

# Mapping adaptation priorities

The principles of the circular economy could not only help to address affordability and resilience in Australian housing but may have value elsewhere in the world as well.

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A lack of affordable housing in Australia, and elsewhere, is affecting greater numbers of people; coupled with this, climate change is having an escalating impact as housing stock is poorly designed for increasing temperatures. Concurrently, there is a growing population of elderly people whose housing must accommodate their specific health and social needs.

Existing housing requires adaptation to ensure it is resilient to these issues; but the risks it faces can be acute and unpredictable, having severe, immediate impacts, or chronic and ongoing ones over the long term. This article explores how existing stock can be prioritised for adaptation, addressing sustainability and resilience issues, by applying the principles of the circular economy. While we offer a case study from Sydney, Australia, similar approaches to local resilience issues can be taken in other locations.

The circular economy has potential to change the way we design, construct and manage our built environment. It aims to generate economic, natural and social capital by supporting renewable energy, ecosystems, healthy and cohesive societies. The question is how this approach might be applied in respect to ageing populations, housing affordability and sustainable housing adaptation.

A circular economy aims to minimise waste, maximise re-use and recycling and move from an open-ended, linear model of production and consumption to a circular one in which wastes are seen as resources. Adapting housing stock attempts to keep existing materials and assets in use in a profitable manner, and can contribute to the emergence of a circular economy ([bit.ly/WilkRemoy](https://bit.ly/WilkRemoy)). This could improve urban density, mixed uses and intensification.

## Resilience and adaptation

The 100 Resilient Cities programme, pioneered by the Rockefeller Foundation, defines urban resilience as ‘the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow, no matter what kinds of chronic stresses and acute shocks they experience’. Many studies on improving urban resilience focus on street patterns, transportation networks and lifeline infrastructure such as water, electricity, communication and gas. But innovations in the residential sector made with the aim of enhancing resilience could also address issues such as affordability, ageing populations and climate change adaptation.

In Sydney, extreme weather is the most significant risk in terms of resilience, with heatwaves having a major impact on mortality and hospitalisation. In January 2018, a temperature of 47.3°C was recorded in the outer suburbs ([bit.ly/BOMClimate](http://bit.ly/BOMClimate)), so reducing the excessive costs of extreme weather events is a priority. Many of Sydney's other high-impact stresses are associated with planning and investment to support rapid growth and social changes in the population. Housing affordability and household debt are major chronic worries, while health infrastructure is the most vulnerable asset as sickness rates and disability increase with age; increased temperatures exacerbate these health concerns among the elderly.

A better match between housing design and people's needs as they age has not been a priority thus far, however. Many elderly people live in large houses with two or more spare bedrooms, but factors such as a lack of suitable, affordable housing, government taxes on house sales and location hinder a move to more appropriate dwellings. Besides personal considerations, limited choices lead such residents to prefer to age in place, although this can reduce the cost burden of care on government and encourage independent, active living.

Accepting longer-term thinking for housing design and adaptation, reflecting the uncertainty of future occupation and housing demand, is imperative ([bit.ly/ARQ05](http://bit.ly/ARQ05)). Modifications to make dwellings more accessible can prevent forced downsizing, while decluttering, reorganisation, renovation and rearrangement of bedroom and storage space for care assistance also help ([bit.ly/AhuriJudd14](http://bit.ly/AhuriJudd14)). One way of downsizing is to subdivide a property to allow those living there to age in place and generate income through affordable rents for the remaining space. Those renting that space might then provide assistance for elderly residents, such as cleaning, shopping, taking them out or sitting with them, which can be thought of in terms of the circular economy ([bit.ly/HousingMS](http://bit.ly/HousingMS)).

### Snapshot of a suburb

The authors collected data on residential stock in the Sydney suburb of Inner West as part of a three-year study started in 2018 to determine housing density, size and types. Population density is high at 5,429 persons per square kilometre, of whom 12 per cent are 65 or older. Housing stock is 24.7 per cent owned outright, 28.4 per cent mortgaged and 43.6 per cent rented; 64.5 per cent of dwellings have two or three bedrooms. However, average household size is 2.4 persons, while lone person households accounted for 27.5 per cent of total households in 2016. The percentage of households with rental payments equal to or greater than the stress level of 30 per cent of their income has increased since 2011, affecting 15.9 per cent of Inner West's population.

Healthcare and social assistance businesses employ 11.1 per cent of the total working population locally, while 20.2 per cent of residents provide unpaid assistance to persons with disabilities or care for others; 14.2 per cent of the Inner West population live with a disability in private dwellings, and 4.5 per cent need assistance for basic activities. Fifty-six per cent of occupied housing stock has spare bedrooms. Some of this could be subdivided and the spare

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rooms used to generate extra income, while local small healthcare and social assistance businesses could expand to respond to this demand, enabling people to work close to home.

Thematic maps prepared from the collected data or made by Inner West Council identify areas that require action to address affordability, increasing temperatures and ageing populations ([bit.ly/TWheatmap](http://bit.ly/TWheatmap)). In Inner West, it is possible to locate areas that are most affected by high temperatures in heatwaves and those with greater percentages of population vulnerable to extreme heat. The northern parts of the suburb deserve special attention and can be designated priority areas for action, as although the east is affected by extreme heat the vulnerable populations there are small.

Analysing tenure type and dwelling structure can identify areas with potential for building adaptation, including high proportions of rented and medium-density dwellings ([bit.ly/TWsocatlans](http://bit.ly/TWsocatlans)). Medium-density terraced housing could offer most potential for subdivision as such properties tend to be narrow and deeper, while back-lane access enables a separate entrance ([bit.ly/YavariVale](http://bit.ly/YavariVale)). Areas in the east of Inner West offer the best opportunities, while those in the west are good but possibly not quite so significant.

To manage the issues in Inner West so people can age in place and be comfortable and secure in affordable houses, we need to analyse whether and where planning legislation needs review, and develop the technical capacity to adapt buildings. By adopting the model of subdividing existing, underoccupied housing to provide older people with home and care assistance in return for an affordable rent, the principles of the circular economy can ensure sustainable, resilient adaptation in Inner West and elsewhere.

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**Related competencies include:** Housing management and policy, Housing strategy and provision, Smart cities and intelligent buildings, Waste management

The business models for charging electric vehicles are still evolving as the technology is adopted and asset managers look for ways to take advantage of charging through energy savings or income streams

