Climate Change Mitigation & Adaptation in Suburban Melbourne

Critical Policy Brief

This briefing has been written by researchers affiliated with RMIT's Urban Futures Enabling Capability Platform as part of RMIT's Greener Start Initiative to inform policy makers and the wider community on opportunities to strengthen climate change mitigation and adaptation in Melbourne's outer suburbs.

Overview

The impacts of climate change present significant challenges for the future development, sustainability and resilience of Melbourne suburbs. The Victorian Government and CSIRO have estimated that, based on current evidence and an ongoing high emissions scenario, daily maximum temperatures in Greater Melbourne will increase by 0.8 to 1.6°C by the 2030s (since the 1990s), with more heat extremes and intensive rainfall events.[1] Melbourne's suburbs are likely to be increasingly at risk from climate change-related events such as drought, heatwaves, storms and bushfires.

The low density development pattern in Melbourne's middle and outer suburbs contributes to climate change hazards through the greenhouse gas associated with high land and material consumption, loss of biodiversity, and high reliance on car travel. Land use also combines with climatic and biophysical factors such as water flows and heat to generate climate change impacts.

This policy brief highlights key opportunities for climate change mitigation and adaptation in urban planning, transport, energy, urban greening, water and waste management. Its recommendations seek to promote sustainability and resilience in Melbourne's suburbs and support achievement of the UN Sustainable Development Goals (SDGs).

Plan for Higher Density Development and Integrated Services

Significant energy efficiency can be achieved through denser urban development. Higher urban density and mixed use development can reduce the urban environmental footprint and provide residents with closer access to services and amenities, enhancing liveability and reducing the need to travel. Providing higher density energy-efficient housing in established areas close to jobs and services would also reduce the need for new housing on the urban fringe.

For urban planning to minimise the impacts of urban settlement and reduce exposure to climate change-related risks, it is important to assess the cumulative effects of development decisions on the environment, urban climate resilience and liveability. This requires a long-term strategic plan that guides development in both new and existing built areas, informed by risk management principles.

The density goal for Melbourne's new growth areas specified in dwellings per hectare is below the level of density needed to support widespread walking and cycling, and too low to support a viable, car-competitive public transport service.[2] *Plan Melbourne 2017-2050* recognises the need for higher densities in suburban development in all areas, with higher density goals close to activity centres and quality public transport and a longer term aim to increase residential density in growth areas to over 20 dwellings per hectare.[3] Plan Melbourne also embraced the concept of "20-minute neighbourhoods" for which a target density of 25 dwellings per hectare was established in 2019.[4] Central to this vision is ensuring access to local destinations, mixed land uses and street connectivity.[5] Higher dwelling density is needed to ensure there are sufficient residents to support the viability of local shops, services and public transport.

New residential areas should be provided with a full array of local retail and community services, as well as public transport access within walking distance. PSPs set a benchmark that new town centres be established for catchments of 2,500-3,500 dwellings. However, only around half of PSPs that have reached this number of dwellings have opened town centres,[6] indicating that local destinations are not always developed in a timely manner to service new communities. While a PSP can call for town facilities to be provided and can set land aside for this purpose, it cannot compel service providers to establish these facilities. This presents a major challenge to achieving sequencing and timely delivery of amenities in growth areas.

Tax instruments can also influence land use and urban density. Stamp duty inflates the cost of property transactions, slowing land use intensification in public transport-accessible neighbourhoods and negatively affecting housing affordability.[7] It is also a significant disincentive for households to relocate to homes of a size more appropriate for their needs, which can lead to overcrowding or under-utilisation. Consideration should be given to replacing stamp duty with a broad-based land tax that is likely to be indirectly priced into cost of the property, improving affordability for both residential and non-residential uses. Applying a land tax to site value rather than the capital-improved value of a property would also provide an incentive for landowners to put vacant or underutilised urban sites to better use.

Key Recommendations

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

11 SUSTAINABLE CITIES AND COMMUNITIES

- Develop a long-term strategic plan for climate change mitigation and adaptation in Melbourne's suburbs that encompasses new and existing built areas.

- Increase density and diversity in targeted areas of Melbourne's established suburbs, focused around the public transport network and activity centres.
- Raise the minimum dwelling density target for suburban development in PSP areas to at least 25 dwellings per hectare in residential areas, with higher density development around activity centres.
- Facilitate development sequencing in growth areas that provides for the early delivery of local amenities to support walkable neighbourhoods and access to public transport, active transport and co-located services.
- Consider the replacement of property stamp duty with a broad-based land tax to facilitate urban intensification and support housing affordability.

Enhance Access to Sustainable Modes of Transport

It is important to increase access to public transport in residential growth areas, where currently almost 1 in 3 residences are located further than 400m walking distance from a bus stop.[8] While PSPs include planning for public transport as a network to key destinations, the timely provision of public transport services remains a challenge for government. PSPs design for bus-capable road networks, though provision of bus services is outside the control of the PSP. Guidelines do not include standards for frequency and span of public transport services, the destinations they serve, or directness of routes – all of which impact on commuter convenience and travel time. Only 36% of Melbournians have access to a public transport stop within 400m that has a service frequency of at least every 30 minutes,[9] and this would be even lower in outer suburban areas. Provision of footpaths, safe cycling and micro-mobility infrastructure within 5 km of public transport hubs, train stations and activity centres is similarly needed. These can be planned for in PSPs, but as with transport, infrastructure decisions are made outside the PSPs and this infrastructure is not always delivered within sufficient timeframes to encourage uptake of active transport modes.[10]

To address the performance gap between radial rail lines and local bus services, frequent and direct services are needed that connect neighbourhood centres, train stations, employment and education hubs. This can initially be serviced through new bus routes, or as suburbs densify, by medium-capacity modes such as Light Rail, Trackless Trams or Bus Rapid Transit.[11] These connective services would enhance accessibility and also support the growth of neighbourhood centres and hubs. The Growth Areas Public Transport Fund receives contributions from all development in PSP areas and has historically been significantly underspent. There is an opportunity to use the Fund more strategically to help meet transport needs in PSP areas.

'Last-mile' transport options for both passengers and freight – such as shared electric vehicles, bicycles or scooters – can expand access to destinations with less environmental impact than private cars, traditional vans and trucks.[12] Fleet-based shared vehicles and micro-mobility options are more prevalent in inner urban areas where there is greater concentration of potential users. Incentives may be required to establish similar services in outer-suburban and new growth areas.

Key Recommendations

- The Victorian government commit to improved minimum standards for frequency and operating hours of public transport services, with PSP guidelines providing clear criteria on network design including route destinations and route directness.
- Create walkable mixed-use neighbourhoods with destinations needed for daily living that include safe cycling and micro-mobility infrastructure within 5km of train stations, activity centres and public transport hubs.
- Investigate the potential for second tier, medium capacity public transport services that provide faster access between higher-density neighbourhood centres, train stations, employment and education hubs.
- Investigate opportunities for smart fleet-based shared vehicle and micro-mobility options, including consideration of financial or regulatory incentives for fleet operators.

Preserve and Enhance Biodiversity

Biodiversity in Melbourne's suburban and peri-urban areas is under the combined stress of urban development and climate change-related impacts such as increasing droughts, heatwaves, bushfires and flooding. Urban vegetation supports urban resilience through carbon absorption, cooling urban temperatures and flood mitigation, as well as sustaining urban wildlife and peri-urban food production. The "re-naturing" of urban areas also enhances the urban environment and contributes to residents' health and well-being.[13]

Biodiversity can be enhanced through biodiversity sensitive urban design (BSUD).[14] Rather than offsetting biodiversity to sites away from cities, BSUD seeks to enhance the onsite persistence of species and ecosystems through careful planning and design. This includes setting clear biodiversity objectives, providing habitat and resources for target species/ecosystems, mitigating potential risks and planning for connectivity between areas of habitat. In this way, the urban fabric can be designed to be less hostile to biodiversity and can deliver 'everyday nature' experiences needed to enhance residents' health and wellbeing. An important first step is locating new urban development on land of low biodiversity value.[15] BSUD could be explicitly incorporated into the Melbourne Strategic Assessment to enhance biodiversity outcomes near where people live, work and play and mitigate negative impacts of urban development. Strategic assessments incorporating BSUD should be similarly applied to logical inclusion areas and fast growing peri-urban areas.

Where there is urban renewal within established suburbs, aesthetic, health and well-being benefits can be advanced through biophilic urbanism principles, promoting design that enhances residents' connection to nature. The installation of green infrastructure such as green roofs and green walls would help mitigate the urban heat island effect and reduce energy use, as well as delivering economic benefits that can include greater worker productivity, increased amenity of commercial areas and higher property values.[16]

Key Recommendations

- Explicitly include biodiversity-sensitive urban design in planning design guidelines and in Strategic Assessments.
- Replace biodiversity off-setting in urban developments with a focus towards development within land of low biodiversity value and enhancing onsite biodiversity.
- Promote biodiversity-sensitive urban design and biophilic urbanism principles in urban renewal projects to enhance biodiversity and liveability, and minimise tree canopy and green space loss.

Mitigate Bushfire Risk

As urban growth extends into peri-urban areas, residents and their homes are increasingly susceptible to bushfire risk, including from grass fires. Since the 2009 Black Saturday bushfires, higher construction standards have been introduced for new dwellings in bushfire-prone areas along with 'defendable space' requirements. The reforms stopped short of introducing a buyback scheme for existing residential properties in areas particularly at risk,[17] and no government has provided subsidies for retrofitting existing housing in high bushfire risk areas.[18] Property-

level risk mitigation therefore largely depends on the engagement of residents and their level of bushfire preparedness.[19]

The increasing frequency and severity of bushfires calls for a new layer of risk management. A more systematic planning regime is needed that takes into account the cumulative effects of individual land use decisions in bushfire risk areas, with authority to make broader planning decisions on the basis of the precautionary principle. A whole-of-government approach is required that spans emergency management, land use planning, provision of safe and resilient infrastructure, education, public health and community development.[20]

Victoria's Bushfire Integrated Planning and Building Framework allows for a local overlay to complement the state-wide Bushfire Management Overlay, taking site-specific conditions into account.[21] However, there has been little recognition of the potential for bushfire incursion into new outer urban suburbs, and the risks of subdivision and development in highly fire-prone areas on the urban fringe.[22]

Key Recommendations

- Include outer-urban development within the Integrated Planning and Building Framework for Bushfire in Victoria, taking into consideration the cumulative effects of individual land use decisions on regional and sub-regional risk profiles.
- Consider incentives for the retrofit of existing housing and infrastructure in high bushfire risk areas to reduce vulnerability.

Increase Energy Efficiency and Distributed Supply

While suburban energy consumption has improved significantly in recent years through energy efficiency measures in buildings and equipment, the single-family detached houses that predominate in residential suburbs remain energy intensive, partly because of increased average house size. High-rise residential apartment buildings also under-perform in energy efficiency.[23] In housing design, limited attention has been given to thermal performance, solar orientation, passive solar energy or improved summer performance. Energy efficiency opportunities include the introduction of cost-reflective electricity pricing, use of smart meters and monitoring that make electricity use patterns transparent to households, and Smart Home software that automates operation of home technology.[24] Policies and incentives should also seek to provide vulnerable households and tenants access to energy cost-saving technologies in healthy, safe, resilient buildings.

Resilience in electricity supply has been enhanced through diversification from centralised, fossil fuel-driven electricity generation to smart, efficient user solutions and distributed renewable energy.[25] Distributed, two-way power generation will increasingly lower the dependence of consumers on grid-supplied electricity, further empowering consumers, and creating new business models. Regulators can support this transition by setting ambitious energy efficiency and renewable energy targets, changing market rules, and fostering investment in distributed supply systems such as rooftop solar panels.[26] This can also include investigating decentralised energy generation and storage equipment at the neighbourhood scale.

Key Recommendations

- Introduce more ambitious energy efficiency and renewable energy standards for Victoria that ensure new buildings, particularly high density housing, achieve high standards of comfort, safety, equity, resilience and energy affordability.
- Ensure housing design guidelines and standards address thermal performance, solar orientation, passive solar energy and improved summer performance.
- Promote industry use of digital analytics, performance monitoring and lifecycle analysis to better integrate into design and report on building energy and sustainability performance, including over a building's lifetime.
- Promote and encourage through financial incentives or regulation improvements to energy and sustainability performance of existing residential and commercial buildings, including for vulnerable households and residential tenancies.
- Modify energy market rules, regulations and policies to support adoption of smart, efficient, distributed energy solutions.

Enhance Water Sensitive Urban Design

Water security has been strengthened in recent years through diversification of supply sources, notably through rainwater and stormwater harvesting and recycling of wastewater.[27] The application of Water Sensitive Urban Design (WSUD) – such as property or precinct-scale water conservation, minimisation of wastewater flow, stormwater management and flood mitigation – has reduced both water consumption and vulnerability to extreme weather events.[28]

Planning and implementation of blue-green infrastructure requires closer collaboration between agencies responsible for water management and landscape planning, across all levels of government.[29] While State building regulations require installation of rainwater tanks or third pipes for supplementary water supply in new residential developments, the implementation of other WSUD principles has been hampered by institutional fragmentation and a lack of knowledge and skills across industry, government agencies and communities. There is also widespread uncertainty about responsibilities for ongoing costs and maintenance of blue-green infrastructure in development precincts.[30]

Key Recommendations

- Promote deployment of decentralised water technologies at precinct or property scales, supported by public education campaigns to increase awareness of long-term water conservation and cost-saving benefits.
- Build skills and knowledge on the benefits and applications of Water Sensitive Urban Design in State and local governments and among regional and town planners, estate developers and the community.
- Institute a long-term and sustainable funding regime to underwrite decentralised water management solutions and infrastructures.

Adopt a Whole of Life-Cycle Approach to Construction Materials and Waste

The predominant waste problem presented by urban development is the volume, management and disposal of construction waste. Construction and demolition waste accounts for around one third of all waste generated in the Australian economy, with a similar proportion going to landfill.[31] Most of the waste, if used at all, is downcycled, so its value is not retained. Rather than the traditional "hand-over" from project design to delivery, iterative collaboration between architects, consultants and construction companies can support improved resource use and waste efficiency outcomes, particularly through the use of energy and resource performance tools.[32]

The Building Code of Australia focuses primarily on design and operational energy efficiency in buildings and gives comparatively little

attention to the embodied energy of construction materials or waste management at construction sites.[33] A good first step would be to introduce construction and demolition waste protocols as have recently been established in the European Union.[34]

A whole of life-cycle approach to construction is essential to account for the true environmental impact of the production, transport and assembly of construction materials, as well as the rate of adaptation, renewal or replacement over the lifetime of a built structure. Landfill levies need to consider the true cost of waste. The external shell of buildings can be designed to be flexible in response to changes in use over time,[35] and building componentry can be designed to be dismantled or deconstructed into reusable pieces. Current linear processes in the building and construction supply chains need to be reconsidered and new ways explored. There is potential for innovative models such as the City of Brummen's (Netherlands) 'lease' construction of its Town Hall, built under a 20-year service contract and designed so it can be disassembled and the components returned to suppliers.[36] [37]

Key Recommendations

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

- Improve waste identification, source separation and collection, supported by waste logistics and waste processing facilities.
- Support procurement systems for high class recovery of waste to ensure second and third life of materials, underpinned by a framework to ensure quality and confidence in recycled construction and demolition materials.
- Promote industry use of 'track and trace' in material use to develop and support 'material banks' that can be used for design and construction process innovations.
- Incorporate life cycle assessments of construction materials and waste management at construction sites into state based regulations and the National Construction Code.

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