.3.2	Balancing intensification and urban green space preservation in Auckland ...	18
3.3.3	Optimal amounts of urban green space for maximum benefits?	19
3.4	Buildings and construction.....	20
3.4.1	Operational emissions.....	21
3.4.2	Embodied carbon emissions	23
3.4.3	Integrated approach to sustainability in building and construction AND land-use and transport planning	24
3.5	International exemplars of sustainable urban development.....	26
3.6	Housing supply	26
3.6.1	Accelerating quality development at scale	27
3.6.2	Funding and financing.....	28
3.6.3	Construction sector capacity and capability	28
3.7	Housing affordability	29
4	Conclusion.....	31
4.1	How the updates to the Homes and Places outcome reflect the evidence on the role of cities in climate change action.....	31
	References	34
	Appendix 1: Legislation.....	38
	Appendix 2: The 15-minute city	42
	Appendix 3: International exemplars of sustainable urban development	44

1 Summary of updates

The most significant update for the Homes and Places outcome is an emphasis on making climate change more integral to the directions and focus areas, incorporating the focus of Te Tāruke-ā-Tāwhiri: Auckland’s Climate Plan.

Overall, the outcome statement, directions and focus areas are still relevant and valid, but there is a need to update the supporting narrative to address the strategic gap on climate change and be more explicit about the role that housing and urban places can and must play in building a low-carbon Auckland. In addition, the outcome has been updated to reflect changes to the legislative environment (e.g., Healthy Homes and Residential Tenancies Act) and new data on housing supply and affordability. The updates to integrate climate change are summarised in Table 1.

Table 1: Updates to integrate climate change in the Homes and Places outcome

Aspect to be updated	Updates
<p>Direction 1 Develop a quality compact urban form to accommodate Auckland's growth</p>	<p>Updated narrative to include the benefits of a compact urban form in terms of supporting decarbonisation e.g. limiting urban sprawl enables the much-needed mode shift. Stronger link with the Transport and Access outcome, and how higher density near transport hubs is critical to achieving climate goals.</p> <p>Direction wording updated to reflect the critical role of a compact urban form to a low-carbon future i.e. Develop a quality compact urban form to accommodate Auckland's growth and support a low-carbon future.</p>
<p>Direction 2 Accelerate the construction of homes that meet Aucklanders’ changing needs and preferences</p>	<p>Updated to ensure greater emphasis on quality, a shift from the current focus on quantity of homes only. Updated to reflect the importance of quality and sustainability e.g. the need for more sustainable building methods and materials.</p> <p>Direction wording updated to reflect the emphasis on quality i.e. Accelerate the construction of quality homes that meet Aucklanders’ changing needs and preferences.</p>

Aspect to be updated	Updates
<p>Direction 4</p> <p>Provide sufficient public places and spaces that are inclusive, accessible and contribute to urban living</p>	<p>Updated to reflect the role of green spaces in greening the city and the opportunity they provide for climate action, both mitigation and adaptation. For example, the role of trees for air quality, carbon sequestration and cooling air, land and water by offering shade and moisture.</p>
<p>Focus Area 1:</p> <p>Accelerate quality development at scale that improves housing choices</p>	<p>The definition of quality broadened to reflect climate considerations more strongly i.e. buildings must make use of sustainable building methods (construction materials and methods to lower embodied emissions) and greater energy efficiency must be ensured.</p>
<p>Focus Area 3:</p> <p>Improve the built quality of existing dwellings, particularly rental housing</p>	<p>Updated to ensure greater focus on the quality of buildings and their emissions impact i.e. operational and embodied emissions. Includes mention of the emissions reduction benefits of retrofitting existing buildings.</p>
<p>Focus Area 5:</p> <p>Create urban places for the future</p>	<p>Updated to include mention of the role of green spaces in mitigation and adaptation, in line with the updates to Direction 4.</p>

2 Introduction

2.1 Purpose

The purpose of this report is to inform an update of the Homes and Places outcome in the Auckland Plan 2050 (AP2050). The aim of the update is two-fold. Firstly, and most importantly, the update will ensure that climate change is made more integral to the Homes and Places outcome, reflecting not only the severity of the climate crisis but importantly, the role that housing and urban places can and must play in building a low-carbon Auckland. Secondly, the original content will be brought up to date where needed (e.g. legislative changes, housing affordability data).

This evidence report supports the dual aims of the update. Mostly, it will focus on the evidence to support the aim of integrating climate change more firmly in the outcome. In doing so it will examine the role of cities in carbon emissions reduction, as it pertains to the Homes and Places outcome. The information has been drawn from a wide range of sources including Te Tāruke-ā-Tāwhiri: Auckland's Climate Plan, and a review of the recent literature and evidence from countries and cities that are leading in the transition to a low carbon future.

Evidence to underpin any other updates to the original context will be addressed last, focusing on housing supply and affordability.

Before presenting the new evidence, the report will briefly outline the case for updating the Homes and Places outcome of the Plan. It will also provide information on the broader context, including an overview of the legislative changes since 2018 as they pertain to urban development and climate change, emissions reduction in particular.

This report is one of a set of interrelated background papers prepared to support the update to the Auckland Plan 2050.

2.2 The case for updating the Homes and Places outcome

The housing challenges Auckland faces are as acute as when the AP2050 was written and adopted in 2018. The housing crisis persists with housing affordability worsening and home ownership continuing to fall. The Covid property boom that added another 45 per cent to Auckland house prices has exacerbated an already critical situation (Infometrics, 2022). The causes of the housing crisis are complex and the negative consequences many and varied, but taken together, they undermine individual and social wellbeing. The existing Homes and Places outcome is to a large extent framed around the housing crisis and the urgent need for action to ensure that all Aucklanders have access to a secure, healthy and affordable home. This remains as valid and important as it was when it was written.

Since the adoption of the AP2050 in 2018, the Auckland Council has declared a climate emergency, and in 2020 Te Tāruke-ā-Tāwhiri (TTaT): Auckland's Climate Plan was published with a goal of reducing our greenhouse gas emissions by 50 per cent by 2030 and achieving net zero emissions by 2050 (against a 2016 baseline). While climate change is identified in the AP2050 as one of the key challenges facing Auckland, the severity of the climate crisis and the speed at which the transition to a low emissions society needs to happen is not strongly reflected in the Plan. The Homes and Places outcome does not make any explicit mention of climate change, or of the adaptation and mitigation efforts required to respond to the climate crisis to ensure a low carbon, climate resilient future for Auckland.

From a national policy perspective, the recent release of the National Emissions Reduction Plan and the National Adaptation Plan set out policies and strategies pertaining to the building and construction sector and its role in addressing and responding to climate change. The AP2050 should respond to the direction set in these national plans.

There is a clear case then for updating the Homes and Places outcome section of the Plan to reflect the new strategic direction and address the strategic gap on climate change, and be more explicit about the role that housing and urban places can and must play in building a low-carbon Auckland.

It is also timely to ensure that the original content is up to date. The past few years has seen a deepening of the housing crisis and there have been legislative changes, both of which should be reflected in the Homes and Places outcome in the Plan.

2 Context

This section presents the context of the Homes and Places outcome. It comprises:

- a summary of recent changes to the legislation relevant to urban development and climate mitigation (Section 2.1)
- summary information on Te-Tāruke-ā-Tāwhiri: Auckland's Climate Plan and how it links to the Homes and Places outcome (Section 2.2)
- a summary of the main climate change challenges and opportunities for Auckland pertinent to the Homes and Places outcome (Section 2.3).

2.1 Recent changes to legislation

There have been several changes to the legislative landscape since 2018 of relevance to the Homes and Places outcome, and further changes are underway. These changes affect urban development and will have an impact on urban emissions. These initiatives cut across policy domains and sectors, and include:

- Resource Management reform (underway)

- Natural and Built Environments Act (NBEA)
- Spatial Planning Act
- Climate Change Adaptation Act
- National Policy Statement on Urban Development (NPS-UD)
- Government Policy Statement on Housing and Urban Development (GPS-HUD)
- Urban Growth Agenda (UGA)
- National Emissions Reduction Plan
 - Building for Climate Change programme (includes changes to the Building Code (H1) to improve building energy efficiency, and Whole-of-Life Embodied Carbon Reduction framework implementation)
 - Transport Emissions Action Plan (TEAP)
- National Adaptation Plan (NAP)
- Government Policy Statement on Land Transport (GPS-LT)
- Waste Minimisation Strategy and Waste Minimisation Act
- The Future for Local Government Review

Appendix 1 provides greater details on the above-mentioned legislation, policies and strategies.

These interventions are expected to influence the shape of urban development in different ways and affect the potential for cities to achieve emissions reduction.

The Government is increasingly taking a stronger role in planning for the growth of New Zealand's largest cities, as evidenced in the August 2020 introduction of the National Policy Statement on Urban Development (NPS-UD) and the passing of the Enabling Housing Supply and Other Matters Amendment Act 2021 in December 2021.

The NPS-UD provides national direction on urban development thereby guiding council planning. The focus is on encouraging well-functioning, liveable urban environments and improving access to affordable housing through better planning decisions. One of the stated objectives is to ensure carbon emissions reduction in urban development.

The NPS-UD requires Auckland Council to enable greater housing density, with buildings of six storeys or more within walkable catchments around the city centre, in and around our ten large metropolitan centres and around train stations on Auckland's rail network and stops on rapid busways, such as the Northern Busway.

The Enabling Housing Supply and Other Matters Amendment Act 2021 aims to enable even more residential development across Auckland requiring Council to apply the new Medium Density Residential Standards (MDRS). These new standards will allow property owners to develop housing of up to three storeys on most sites in most residential areas, without

needing a resource consent. While it is still unclear what the impact on emissions will be from the resulting densification it should lead to reduced emissions per capita provided that: (i) densification occurs in areas that are well-connected by public transport and other transport infrastructure to enable Aucklanders to make sustainable transport choices such as walking, cycling and using public transport, and (ii) that whole-of-life embodied carbon emissions are minimised in new builds. Meanwhile, housing in places not adequately supported by public transport, amenities and not adequately enabling active transport could have the opposite effect and should be discouraged.

Other legislative changes of relevance to the Homes & Places outcome are the introduction of Healthy Homes Standards and changes to the Residential Tenancies Act 2020 with the introduction of the Residential Tenancies Amendment Bill 2020. Healthy Homes Standards aims at improving the quality of rental homes by covering improvements to heating, insulation, and ventilation, and addressing issues with moisture ingress and drainage and draught stopping. The Residential Tenancies Amendments Bill improves New Zealand's rental laws by giving tenants greater security of tenure and limiting the frequency at which landlords can raise rent from six to twelve months.

2.2 Te-Tāruke-ā-Tāwhiri: Auckland's Climate Plan

Te Tāruke-ā-Tāwhiri: Auckland's Climate Plan was adopted in July 2020 (Resolution number ECC/2020/29) following Auckland Council's unanimous declaration of a Climate Emergency in June 2019. It is a regional, evidence-based plan aligned to our commitments to the two core goals:

- Halve regional emissions by 2030 and reach net zero emissions by 2050 (against a 2016 baseline)
- Take a precautionary approach to planning for the impacts of climate change

The plan sets out the strategic direction for the next 30 years across eight key priorities for climate action which includes:

- Natural Environment
- Built environment
- Transport
- Economy
- Communities and coast
- Food
- Te Puāwaitanga o te Tātai¹
- Energy and industry

¹ A principles-based priority that is interwoven throughout other priorities

The plan contains 58 action areas and 179 sub-actions where Council has different levels of responsibility and control, reflecting the regional focus of the plan. Several of the priority action areas and associated sub-actions have direct relevance for the Homes and Places outcome - Built Environment, Transport, Natural Environment and Economy. The strongest links between TTaT and the AP2050 Homes and Places outcome are shown in Table 2.

Table 2: Links between Te-Tāruke-ā-Tāwhiri and the AP2050 Homes and Places outcome

Te Tāruke-ā-Tāwhiri: Auckland Climate Plan - Priorities & Actions (most relevant ones selected)	Links to AP2050 Homes and Places Outcome
Built Environment	
<p>Action B1: Ensure our approach to planning and growth aligns with low carbon, resilient outcomes. Includes sub-actions to:</p> <ul style="list-style-type: none"> • Maintain and uphold a quality compact urban form as outlined in the Auckland Development Strategy. Review its implementation to ensure that opportunities for low carbon, resilient development are being realised. • Develop masterplans that demonstrate and promote the opportunity for zero carbon, transit-oriented development that build climate resilience <p>Action B2: Ensure new infrastructure is planned and designed to minimise climate risks and lifecycle emissions</p> <p>Action B3: Ensure the management of existing infrastructure increases climate resilience and reduces emissions</p> <p>Action B5: Accelerate the uptake of sustainable design and construction for new buildings</p> <p>Action B6: Deliver and support retrofit programmes to transition to low-carbon, resilient, healthy buildings</p>	<p>The TTaT Built Environment priority and associated actions are directly relevant to the Homes and Places directions and focus areas. For example, TTaT reiterates the importance of the Auckland Plan’s goal of developing a quality compact urban form (Direction 1), as being key to low carbon, resilient urban development.</p> <p>Other strong links exist to the following Homes and Places direction and focus areas:</p> <p>Direction 4 Provide sufficient public places and spaces that are inclusive, accessible and contribute to urban living</p> <p>Focus Area 1 Accelerate quality development at scale that improves housing choices</p> <p>Focus Area 3 Improve the built quality of existing dwellings, particularly rental housing</p> <p>Focus Area 5 Create urban places for the future</p> <p>Public spaces are important for liveability in cities (as places for recreation and socialisation), and also, in the case of public</p>

<p>Action B7: Develop and support initiatives to minimise construction and demolition waste</p> <p>Action B8: Ensure public spaces support a low carbon, climate resilient Auckland and optimise multi-functional benefits</p> <p>Action B9: Establish and rapidly scale low carbon, resilient precinct across Auckland</p>	<p>urban green spaces, have an important role in mitigating and adapting to climate change.</p>
<p>Transport</p>	
<p>Action T1: Changing the way we all travel</p> <p>Action T4: Improve safety, connectivity, and amenity of walking infrastructure</p>	<p>The TTaT Transport priority and associated actions are highly relevant for the Homes and Places outcomes. That is due to the inseparable link between urban form and transport, with a quality compact urban form (greater density, mixed-use) (as part of Action B1) reducing car dependency and enabling mode shift to low carbon transport options like walking, cycling and public transport.</p>
<p>Economy</p>	
<p>Action E2: Accelerate the uptake of innovation that supports the delivery of a climate resilient, climate proof and regenerative economy</p> <p>Action E5: Leverage public sector and large business procurement to deliver climate outcomes for Auckland Council</p> <p>Action E6: Manage our resources to deliver a zero waste, circular economy</p>	<p>The TTaT Economy priority and associated actions have strong relevance for the Homes and Places outcome. More innovative practices and sustainable building methods are needed to lower the emissions arising from building and operations (embodied and operational emissions) of new builds, and likewise, in renovation efforts of existing homes and other builds to ensure greater energy efficiency. There is also a need to adopt better waste management practices and circular methods in the building and construction sector.</p>

Natural Environment	
<p>Action N2: Grow and protect our rural and urban ngahere/forest to maximise carbon capture and build resilience</p> <p>Action N3: Integrate connected, nature-based solutions in development planning</p> <p>Action N5: Ensure land use practices deliver healthy, resilient soils, waterways and ecosystems</p>	<p>The TTaT Natural Environment priority and associated actions have strong relevance for the Homes and Places outcome. Urban development often comes at the expense of nature. Intensification in particular puts pressure on urban green space. Yet it is widely recognised that nature and urban green space offer a wide range of benefits and are critical to making cities more sustainable and liveable. Not only does green space offer numerous benefits to people’s health and wellbeing, it also has a critical role in climate change mitigation and adaptation. The role of nature and urban green space in climate change mitigation and adaptation arise from the ecosystem services nature offers (e.g. regulating local climate / temperatures and air quality, carbon sequestration and storage, moderation of extreme events). Nature-based solutions can tackle multiple challenges that cities face, and include such things as: green roofs (included in action B8) and city parks to limit heat stress (heat island effect), city lagoons to store water, permeable surfaces and rain gardens to intercept stormwater. Meanwhile they provide recreational spaces for people living in cities.</p> <p>By taking a strategic approach to planning and managing of nature and green spaces, cities can maximise the role of nature and green space in climate change adaptation and mitigation in cities.</p>

2.3 Auckland's climate change challenges and opportunities

Auckland will need a significant number of new dwellings and new infrastructure to be built over the next three decades to accommodate projected population growth. Achieving this, while at the same time reaching our climate goal of net zero emissions by 2050 is a huge task. In fact, under a business-as-usual scenario Auckland's emissions would be expected to increase by 19 per cent (Auckland Council, 2020).

Auckland's housing challenges and climate change challenges are deeply interlinked. Lack of housing supply and poor-quality housing are at the same time causes and results of Auckland's housing challenges. How we address these housing challenges e.g. where and how we construct more housing and supporting infrastructure have big implications for our carbon emissions now and into the future.

The decarbonisation pathway modelled in TTaT involves numerous actions that are directly relevant to the Homes and Places outcome (as highlighted in Table 2) – measures that are well-known as being key to low carbon development in cities. This decarbonisation pathway will require transformative action across sectors and by a diverse range of stakeholders including Auckland Council, central government, businesses and individuals.

Auckland must also prepare and adapt to the unavoidable impacts of climate change. There are significant challenges around managing the impacts of climate change on homes and places and ensuring their resilience. This includes significant challenges around coastal retreat and ensuring that Auckland's growth occurs in places that minimises the risks from climate change. Likewise, there are real challenges to ensure our homes and places can withstand more extreme climate conditions (i.e. warmer and wetter climate). This paper will primarily focus on emissions reduction, but adaptation is also critically important. This is also reflected in TTaT, and adaptation is also a key consideration in the development of the Future Development Strategy.

The main climate change action opportunities for Auckland that relate directly to the Homes and Places outcome can be summarised as:

- Creating a more compact Auckland
- Building better, more sustainable housing with low operational and embodied emissions
- Renovating existing housing for energy efficiency
- Focus on providing public places for recreation and climate change action

Enabling actions include:

- Strong cross-sector collaboration
- Engaged and participatory citizen involvement to encourage buy-in and behavioural change in the community

- Massive investment in public transport and active mobility infrastructure
- Strong and bold policy shifts towards low carbon and equitable outcomes.

3 Evidence

This section contains evidence on the following topics to support the integration of climate change considerations (mitigation and adaptation) in the Homes and Places outcome:

- the role of cities in decarbonisation
- the benefits of a quality compact urban form and the link to active mobility and public transport
- building and construction
 - Operational emissions
 - Embodied emissions
- the importance of urban green space for climate change mitigation and adaptation.

In addition, evidence is presented to support general updates in relation to:

- Housing supply and affordability

3.1 The role of cities in climate change action

“The battle for the planet will be won or lost in cities”

Coalition for Urban Transition (2018, p.10)

Cities are home to more than half of the world’s population (projected to increase to 70% by 2050) and account for a disproportionately large share (70%) of global greenhouse gas emissions. Therefore, cities have a crucial role in meeting climate change mitigation goals and limiting global warming to 1.5 °C by 2050 as agreed under the 2015 Paris Agreement.

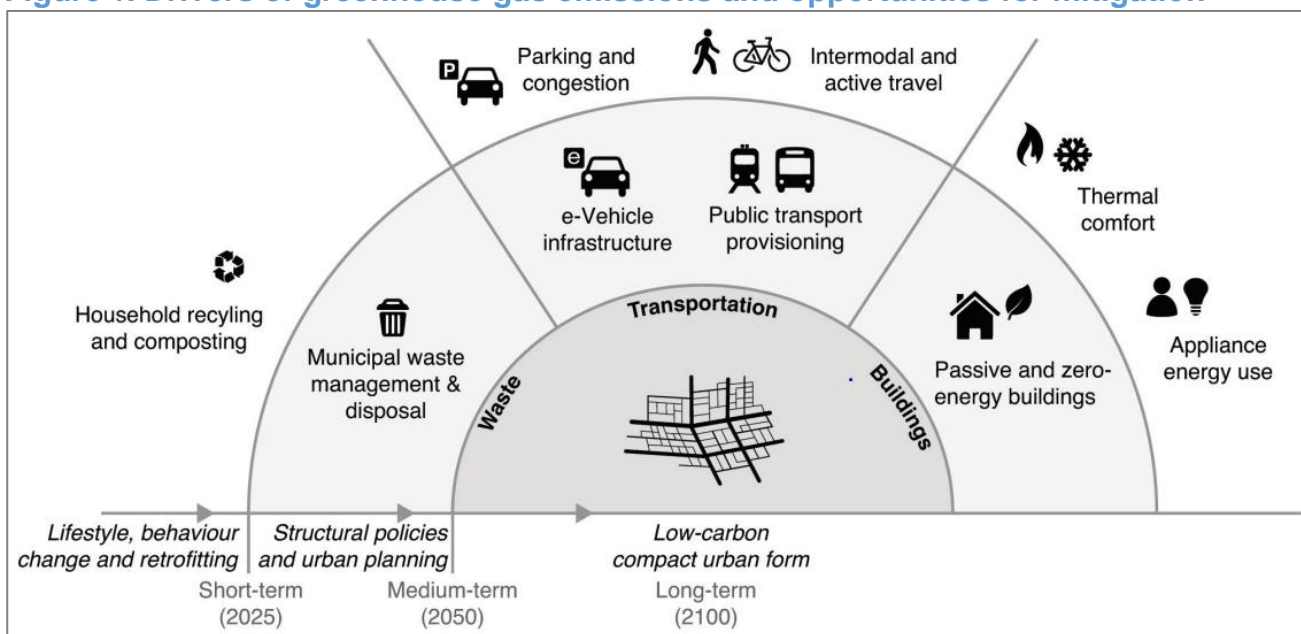
Cities are increasingly stepping up to the challenge of reducing emissions and setting ambitious emissions targets; in some cases more ambitious than their national governments. Some of the most ambitious cities include Helsinki (2035) and Stockholm (2040) (OECD, 2019). The European Union Horizon programme has adopted a ‘climate-neutral and smart cities mission’ which aims to have 100 climate neutral cities by 2030 (European Commission, 2022). By comparison, Auckland’s target is to reach carbon neutrality by 2050; a target that is shared by more than 1,000 cities globally which have joined the Cities Race to Zero campaign, an initiative coordinated by a range of international organisations including C40. This target is in line with New Zealand’s national target.

There is a clear consensus about the common elements to effective low carbon urban development (Coalition for Urban Transformations, 2018; Lamb et al, 2018). These include:

- compact urban form
- clean and efficient urban transportation options
- efficient buildings and sustainable construction
- efficient waste management.

Figure 1 shows the different drivers of urban greenhouse gas emissions, and it also gives a sense of the different time scales involved.

Figure 1: Drivers of greenhouse gas emissions and opportunities for mitigation



Source: Lamb et al. (2018).

Carbon emissions reductions are maximised when measures from the four domains – urban form, transport, buildings and waste - are pursued concurrently and in an integrated fashion. That is, land use patterns that reduce the need for motorised travel accompanied by low emissions sustainable transport infrastructure, and by buildings with low embodied and operational emissions, all combine to maximise emissions reductions. These elements are interlinked and together determine how people live, and whether people are enabled to make low carbon choices while enjoying a high quality of life. This highlights the critical importance of ensuring policy complementarity across these areas.

There are also important co-benefits arising from pursuing low carbon urban development, for example improved public health, enhanced employment opportunities, greater economic productivity and reduced local pollution (Coalition for Urban Transitions, 2018).

3.2 Compact urban form and the link to transport

A compact urban form is a critical component of low carbon urban development. This is largely due to the inseparable link between urban form and transport, with the urban form largely determining the viability and practicality of different modes of transport. A compact urban form (greater density, mixed-use) reduces car dependency and vehicle kilometres travelled (VKT) when the car is in use, and it enables the use of low (and zero) carbon transport options like walking, cycling and public transport.

Other emissions benefits from a compact urban form include a reduced need for public utility expansions and transport infrastructure, and lower building emissions resulting from the different types of buildings that make up more dense cities (e.g. medium-rise buildings are more common in compact cities and these consume less operational and embodied emissions than standalone buildings) (Royal Town Planning Institute, 2018).

An integrated approach to land use planning and transport planning is critical to achieving substantial emissions reductions. It requires a combination of measures, including mixed-use development in new and existing developments, brownfield development, investment in walking and cycling infrastructure, good-quality rapid and frequent public transport, and policies to support behavioural change. Transit oriented development that promotes denser, mixed-use development around public transport service, is also a key part of achieving a compact urban form (National Economic & Social Council, 2019).

A quality compact growth model was adopted as part of the first Auckland Plan in 2012, and guided the development of the Auckland Unitary Plan, which came into effect in 2016. Auckland is progressively becoming more compact because of the pursuit of the quality compact growth model. Since the adoption of the Unitary Plan there has been a marked shift in the types of dwellings consented towards more multi-unit housing (refer to graph in section 3.5), and in 2020/2021 most growth (82%) occurred within the existing urban area, particularly in and around centres. In the same period, 25 per cent of the total residential dwellings consented were within the 1,500m catchments of train stations and the Northern Busway stations. Of these, 85 per cent were apartments and townhouses. Having said that, it is worth noting that the proportion of total consents that are within the 1,500m rapid transit network (RTN) walkable catchment has been declining since mid-2020 (Auckland Council, 2021a).

Yet, Auckland also continues to grow out as well as up, as evidenced by the number of greenfield areas being developed on the city's fringes. In the absence of good public transport in these areas, the result is that people end up living more car-dependent lives. The average distances travelled by car increases, and it is much more difficult and costly to provide good public transport connectivity, or for people to live more locally and utilise sustainable methods of getting around like walking and cycling – consequently transport emissions increase. Analysis of 2018 census data has confirmed that areas of recent

greenfields development in the region have a higher mode share of private vehicles for journeys to work and education than the Auckland average.

Auckland's historical low density development pattern has been enabled by car mobility and spurred by New Zealanders' preferences for detached single-family homes. Yet, this dispersed development pattern has several adverse effects with respect to climate emissions, which is also clearly reflected in Auckland's per capita emissions when compared with denser cities leading in the green transition. For example, Auckland's emissions per capita² (4.78 tCO₂e) is roughly double the emissions of Paris (2.45), Copenhagen (2.39) and Oslo (2.06), and three times that of Stockholm (1.53). The contrast becomes even starker when focusing on transport only, where Auckland's per capita emissions (2.74) are roughly three times that of Oslo (0.93) and Copenhagen (0.85), four times that of Stockholm (0.74) and six times that of Paris (0.45). In fact, Auckland's transport emissions are more similar to that of North American cities, typically characterised by high degrees of sprawl (e.g. Chicago, Seattle and Boston).

The AP2050 and Development Strategy are largely quiet on the benefits of the compact urban form with respect to carbon emissions, with the main rationale centring on the need to accommodate future population growth and realise the environmental, social and economic benefits that a compact approach brings. It does make a link to transport, highlighting the greater efficiency for infrastructure investments resulting from a more compact urban form.

Achieving Auckland's carbon reduction goals depends on an urban form that is significantly different to the low-density urban form that has characterised Auckland for the past few decades. Only a compact urban form will enable the radical changes in travel behaviour (i.e. mode shift) required to significantly lower Auckland's transport related carbon emissions. Transport is the sector in which the largest potential for emission reduction lies, being Auckland's largest source of emissions (44%). TtAT's decarbonisation pathway includes a 64 per cent reduction in transport emissions by 2030 and the recently adopted Transport Emissions Reduction Pathway (Auckland Council, 2022) outlines the pathway for achieving this goal. The continued pursuit of the quality compact urban form is critical. TtAT also expresses this in the sub-action to "Maintain and uphold a quality compact urban form as outlined in the Auckland Development Strategy."

² City comparisons include the BASIC Emissions (stationary energy, transport and waste) as defined in the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories. Data is from 2018. Obtained from the C40 greenhouse gas emissions interactive dashboard [Greenhouse gas emissions interactive dashboard \(c40knowledgehub.org\)](https://www.c40knowledgehub.org/)

New urban models for sustainable and healthier cities

Several new urban concepts or models are being introduced in cities around the world, including the 15-minute city (Paris), Superblocks (Barcelona), low traffic neighbourhoods (London) and car free city (Amsterdam; Freiburg). In many cases these commenced prior to the pandemic, but further accelerated during, as the need for social distancing spurred a re-think of the use of public space, mobility and work locations (i.e. remote working). Common to these models is that they prioritise increasing public and active transportation (walking and cycling) and reducing car use, creating better green and open spaces, and thereby reduce air pollution, noise and heat island effects and increase physical activity. This creates the conditions for more sustainable and healthier cities. Cities with lower carbon emissions result in? better health outcomes for people (Nieuwenhuijsen, 2022).

Appendix 2 contains more information on the 15-minute city concept championed by the C40 as an urban planning framework for all cities.

3.3 The role of urban green space in climate change mitigation and adaptation

3.3.1 Crucial urban green space and its benefits

Urban green space is essential to making cities more sustainable and liveable. The benefits to health and wellbeing have long been known, but more recently the critical role that they play in climate change mitigation and adaptation have become recognised too. As a result, urban greening is becoming a policy priority in countries and cities globally, and urban planners are increasingly seeking to integrate nature into urban planning for resilient, sustainable and liveable cities (Newton, 2022; Maes et al., 2019).

The importance of public green space increases in more compact urban environments with less private green space. Yet, urban development and intensification often come at the expense of nature and urban green space as infill causes private green space to be lost, typically without a corresponding increase in public green space. There are some challenging tensions to navigate between increased intensification and the preservation, let alone enhancement of urban green spaces. These considerations must be central within the context of planning for more compact cities. By taking a strategic approach to planning and managing of nature and green spaces, cities can maximise the role of nature and green space in climate change adaptation and mitigation in cities, while at the same time contributing to the liveability of higher density living (Davern et al., 2017).

The role of nature and urban green space in climate change mitigation and adaptation arise from the ecosystem functions and services nature offers (e.g. regulating local climate / temperatures and air quality, carbon sequestration and storage, moderation of extreme

events). Nature-based solutions can tackle multiple challenges that cities face and include such things as: green roofs and city parks to limit heat stress (heat island effect), city lagoons to store water, urban forests and trees for shade, water retention and bird life, and permeable surfaces and rain gardens to intercept stormwater. At the same time, they also provide recreational spaces for people living in cities (Cvejic et al., 2015).

Greening of infill development may also hold some of the answer to making densification and more compact urban environments more attractive to city residents, thereby helping curb the demand for greenfield development. People will not necessarily trade the benefits of a detached house, nature and private green space offered in more sprawling suburbia for a more urban lifestyle with less private indoor and outdoor space, unless more compact living is high quality and offers access to significant green and open space. Some Australian researchers have suggested that to make higher density living more attractive and deal with urban sprawl, a new vision for urban densification is needed “that responds to the urban, societal and ecological challenges of the 21st century and aligns with people’s preference for suburban living near nature”, and “resonates with the leafy green qualities of suburbia that most people desire” (Bolleter and Ramalho, 2019).

3.3.2 Balancing intensification and urban green space preservation in Auckland

Auckland is at a critical point when it comes to the protection and valuing of our urban green space amidst growing intensification. There is no question that urban green space is essential to liveability and the enhanced wellbeing of Aucklanders, as well as climate change mitigation and adaptation. At the same time it is also the case that the council is constrained in its ability to acquire new parks and open spaces in the existing urban area due to land and budget constraints. This has led to a focus on improving the quality of existing parks and improving the linkages between open space, such as establishing greenways (for greenfield areas the focus is on establishing the open space network). The question is whether this approach is adequate to ensure that our urban green spaces can deliver the desired health and wellbeing benefits, as well as the required ecosystem services, especially regarding climate change mitigation and adaptation. The evidence and best practice unequivocally point towards the enhanced importance of urban green space.

Meanwhile, the NPS-UD and MDRS are enabling intensification to an even greater extent without stipulating any requirements for green space provision. There are objectives to ensure ‘well-functioning urban environments (objective 1)’ and to ensure that our ‘urban environments support reductions in greenhouse gas emissions and are resilient to future and current impacts of climate change (objective 8)’. Further, policy 1 states that “Planning decisions [must] contribute to well-functioning urban environments, which are urban environments that, as a minimum:” ... “c) have good accessibility for all people between

housing, jobs, community services, natural spaces, and open spaces, including by way of public or active transport". These objectives and policy 1 indirectly emphasise the importance of green urban space but are not specific about the amount of green space, type of green space or recommended distance from people's homes.

The council must proactively ensure sufficient provision of parks and green space by protecting existing green space, acquiring new land for parks and making greater use of nature-based solutions. The latter includes designers "finding ways to integrate urban greenery into high-density areas, and the possibility for green infrastructure to grow not just between buildings, but upon and over them" (Newton et al, 2022, p.111) (e.g. green roofs, green facades and living walls).

3.3.3 Optimal amounts of urban green space for maximum benefits?

But how much green space is needed to meet health and wellbeing benefits, as well as the required ecosystem services, especially regarding climate change mitigation and adaptation? While the literature does not specify an optimal amount of urban space per resident, there has been efforts to establish some guidelines.

With respect to the space and access required to realise health and wellbeing benefits, the World Health Organisation recommends that everyone has a green space of at least 0.5-1ha within 300m of their house (WHO, 2017). "Some European cities have defined per capita threshold values for urban green space or minimum accessibility for a defined area. For example, the city of Berlin, Germany, aims to provide at least 6m² of urban green per person, while Leipzig, Germany, aims even higher and wants to achieve 10m² per capita. The national target in the UK is that urban residents should have access to a natural green space of minimum 2ha within a distance of 300m from their home. Berlin also recommends that every resident should have access to urban green of minimum 0.5ha within a 500m walk from their house" (Green Surge, 2017).

The so-called 3-30-300 rule for urban forestry is a concept that has recently been introduced. It holds that everyone should be able to see at least three trees from their home; every neighbourhood should have at least 30% tree cover; and people should reach a green area of 1ha within 300 metres, as per the WHO's recommendation above. The rule recognises that in order to realise the many benefits of nature in cities trees and nature must be brought right into neighbourhoods and on their doorsteps, rather than striving for city-wide tree canopy cover as is often the case (Konijnendijk, 2022).

Auckland also has provision targets as outlined in the Open Space Provision Policy 2016. The targets differ depending on the open space typology. For example, the provision target states that every resident should have access to a 0.3 – 0.5ha neighbourhood park within a 400m walk in high and medium density residential areas and 600m walk in all other residential areas. Larger suburb parks (between 3 – 10ha or more depending on use) should

be accessible within a 1000m walk in high and medium density residential areas and 1500m walk in all other residential areas (Auckland Council, 2016). Notably our provision targets are lower than the WHO recommended targets.

In addition, the Auckland Urban Ngāhere (Forest) Strategy recognises the critical importance of our urban forests for their health and wellbeing benefits, and the ecosystems functions and services they provide - stormwater management, air pollution removal, improved water quality, cooling to reduce the urban heat island effect, and ecological corridors to connect habitats and improve biodiversity. The Strategy sets a goal to increase urban canopy cover from 18 to 30 per cent (with no local board having less than 15 per cent canopy cover) (Auckland Council, 2019).

Amsterdam is an interesting example of a city refocusing on urban green space as a priority. Having lost three million square metres of green space to urban development over the past decade (ESPON, 2020), greening the city is now one of Amsterdam's four key themes in its strategy and the municipal budget for it is increasing accordingly (City of Amsterdam, 2018). In Ørestad, an urban renewal area in Copenhagen, "one third of space is allocated for parks, green areas, lakes and artificial canals, whilst large scale leisure space is located in the green belt in the city proximity" (ESPON, 2020).

As well as consideration about amounts of green space, there are also important considerations of design and types of green and open spaces, to ensure that these meet the needs of people across the life course (Davern et al, 2017).

There are also important equity considerations as green space tends to be unequally distributed in cities with people in lower socioeconomic areas having less access to quality green spaces. This is also the case in Auckland where there is less access to quality green space in parts of South Auckland compared to leafy inner-city suburbs. This is reflected in much lower levels of canopy cover in parts of South Auckland, home to the two local boards with the lowest canopy cover in Auckland - Māngere-Ōtāhuhu (eight per cent) and Ōtara-Papatoetoe (nine per cent). This is far below the average for Auckland of 18 percent and the target of 30 percent (Auckland Council, 2019).

3.4 Buildings and construction

Buildings and construction have a crucial role to play in transitioning to a low carbon economy. In 2018, the building and construction sector was responsible for 7.4 Mt CO₂e of emissions, representing 9.4 per cent of New Zealand's emissions (or over 15 per cent if biogenic methane is excluded). In addition, 2.9 Mt CO₂e of building- and construction-related emissions occurred outside of New Zealand from the production of imported building materials and products. In Auckland, the built environment is responsible for a significant proportion of emissions, with roughly a quarter being attributable to stationary energy use in

residential, commercial and industrial buildings. Given the volume of construction projected in Auckland in the foreseeable future emissions are expected to increase.

Emissions arising from the built environment fall into two categories:

- **Embodied emissions** – the carbon emissions arising from the construction of a building. It includes emissions from sourcing raw materials, manufacturing, transport, the construction & installation activity and wastage in the building and construction process. Further, during their life cycle, the same products and materials also cause carbon impacts when they are maintained, repaired, or disposed of.
- **Operational emissions** – carbon emissions attributable to the operation of buildings – that is total emissions resulting from all energy sources used to keep buildings warm, cool, ventilated, lighted and powered.

Whole of life carbon (WLC) emissions include embodied and operational. The Ministry for Business, Innovation and Employment's (MBIE) Building for Climate Change programme of work focuses on two streams: (i) whole of life embodied carbon reduction, and (ii) operational efficiency, for new buildings only initially.

The built environment is one of the key priority areas of TTaT with several associated actions (refer Table 2) and targets modelled as part of the decarbonisation pathway in TTaT. These targets include:

- all new residential and commercial buildings operating at net zero emissions by 2030
- 50 per cent of existing residential and commercial buildings retrofitted to a high standard of energy efficiency by 2030.

3.4.1 Operational emissions

Operational emissions are those emissions that are directly related to the use of a building, resulting from all energy sources used to keep buildings warm, cool, ventilated, lighted and powered. There is huge scope for enhancing the energy efficiency of Auckland houses and other buildings, both existing and new.

Existing houses

It is predicted that current housing stock will make up approximately half of all dwellings in Auckland in 2050. Our current building stock is built to the minimum insulation standard required by law, and therefore has low operational efficiency and poor thermal performance, which must be improved significantly to achieve greater energy efficiency and emissions reduction. Doing so also has significant co-benefits in terms of improved health and wellbeing outcomes. The poor quality of many New Zealand houses is a public health issue that comes at a high cost to the individuals directly affected, but also to society more

generally (Building Performance Institute Europe, 2020).³ For example, almost one in five Auckland households live in houses with mould issues, an issue that is particularly common in rental properties affecting 27 per cent of renting households (Berl, 2020). Living with dampness and mould has detrimental health effects and has been linked to the high incidence of respiratory disease in New Zealand (Johnson, Howden-Chapman and Equb, 2018).

Lifting the energy performance of our existing housing stock will require a substantial drive for renovation and retrofitting. Unfortunately, national direction on major renovation and retrofitting efforts is lacking. The National Emissions Reduction Plan does contain a focus on encouraging and enabling emissions reduction from existing buildings including an action to introduce mandatory energy performance certificated. However, the initial focus is on government, commercial and large residential buildings with a view to potentially expand to other residential buildings in the future (Ministry for the Environment, 2022). The Building for Climate Change Programme led by MBIE contains a workstream focused on enhancing energy efficiency, but its focus is on new builds only. Addressing existing buildings will happen in the future, but no timeline is available (MBIE, 2021). At this point, efforts to improve energy efficiency of housing has been relatively limited. The Government's Warmer Kiwi Homes programme offers subsidies to lower income homeowners to insulate and install heating and is estimated to have assisted 85,000 households since July 2018 (Ministry for the Environment, 2022).

TTaT targets retrofitting 50 per cent of existing residential and commercial buildings to a high standard of energy efficiency by 2030, through the delivery of a retrofitting programme, which would involve installation of insulation, double glazing, efficient heating and lighting, and renewable energy generation. It will be a challenge to do so, especially in the absence of national direction.

It is worth noting the link between renovations and embodied emissions. Renovations to enhance energy efficiency increase embodied carbon by adding new material and systems into the building (United Nations Environment Programme, 2021). That is, the embodied emissions produced by the renovations must be kept as low as possible.

New houses

What we build is critically important; it will determine a great deal of our emissions long into the future. The lifecycle of built assets is long. Residential buildings are typically considered to have a lifespan of 90 years and infrastructure even longer.

The construction of new houses must therefore seek to build to net zero carbon or passive house standards. However, New Zealand's building code standards are low by international

³ Studies into the wider benefits of improvements in energy efficiency in buildings have found these to include reduced healthcare costs, greater labour productivity (resulting from fewer sick days) and improved educational performance (Building Performance Institute Europe, 2020).

standards and poor when it comes to its energy-efficiency requirements. That means that even new builds are not meeting high energy efficiency standards. There were some updates to the Building Code in 2021 to make new homes and buildings more energy efficient, but these fall far short of the standards that would be required for zero carbon homes. Other countries are far ahead of New Zealand in tightening building codes to help decarbonise their built environments.

There are some signs of change. New Zealand Green Building Council's (NZGBC) existing tools, Green Star, Homestar, Passive House and NABERSNZ (commercial buildings), already put a central focus on reducing greenhouse gas emissions. Although in the case of the Homestar rating scheme, even Homestar 6, adopted by Kāinga Ora as a minimum standard, only recognises a home that has been built above the current standards set by the New Zealand building code. This is well short of world leading standards for design, construction and efficiency in operation, as indicated by a Homestar 10 rating. NZGBC (2019) has recently released the document *A Zero Carbon Road Map for Aotearoa's Buildings* and a set of tools that will allow building owners to measure, manage and offset emissions on a path to carbon zero.

Eke Panuku Development Auckland has introduced Homestar 6 rating as a minimum requirement on its residential sites (Homestar 7 in Wynyard Quarter) as part of its commitment to climate change and sustainability. Kāinga Ora has also introduced minimum Homestar 6 certification for new builds (except apartments) contracted from 1 July 2019, and for apartments from 1 January 2021. Eke Panuku has also been taking a sustainable approach to master planning, with two Panuku neighbourhoods achieving a Green Star–Communities rating in 2019⁴. The Opanuku Precinct in Henderson and the Unlock Takapuna programme have been independently rated for their commitment to sustainability, planning for climate change and building community resilience.

3.4.2 Embodied carbon emissions

Embodied carbon emissions refer to the carbon emissions arising from the construction of a building or structure. It includes the emissions from sourcing raw materials, manufacturing, transport, the construction & installation activity and wastage in the process. It also includes the carbon impacts when the building products and materials are maintained, repaired, or disposed of (Carbon Neutral Cities Alliance, 2020).

Reducing embodied emissions is an enormous challenge globally, and no less so in Auckland as the city continues to grow. The United Nations Environment Programme (2021, p.74) points out “that countries that have ambitious building regulations and a low-carbon-

⁴ Green Star - Communities is one of a handful of internationally recognised sustainability rating tools for communities and precincts. Owned by the Green Building Council of Australia (GBCA), the tool has been adapted alongside NZGBC for use in a New Zealand context.

intensity electricity grid, such as Denmark or France, embodied carbon emissions can be two to four times greater, or more, than emissions associated with operational energy use”. The same can be said for New Zealand. This highlights the critical importance of efforts to reduce embodied emissions.

Despite much recognition about the importance of reducing embodied emissions, current efforts globally fall short of achieving what is necessary to reduce carbon emissions in line with the Paris Agreement (Ramboll, 2022). About 70 per cent of a building’s embodied emissions are emitted upfront i.e. during the production and construction phase. This highlights the need to focus reduction efforts on upfront carbon emissions rather than on (future) end-of-life scenarios.

Reducing embodied carbon in buildings require careful consideration of materials, building designs and construction methods. For example, building designs that optimise use of space to reduce required floor area and hence material consumption, the conscious application of (fast-growing) bio-based construction materials (such as timber, bamboo, straw or hemp), and the adoption of circularity principles, including the use of repurposed or recycled materials that reduce waste, all reduce embodied carbon (Ramboll, 2022).

TTaT contains several actions and sub-actions that aim to reduce embodied emissions. These include actions to ensure sustainability and reduced carbon impacts from design to demolition e.g. enhancing reuse of building material and initiatives to reduce construction and demolition waste. Making progress on these initiatives requires action by many different actors, including central government and the construction sector.

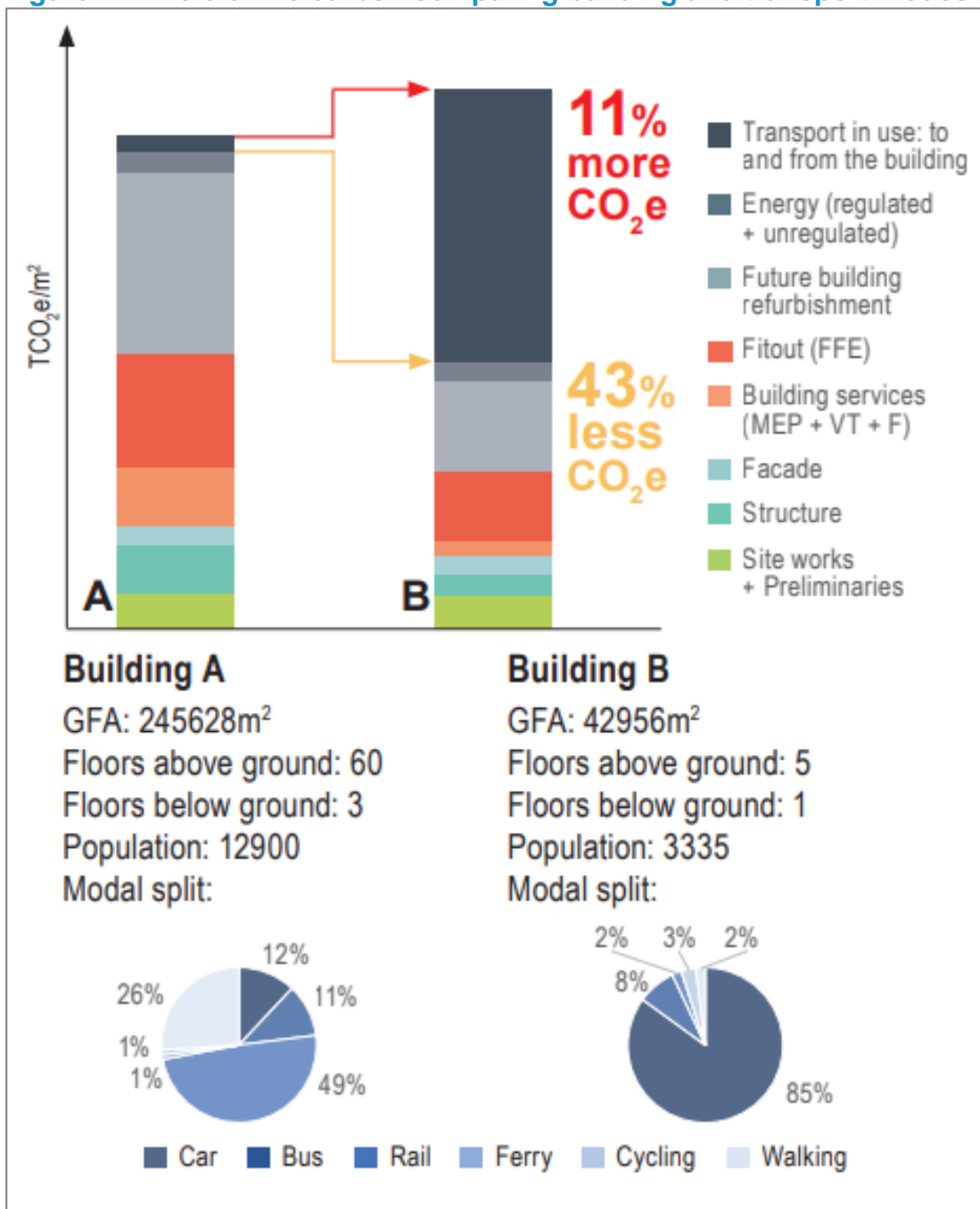
There are several initiatives underway. As part the MBIE-led Building for Climate Change Programme’s Whole-of-Life Embodied Carbon Reduction work stream a whole-of-life embodied carbon emissions reduction framework was consulted on in 2020. The recently released Emissions Reduction Plan contains actions to progress the regulatory changes required to put the framework into action. Among other initiatives, this includes regulatory changes to introduce whole-of-life embodied carbon requirements to the Building Code (consultation in late 2022). Likewise, the Construction Accord Transformation Plan 2022-2025 also contains a goal focused on reducing embodied carbon.

3.4.3 Integrated approach to sustainability in building and construction AND land-use and transport planning

While sustainability in design and construction is crucial, current best practice stresses the importance of taking an integrated approach to buildings and infrastructure, taking account not only of building level emissions (operational and embodied), but also the infrastructure that serve buildings and communities, notably transport.

To illustrate this point, the World Green Building Council (2021) highlights a case study example that compares the dramatic differences in whole life cycle carbon accounting when transport is factored in (Figure 2). Once transport in use to and from the building is factored in, the otherwise superior building (Building B) from a purely sustainable design perspective (operational and embodied emissions) has a higher whole of life carbon footprint, than the less sustainable building that is located as part of transit-oriented development. The example clearly shows that emissions reduction is maximised when taking an integrated approach to building and construction, and transport and land use planning.

Figure 2: Whole of life carbon comparing building and transport modes



Source: World Green Building Council (2021)

3.5 International exemplars of sustainable urban development

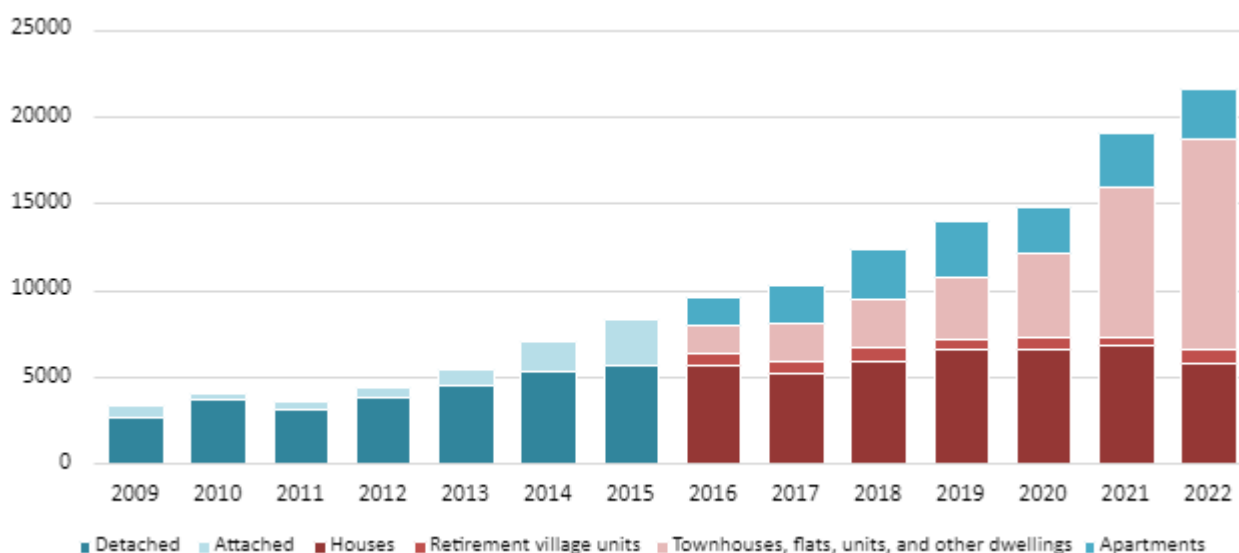
There are some great exemplars of sustainable urban development where decarbonisation is firmly on the agenda. Two examples are presented in Appendix 3, both from Scandinavia where some of the most radical approaches to urban development can be found. Both are brownfield developments; redeveloped waterfront locations.

3.6 Housing supply

Auckland will need a significant number of additional dwellings to be built over the next three decades. These will need to be a broader mix of housing types of different sizes and at different price points.

There has been a significant increase in the number of dwellings consented over the past decade, and a clear shift in housing typologies over time, very much in line with the quality compact approach to growth set out in the Development Strategy (see Figure 3). In the year to June 2022 multi-unit dwellings (apartments, townhouses, flats, units and other dwellings (not including retirement village units)) made up approximately 69 per cent of new dwellings consented while detached houses made up 27 per cent. It is a significant change from 2015 - the year before the Unitary Plan became operative - where multi-unit dwellings made up 32 per cent of all new dwellings consented and houses made up 57 per cent.

Figure 3: Number of new dwellings consented by type (for reporting year 1 July – 30 June)



Source: Statistics New Zealand, building consents data

Note: In 2015, Stats NZ revised the classification of data resulting in four categories: 1) Houses, 2) Apartments, 3) Townhouses, flats, units and other dwellings, 4) Retirement village units, previously reported as ‘attached’.

The change in the types of dwellings consented is enabling most growth (82% in 2020/2021) to occur within the existing urban area, particularly in and around centres, evidencing that Auckland is progressively becoming more compact. Further, concentrations of more dense housing is occurring in areas with good transport accessibility. In 2020/2021, a quarter of all dwellings consented were within a 1,500m catchment of train stations and the Northern Busway, and of these 85 per cent were more intensive housing types (apartments and townhouses etc.). Having said that, it is worth noting that the proportion of total consents that are within the 1,500m RTN walkable catchment has been declining since mid-2020 (Auckland Council, 2021a).

A 2015 study showed that a mismatch existed between the supply of dwelling typologies and what residents would choose (Yeoman and Akehurst, 2015). There was strong unmet demand for higher density attached dwellings and apartments within the high amenity established suburbs. The fact that a growing percentage of dwellings consented in established suburbs within the Auckland Isthmus are for higher density dwellings shows that Auckland is moving in the right direction with regards to delivering the mix of housing people want. For example, in 2020/21, more intensive housing types (apartments, townhouses, retirement units) made up 76 per cent, 60 per cent and 72 per cent respectively of all new dwellings consented in the Albert-Eden, Orakei and Maungakiekie-Tamaki local board areas. However, much of what is being built is at the higher priced end of the market, and not necessarily affordable for many residents – whether for rent or home ownership.

3.6.1 Accelerating quality development at scale

Under the National Policy Statement on Urban Development 2020, the Council produced a Housing and Business Development Capacity Assessment (HBA) that provides information on the demand and supply of housing and business land over the short, medium and long-term. The HBA demonstrated that Auckland has feasible development capacity in excess of demand in the short and medium term (1-10 years) with total net infill development capacity of 101,649 dwellings and the total net redevelopment capacity of 909,179 across Auckland's urban zoned land. The commercially feasible development capacity is found to be between 838,000 and 1.4 million dwelling units, depending on the modelling scenario (the maximum percentage of profit yield and the minimum priced dwelling units scenarios – for further information refer to Auckland Council (2021b)).

Commercial feasibility will strongly depend on plan-enabled capacity in the most desirable areas as expressed via land values and the relative scale of development allowed. The current versus future state of housing affordability will depend on the distribution of housing supply at significant intensity in areas of high demand. This increase in scale and density will allow for people to freely make the choice between living close to jobs, amenities and infrastructure versus further away.

The introduction of new legislation - the Enabling Housing Supply Act - seeks to further increase housing supply and enable more medium density housing.

3.6.2 Funding and financing

To deliver the homes and places that Auckland will need as it grows will require significant investment in bulk and other infrastructure. This includes both new infrastructure to support the greenfield land identified in the Future Urban Land Supply Strategy, and upgrades to networks to support intensification of the existing urban area. In addition, there will be infrastructure costs associated with responding to climate change impacts such as sea level rise and flooding.

In 2018 it was projected that this infrastructure could require investment over 30 years of around \$30 billion. Increases in land and construction costs since this time, along with work we have done to assess the costs of specific development areas such as Drury suggest the figure is significantly more than this.

There is a substantial difference between this projected level of investment required and the funding currently available. The council continues to look at opportunities to address this gap. These opportunities include partnering with central government, and alternative funding and financing tools.

The council is working with the Government to access funding through both the Housing Acceleration Fund and the Infrastructure Acceleration Fund that will help support the provision of some critical infrastructure that unlocks land for housing development. The council is also exploring opportunities to use new tools available such as those enabled by the Infrastructure Funding and Financing Act. If the funding gap cannot be resolved then the growth will not be fully supported by the infrastructure required to deliver a sustainable and well-functioning urban environment.

3.6.3 Construction sector capacity and capability

Strong demand for residential construction, as evidenced in record high dwelling consents, have put additional pressure on a construction sector already facing challenges in keeping pace with the demand for housing. Workforce capacity and capability constraints, high building cost and low productivity are some of the long-term issues facing the sector – these issues have been exacerbated by shortages of labour, supply chain disruptions and international border closures during the pandemic (MBIE, 2022).

The cost of construction in New Zealand is high, and rising demand coupled with constrained supply has fuelled rapid construction sector inflation. In 2021, residential construction cost rose by 11 per cent and similar increases are forecast for 2022. Rising residential construction price inflation is not only a New Zealand phenomenon; it is happening globally. However, New Zealand has seen construction price inflation well above the OECD average

(8.5%) in 2021, as was the case in the five years from 2016 to 2021 where annual residential construction price inflation was just over 5 per cent (New Zealand Infrastructure Commission, Te Waihanga, 2022; MBIE, 2022a).

Work force capacity and capability constraints have been an ongoing challenge for the New Zealand construction sector. While there has been strong growth in the construction workforce, the labour shortage is as pressing as ever. In 2021 90 per cent of construction businesses reporting that they experienced moderate to severe difficulty recruiting tradespersons, up from 74 per cent in 2020 (Stats NZ Business Operations Survey 2021, quoted in MBIE (2022a)).

The Construction Sector Accord, a joint commitment between government and industry to work together to lift the performance of the construction sector, was launched in 2019. In 2020, the Accord launched the Construction Sector Transformation Plan 2022-2025, an action plan for change focused on addressing the sector's systemic challenges (e.g. low productivity, capacity and capability issues, environmental impact, poor health and safety) and building resilience across the sector (MBIE, 2022b).

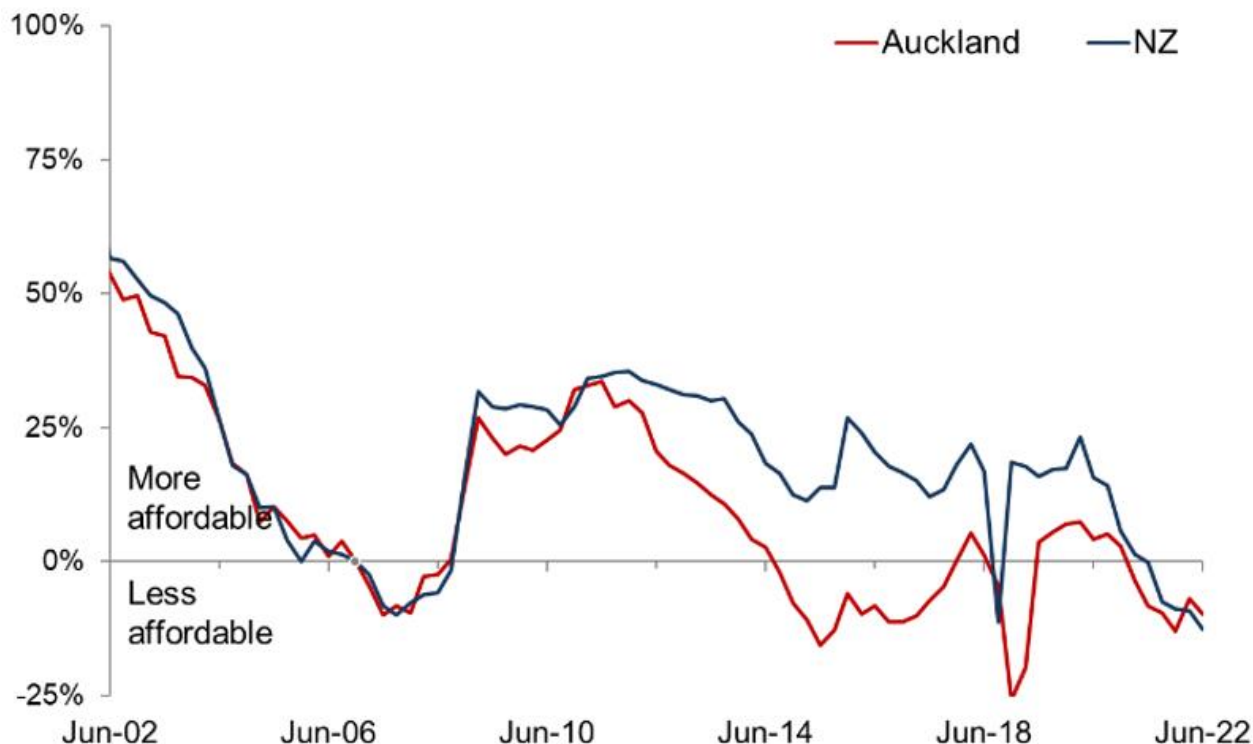
3.7 Housing affordability

Access to affordable housing – whether for rent or home ownership – is critical to stability, social cohesion and equity, and thus the wellbeing of individuals. House price growth has far outstripped wage growth for the past two decades. The median house price in Auckland is just over eleven times the median household income, significantly higher than the median house price to median income ratio of three, considered the threshold for affordability. In 2012, when the Auckland Plan was adopted, the median house price to median income ratio for Auckland was 6.7. Today Auckland is one of the world's least affordable housing markets, and this has worsened substantially over time (Urban Reform Institute and Frontier Centre, 2022; 2013). The housing price boom witnessed since the beginning of the pandemic has exacerbated already unsustainable house price growth, and rents have also been increasing (Gibson, 2022).

Affordability is more than just the price of a home. It includes other housing-related costs, (e.g. rent or mortgage payments, heating and transport), whether people own or rent their home. The Chief Economist Unit's serviceability affordability model (SAM) measures household incomes, interest rates and deposit requirements (see Figure 4)). The model shows that affordability has worsened over the last three years. This is largely due to where mortgage interest rates are at in the current monetary tightening cycle. However, prices are coming down, Auckland's median price is currently (Sep 2022) at \$1.05m having come down from \$1.3m less than a year ago; a decline of 8.3 per cent (REINZ, 2022). The outlook on affordability will be dependent on how falling prices, modest income growth and high interest

rates interact. If the first two are able to offset the increased cost of financing, then this is likely to improve affordability over time.

Figure 4: SAM median house price affordability relative to December 2006



Source: Chief Economist Unit, Auckland Council.

The high cost of housing in Auckland is particularly challenging for low-income households and renters. While the average Auckland household spend almost a quarter of their disposable income on housing costs (22.4% in 2021), households in the lowest income quintile (lowest income 20%) spend almost half of their disposable income on housing. Meanwhile, households in the highest income quintile paid, on average, just 15 per cent of their disposable income on housing (Statistics New Zealand, 2022).

Likewise, renters spend a much higher proportion of their incomes on housing costs. In 2021, 33 per cent of renting households spent over 40 per cent of household disposable income on housing costs, compared to 15 per cent of homeowners (Statistics New Zealand, 2022).

The difficulty of finding affordable housing experienced by lower income households is a problem that has been exacerbated during the pandemic. The demand for public housing in Auckland has increased significantly - 40 per cent more people were on the public housing register in June 2022 (8,550) than in March 2020 (6,087) (Ministry of Social Development, n.d).

4 Conclusion

4.1 How the updates to the Homes and Places outcome reflect the evidence on the role of cities in climate change action

The updates to the Homes and Places outcome that arise from the evidence presented in this report are summarised in Table 3 below. As shown, updates that reflect a greater climate change focus will be made to directions 1, 2 and 4, and focus areas 1, 3 and 5.

Note that the table only summarises updates to address the strategic gap on climate change. In addition, there will be changes to the content of the Homes and Places outcome in regards to housing supply and affordability, and legislative changes. These are not reflected in the table.

Table 3: Homes and Places Strategic Framework

Updates to integrate climate change in the Homes and Places outcome	
Aspect to be updated	Updates
<p>Direction 1</p> <p>Develop a quality compact urban form to accommodate Auckland's growth</p>	<p>Update narrative to include the benefits of a compact urban form in terms of supporting decarbonisation e.g. limiting urban sprawl enables the much-needed mode shift away from a reliance on cars to public transport and active modes of transport, such as walking and cycling with the associated benefits for emissions reduction.</p> <p>Build a stronger link with the transport and Access Outcome. Achieving higher density near transport hubs critical to achieving climate goals.</p> <p>Update wording of the direction to highlight the critical role of a compact urban form to a low-carbon future i.e. Develop a quality compact urban form to accommodate Auckland's growth and support a low-carbon future.</p>

Updates to integrate climate change in the Homes and Places outcome	
Aspect to be updated	Updates
<p>Direction 2 Accelerate the construction of homes that meet Aucklanders’ changing needs and preferences</p>	<p>Add a greater emphasis on quality. The current focus is on quantity of homes. Update to ensure that the importance of quality and sustainability considerations are reflected e.g. the need for more sustainable building methods and materials.</p> <p>Update the wording of the direction to reflect the emphasis on quality i.e. Accelerate the construction of quality homes that meet Aucklanders’ changing needs and preferences.</p>
<p>Direction 4 Provide sufficient public places and spaces that are inclusive, accessible and contribute to urban living</p>	<p>Include mention of the role of places in greening the city and the opportunity they provide for climate action, both mitigation and adaptation. For example, the role of trees for air quality, carbon sequestration and cooling air, land and water by offering shade and moisture, all of which will become more important in the future.</p>
<p>Focus Area 1: Accelerate quality development at scale that improves housing choices</p>	<p>Broaden the definition of quality to reflect climate considerations more strongly. Include in narrative mention of how new buildings must make use of sustainable building methods (construction materials and methods to reduce embodied emissions) and greater energy efficiency must be ensured.</p> <p>The framing is currently on speed and cost effectiveness as a result of the overall focus of the outcome on the housing crisis; climate considerations should be integrated.</p>
<p>Focus Area 3: Improve the built quality of existing dwellings, particularly rental housing</p>	<p>Greater focus on the quality of buildings and their emissions impact i.e. operational and embodied emissions. Include mention of the emissions reduction benefits of retrofitting existing buildings.</p>

Updates to integrate climate change in the Homes and Places outcome	
Aspect to be updated	Updates
Focus Area 5: Create urban places for the future	Include the role of green spaces in mitigation and adaptation, in line with the updates to Direction 4.

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Appendix 1: Legislation

Relevant legislation that impacts urban development and emissions reduction in different ways

National Emissions Reduction Plan

The Emissions Reduction Plan will set out how New Zealand will meet its first emissions budget (2022-2025) and set the path towards meeting our long-term climate targets. The Government intends to publish the first Emissions Reduction Plan setting out policies and strategies for meeting emissions budgets by 31 May 2022. The Ministry for the Environment (MfE) is leading overall consultation on the Plan. Auckland Council did a comprehensive submission on the Plan [insert link]. The Emissions Reduction Plan contains sector strategies. Of particular note for the housing and urban development space is:

- **Building for Climate Change programme:** This work, led by the Ministry of Business Innovation and Employment (MBIE), concerns the Building and Construction sector's response to climate change. The programme has two main areas of focus:
 - **Whole-of-life embodied carbon reduction:** framework proposes to set mandatory reporting and measurement requirements for whole-of-life carbon emissions, including from the materials used in construction, the construction process, construction waste, and the disposal of a building at the end of its life. Signalled intention of bringing whole-of-life embodied carbon requirements into the Building Code (consultation on this late 2022).
 - **Operational efficiency:** proposes to set required levels of efficiency for energy use and water use and define minimum indoor environmental quality measures for new buildings.
 - The programme will be looking to add emissions caps for new buildings to require levels of efficiency and reduce embodied carbon. Operational efficiency requirements are proposed for 2035 for new buildings, with existing buildings included later.
 - Changes to the H1 insulation requirements in the Building Code to ensure improved energy efficiency of buildings (effective May 2023).
 - The Council made a comprehensive submission on the Building for Climate Change Programme.
- **Transport Emissions Action Plan (TEAP):** The TEAP will identify key measures for reducing emissions from the transport system, and pathways for achieving net zero by 2050. The work includes identifying opportunities to reduce emissions through supporting compact urban development and supporting the move away from car dependency to low carbon transport modes.

National Policy Statement on Urban Development 2020 (NPS-UD)

The existing national direction on urban development, which guides council planning, enables growth 'up and out' in locations with existing services and infrastructure, promoting growth in centres and public transport networks. The NPS-UD provides

national direction under the RMA that addresses planning regulations, methods and practices that impact of the delivery of both brownfield and greenfield developments where there are the greatest benefits – in places with good transport links, access to jobs, community services and education. The NPS-UD have provisions that require Councils to enable intensification near existing centres and public transport routes and to remove minimum car parking restrictions from district plans. The intention is to encourage well-functioning, liveable urban environments. Requires Councils to remove overly restrictive rules that affect urban development. The National Policy Statement on Urban Development (NPS-UD) 2020 is currently being updated to align with the Resource Management (Enabling Housing and Other Matters) Amendment Act 2021.

- Objective 8 of the NPS-UD states that New Zealand’s urban environments must support reductions in greenhouse gas emissions and are resilient to future and current effects of climate change.

Urban Growth Agenda (UGA)

The UGA aims to remove barriers to land supply and infrastructure to enable cities to grow up and out. The main objective of the UGA is to improve housing affordability, underpinned by affordable urban land. There are four wider objectives to:

- improve choices about the location and type of housing
- improve access to employment, education and services
- assist emission reductions and build climate resilience
- enable quality-built environments, while avoiding unnecessary sprawl

Five interconnected focus areas cover aspects of urban and infrastructure planning, including enabling strategic integrated planning. The UGA is delivered through partnerships between the Crown, local government, iwi and local communities.

UGA partnerships: The **Auckland Housing and Urban Growth Joint Programme** developed under the UGA is a collaboration between Auckland Council and the Government to deliver shared housing and urban growth priorities. The programme covers both spatial priorities (e.g. development opportunities arising from the City Rail Link, the City Centre to Mangere Light Rail Transit projects, Manukau centre and Drury) and policy priorities, such as how to deliver more affordable housing and quality intensification. A key implication of the Government signing up to the Joint Programme is that it creates an obligation for ministers and government agencies to engage with Auckland Council in a spirit of collaboration.

Government Policy Statement on Housing and Urban Development (GPS-HUD)

The GPS-HUD sets out the Government’s long-term vision for housing and urban development in New Zealand. It provides strategic direction to the housing and urban development system and takes a multi-decade outlook. It also includes direction to Kainga Ora on mitigating and adaption to the effects of climate change.

Government Policy Statement on Land Transport (GPS-LT)

The GPS-LT outlines the Government’s strategy for investment in land transport over the next 10 years, which is then implemented by Waka Kotahi through the National Land Transport Programme. It provides guidance on how the Government invests the National Land Transport Fund (NLTF), and how activities for Regional Land Transport Plans (RLTPs) and the National Land Transport Programme (NLTP) are assessed

and prioritised. One of the key outcomes sought by the GPS-LT is to reduce greenhouse gas emissions from transport.

Resource Management Act 1991

The RMA is the main law governing management of our natural resources. The RMA regulates land use and the provision of infrastructure, as well as air, soil, freshwater and the coastal marine area. Under the RMA Councils are required to incorporate climate change into existing frameworks, plans, projects and standard decision-making procedures. A climate change perspective is now integrated into activities such as flood management, water resources, planning, building regulations and transport. The RMA Amendment Bill 2020 introduced new provisions formally linking the RMA to the Climate Change Response Act 2020 (CCRA) by requiring Councils to have regard to emissions reduction plans and national adaptation plans under the Climate Change Response Act 2002 when making and amending regional policy statements, regional plans and district plans.

- **The Enabling Housing Supply and Other Matters Amendment Act 2021 and the Medium Density Residential Standards (MDRS):** removes barriers to medium density developments in New Zealand's five largest cities. That is, the Bill accelerates implementation of the NPS-UD by requiring Council to set more permissive land use regulations and amend RMA plans to enable intensification. The Council's submission on the Housing Supply Bill can be found here [insert hyperlink]

A 2020 review of the RMA has resulted in a decision to repeal the RMA and replace it with new separate pieces of legislation. The new Acts will be:

- **Natural and Built Environments Act (NBEA):** provides for land use and environment regulation (the primary replacement for the RMA). The review panel suggested a revised purpose for the NBEA: enhancing the quality of the environment to support the wellbeing of present and future generations as opposed to the 'old' purpose of managing the adverse effects of the activities on the environment rather than promoting positive outcomes. The new purpose will be achieved by promoting positive outcomes for both the natural and built environments, ensuring that use, development and protection of resources only occurs within prescribed environmental limits and that the adverse effects of activities on the environment are avoided, remedied or mitigated. With respect to urban growth, the revised purpose and principles of the NBEA will provide for specific outcomes for the built environment, including the availability of development capacity for housing and business purposes to meet expected demands, and the strategic integration of infrastructure with land use. To address the effects of climate change, Outcomes in the purpose and principles of the NBEA will be designed to reduce risks from natural hazards, improve resilience, reduce greenhouse gas emissions, promote activities that mitigate emissions or sequester carbon and to increase the use of renewable energy.
- **Spatial Planning Act (SPA):** The Spatial Planning Act will set long-term strategic goals and facilitate the integration of legislative functions across the resource management system. These would include functions exercised under the NBEA, the Local Government Act, the Land Transport Management Act and the Climate Change Response Act to enable land and resource planning to be better integrated with the provision of infrastructure as well as associated

funding and investment. Under the SPA Council's will be required to prepare spatial strategies that identify areas suitable for urban growth (as well as areas not suitable for development) and would also facilitate the provision of infrastructure necessary to support growth. Climate change mitigation measures consistent with the CCRA will identified by in spatial strategies developed under the SPA.

- **Climate Change Adaptation Act:** the purpose of the CCA is to address complex legal and technical issues associated with managed retreat and funding and financing adaptation. Managed retreat is a tool which requires careful planning for progressive withdrawal from areas that will be affected by climate change. It is focused on existing uses unlike many other planning and consenting processes that focus on proposed uses.

Waste Minimisation Strategy and Waste Minimisation Act

A new national waste strategy and new legislation is under development to better regulate how we manage products and materials circulating in our economy.

Construction Sector Accord and Transformation Plan workstream on Environmental Sustainability

The Construction Sector Accord is a joint commitment from government and industry to work together to create a high performing construction sector for a better New Zealand. The Accord recognises the significant challenges for the construction sector with regards to its environmental impacts. Under the environmental sustainability workstream BRANZ has developed a Construction Sector Environment Roadmap for Action that outlines how the built environment and construction sector can contribute to New Zealand's climate and other environmental goals. Reducing emissions in the sector is one of the key priority areas.

The Future for Local Government Review

This review is underway. The Terms of Reference recognises the important role of local government in reducing greenhouse gas emissions and adapting to climate change. The review will consider the implications for local government, including significant financial implications.

National Adaptation Plan

Homes, Buildings and Places is one of five outcome areas in the recently released (2022) National Adaptation Plan which seeks to address the most significant climate risks identified in the National Climate Change Risk Assessment 2020. The Plan includes a broad range of critical actions to deliver a climate resilient built environment - ensuring that development happens in the right places and that homes and buildings can withstand the impacts of climate change. For example, Resource Management reform which is a critical enabling action to ensure that growth is directed to the most appropriate locations. Other proposed actions that aim to reduce and manage the impacts of climate hazards on homes and buildings include updating of the regulatory requirements (i.e., Building Code) to ensure buildings are designed and constructed to withstand more extreme climate conditions.

Appendix 2: The 15-minute city

The concept of the 15-minute city has gained traction as an approach to low carbon urban planning in recent time. In essence, the 15-minute city is a city in which all residents have access to most, if not all, of their needs within a 15-minute bike ride or walk. This enables people to live and thrive in their local community, reducing car dependency and motorised commuting times, in turn resulting in substantial emissions reductions. That is, a 15-minute city is density and mixed-use development in practice requiring essential amenities, different housing types, green spaces and work opportunities to be available within a 15-minute walking and cycling distance.

The approach is also championed by C40 in its C40 Mayors' Agenda for a Green and Just Recovery (2020), in which the 15-minute city is recommended as an urban planning framework for all cities, highlighting its contribution to emissions reduction and environmental sustainability (C40, 2020). The concept is by no means new, but rather an iteration of concepts and ideas that have been around in urban planning and design for centuries that focus on the importance of 'complete neighbourhoods' to liveability and quality of life. While some cities have pursued an urban development approach that aligns with the 15-minute city approach for a long time, notably typical Nordic cities, it is also the case that the dominating urban planning paradigm for the last century has separated residential areas from business, retail, industry and entertainment. There are plenty of examples of that in Auckland too.

The 15-minute city approach to urban planning is also considered complimentary to transit-oriented development, with neighbourhoods naturally requiring connectivity to other neighbourhoods and work without relying on cars.

The C40 Mayors' Agenda highlights some core principles of complete neighbourhoods (refer to box below).

It follows from these principles that building a 15-minute city requires plans and zoning that enable critical public services, infrastructure and green space accessibility at a neighbourhood level.

To ensure enough green spaces cities may have to transform parking space and reimagine the use of road space into parks. In addition, mixed use zoning is critical, as is the promotion of flexible use of buildings and public space.

Core principles of 15-minute city

- Easy access to goods and services, particularly groceries, fresh food and healthcare.
- A variety of housing types, of different sizes and levels of affordability, to accommodate many types of households and enable more people to live closer to where they work.
- Abundant green spaces to ensure access to nature for everyone
- Smaller-scale office, co-working spaces, retail and hospitality
- Walking and cycling corridors and reduced convenience of driving

Ensuring access to affordable housing is an equally important element. C40 recommends setting affordable housing requirements – inclusionary zoning – in new developments and suggests offering density bonuses or other incentives to developers for providing affordable units.

Councils can also have a role in promoting the establishment of neighbourhood co-working spaces, either directly by re-thinking the use of Council owned buildings, or indirectly by supporting the creation of community-run or private workspaces. The importance of these spaces will only grow as new models of working have rapidly emerged during the pandemic.

Appendix 3: International exemplars of sustainable urban development

Sweden: Malmö – Western Harbour

The Southern Swedish city of Malmö has become known for its focus on sustainable urban development. With its relatively small population of 350,000 inhabitants, half of which are under the age of 35, some might say that the city is punching above its weight in terms of sustainability. The city has transformed itself from an industrial city into a climate-smart knowledge city, listed as the fourth most innovative in the world by the OECD. The city is working actively for sustainability initiatives and is the first city in Sweden that has publicly announced the commitment to implement the UN Sustainable Development Goals (SDGs). The SDGs are integrated into the City Council's goals and as part of the budget process. Over the last years Malmö has received many international awards for its focus on sustainable urban development and pilot projects. One such project is Western Harbour (ICLEI 2021).

Malmö's Western Harbour was previously a shipyard and industrial area covering 187 hectares. Today the area is home to 10,000 residents and more than 16,000 work there, and it has become an international model for sustainable urban development. The area has developed over 20 years, but initially started with the Bo01 district, the world's first climate neutral city area, built for the European housing exhibition in 2001. The area is the result of a comprehensive planning process led by the local authority, which developed a master plan for the area with the help of a renowned architect and planner, who conceived a holistic vision of which sustainability and decarbonisation was fundamental. The area combines leading practices in urban planning and design, transport and infrastructure planning, building design and waste management (ICLEI, 2021, Smart City Sweden, n.d).

In practice this means an emphasis on public transport, walking and cycling, and sustainable building practices, such as low energy and passive houses, and the use of nature-based solutions (e.g. green roofs and extensive rain water run-off systems). The urban form is characterised by mixed use, and building typologies reflect the human scale and ensure architecturally interesting and liveable neighbourhoods. The area is supplied with local, renewable energy from a local wind power plant and solar collectors mounted on roofs and walls of buildings. The area has an advanced system for waste management. Green spaces and urban areas have been prioritised as an integral component of good urban design and, in fact, half the area is dedicated to green and open spaces, enhancing liveability and benefitting biodiversity (Smart City Sweden, n.d., Quintero et al, 2019).

It is possible to experience a [guided digital tour of Western Harbour](#).

Denmark: Copenhagen – Nordhavn

Copenhagen is another Scandinavian city well-known for its focus on sustainable urban development. It is possibly the most ambitious city in the world with respect to decarbonisation, aiming to achieve carbon neutrality by 2025.

One of the city's newest districts Nordhavn is the largest and most ambitious city development project in Scandinavia. The former industrial harbour site, will, when fully developed in 40-50 years, house 40,000 inhabitants and provide employment for about 40,000 people. The vision for Nordhavn is to become the sustainable city of the future and it is designed to be carbon neutral. From the outset the intention was to “lead efforts in addressing climate change, and demonstrate how mitigation strategies contribute to (not adversely impact) the quality of life, welfare and democracy within the city” (Morandini, 2018 ,p.53). Nordhavn is the only new urban district in Denmark to have received the prestigious gold certification for sustainability from the German Sustainable Building Council (DGNB), a de facto standard for certification of urban plans and buildings (Ramboll, 2020).

The Nordhavn development is guided by a masterplan, developed by a consortium of private developers and architects who won an international design competition, and is based on six key principles: islets and canals, identity and history, five-minute city, blue and green city, CO2-friendly city and intelligent grid (Morandini, 2018). Following the design competition, the City of Copenhagen prepared statutory municipal and local development plans stipulating the rules and requirements guiding the development of Nordhavn. These include some governing principles, ensuring that public realm and landscape will be given priority over buildings, sustainable building design, varied building and urban space design, mixed ownership and functions, and re-use of existing buildings on a permanent or temporary basis. In addition, there are rules to ensure architectural variation within each building block e.g. building height (three to six storeys), required shifts in building heights within each building block, and a requirement to follow external boundary of the building plot. For further details refer to a detailed case study found [here](#) (p.57).

Nordhavn showcases numerous sustainable solutions in transportation and building practice, including an elevated metro and bicycle network that create a green loop of the entire neighbourhood. Other sustainable solutions include solar panelling, water cooling, shared mobility services, recycling of building materials, 25% affordable homes within the district and access to public institutions and public spaces along the waterfront. The urban form replicates the existing five- to six-storey courtyard block typology in the older parts of Copenhagen, thus providing a connection to the architectural heritage of the city (Van Deurs, 2020).

There are also examples of the multi-functional urban building approaches that are leading practice in sustainable buildings. One such example is the parking structure Konditaget Lüders (Sports roof Lüders). The building, which is home to a large variety of climbing plants on the exterior facades, consists of a community-based recycling centre, a supermarket,

parking for 785 cars, and an enormous battery which can store and recycle solar energy back into both electric cars and heating systems. The roof of the building contains a public playground and sports training facilities. Another well-known example of such a multi-functional approach to building design, albeit located elsewhere in Copenhagen, is a ski slope on top of a waste-to-energy plant, which aims to provide citizens with direct benefits in their daily lives from initiatives aimed at meeting the sustainability agenda (Van Deurs, 2020).

