Sustainable transformation in real estate developments through conversions

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Abstract

Of the buildings we will have in 2050, 87 percent are already built. If predicted climate changes are correct we need to adapt existing stock sustainably. Reuse is an inherently sustainable option, which reduces the amount of waste going to landfill and limits the use of raw materials. Inevitably, settlements and areas undergo change, whereby land uses become obsolete and buildings vacant. At this stage, the options are either to demolish or to convert to another use. Although office to residential conversions are still few in number in various CBDs, cities such as Sydney show an emerging trend in conversion. Some 100,000 m² of office space is earmarked for residential conversion as demand for central residential property grows and low interest rates create good conditions. With the Sydney market about to be flooded with the Barangaroo office supply in 2017, the conditions for residential conversion are better than ever.

However, what is the level of sustainability in these projects? This chapter investigates the nature and extent of conversion in Sydney, as well as the political, economic, social, environmental, and technological drivers and barriers to successful conversion. Through international comparisons between cases in the Netherlands, Belgium, and Australia, this chapter identifies some key lessons that are applicable to other market and urban contexts worldwide. There is substantial potential to change the nature of the CBD with residential conversion of office space and this chapter explores this potential.

Introduction

To date, conversions of office stock have not been widely undertaken in Sydney, whereas in cities outside Australia, such as in the Netherlands and other European countries, there is an established history of office to residential conversion. As cities transition through change, buildings become redundant and obsolete. The Sydney central business district (CBD) may see an increase in office to residential conversion towards 2020. Office supply is increasing along with an increasing demand for residential property in Sydney, which has led to withdrawals of non-CBD office stock for residential conversion (CBRE, 2015a). Of total Sydney office stock, 3.5 percent will be removed for residential conversion before 2020 as demand for central
residential property grows (CBRE, 2015b), and low interest rates create good conditions. Furthermore, by 2031 the CBD population is projected to increase by 4 percent, requiring 45,000 new homes, and this increase coincides with a stock of ageing offices; some with conversion potential (City of Sydney, 2010). In addition, the Sydney office market is predicted to be saturated in 2016 and 2017 from the Barangaroo redevelopment, thereby making conditions for residential conversion better than ever.

A number of terms describe conversions, and these include adaptive reuse (Langston, 2014) and change of use, which essentially have the same meaning; that is to change the existing land use from one type to another, whilst updating the building. Interestingly “adaptive reuse” is the term favored in Australia whereas “conversion” is favored in Europe.

The UNEP report Buildings and Climate Change (2009: 4) concluded that the built environment has the “potential for delivering significant and cost effective greenhouse gas (GHG) reductions,” and that nations will not meet emissions reduction targets without supporting energy efficiency gains in the sector. Furthermore, failure to deliver low carbon new build and retrofits (including conversions) will lock countries into the disadvantages of poor performing stock for decades. In total, the built environment contributes around a third to global GHG emissions (UNEP, 2009). Often, new sustainable building is perceived as the best way of meeting these aims, however 87 percent of the buildings we will need in 2050 are already built, and therefore adaptation and adaptive reuse is a necessity (Kelly, 2008). Adaptive reuse (or conversion) is an intrinsically sustainable option, as it lowers the amounts of landfill waste, and with the focus on redevelopment in the existing built environment, reduces land take for new buildings and infrastructure. On a pragmatic level, with population growth and increasing rates of urbanization, reusing existing buildings allows for a faster build time compared to demolition and new build (Bullen 2007).

Economic and demographic changes drive transformation in urban settlements. As a result, some land uses become obsolete and some buildings become vacant. In some regions demographic and economic decline causes obsolescence and vacancy, whereas in other regions a spatial shift occurs, with high demands in specific markets and changes of land use. At this point, options for existing real estate are demolition or conversion. This chapter examines sustainability in the context of office to residential conversion in Sydney, and is based on literature and interviews with Sydney stakeholders including real estate experts and developers. Illustrative case study examples are used to show real world practices.

**Background – aim of this chapter**

The potential to convert offices to residential land use has been established (Geraedts and Van der Voordt, 2007; Remøy, 2010; Wilkinson et al., 2014) and is explained by understanding the attributes of the residential and office markets, as well as the location and the building itself. This chapter focuses on evolving practices in the Sydney CBD in Australia, and examines the prevailing residential and office markets, before exploring key location and building attributes.

**The residential property market**

The residential property market in Australia, particularly Sydney, was again very heated in 2015 although there are some predictions that the “bubble will burst.” Overall, the conditions are favorable for growth with low interest rates and reasonable employment conditions. In major Australian cities such as Melbourne, Sydney, and Brisbane there has been high demand by foreign investors, particularly Chinese buyers for CBD apartments (EC Harris, 2014; CBRE,
2015a). These investors are seeking to invest their money in markets they perceive as stable and safe. Ironically, residential property shortage is not addressed as many investment apartments purchased by Chinese buyers remain un-let as it is considered unlucky for Chinese people to occupy buildings that have been already occupied. Having these properties unoccupied exacerbates residential property affordability problems for many Australians. The pension or superannuation system in Australia also encourages citizens, excluding first time buyers, to buy investment properties for an income in retirement, which drives up prices further.

In recent history, residential supply in the Sydney CBD, along with other Australian capital cities, has been very low, and the stock has been restricted predominantly to office use or mono-functional use (JLL, 2014). There has been a shift since the 1990s onwards from urban planners who seek to reintroduce vitality and mixed use into CBDs, by permitting more residential land use. The provision of new apartments with amenities such as gyms and pools, and easy access to work, retail facilities, and entertainment, are attractive to some buyers and investors. Together, the combination of low interest rates, foreign investor demand, wealthy immigrants, and urbanization are driving up residential property prices at high rates and this creates the economic viability to convert older, vacant or partially vacant, office stock into residential land use. This is coupled with the migration of office tenants into the newer Barangaroo stock and the increasing vacancy rates in lower grade stock.

The office market

Australia’s biggest office market is in Sydney, and the CBD has the largest portion, with a total of 4,961,728 m² (m3property, 2015). Australian office space is categorized using the Property Council of Australia’s (PCA) office matrix categories, where premium is the top quality followed by A, B, C, and D grade stock. Over the last few years, demand for office space in Sydney has been high, especially in the CBD. Even after the great financial crisis of 2008, the office market showed growth with overall vacancy decreasing slightly to 9 percent in 2015, from 10 percent in 2011 (CBRE, 2015a). Furthermore, the demand for premium sustainable office buildings is high, and shows a higher value and lower vacancy rates for rated green buildings (Newell et al., 2011). Currently the Sydney office market is performing well and has decreasing vacancy and yields, and increasing absorption rates and capital values, and as a consequence, the office market supply is increasing also.

In 2014, the CBD supply pipeline was 460,000 m², 9.27 percent of the current stock. A large proportion of this, approximately 250,000m², is the Barangaroo development. Barangaroo is a large area adjoining the CBD previously used for maritime land use, which had become redundant when the maritime activity was relocated. It is highly unusual to get such a large amount of office stock coming to market in such a short space of time. This Barangaroo supply will come onto the CBD office market in 2016 and 2017, and is predicted to lead to movement of existing tenants in the CBD in prime stock (premium and A grade) into this new stock (CBRE, 2015a). In turn, the existing tenants in mid-grade CBD office stock are expected to relocate into the vacated premium stock and in this way, a replacement market develops. A form of relative obsolescence will develop with the result being increased vacancies in the mid- and lower-grade stock (Investa, 2014; Savills, 2015a, b).

Drivers for conversion

Conversion is defined as a change of use adaptation and usually requires major changes of the building. Conversion, as such, contributes to the continued use of historical cities and buildings
that are treasured by society; an example is the canal houses in Amsterdam, that were originally constructed in the seventeenth century. Over 400 years, the uses of the buildings have changed numerous times, from warehouse to residential to offices and back to residential and retail, inflicting many changes to the buildings (Leupen, 2006; Remøy, 2010). Several authors (Barlow and Gann, 1993; Beaugerard, 2005; Bullen and Love, 2010; Coupland and Marsh, 1998; Heath, 2001; Langston et al., 2008; Remøy and Van der Voordt, 2007a, b, 2014; Tiesdell et al., 1996; Wilkinson et al., 2009) describe similar conversions of vacant office buildings in obsolete urban areas or downtown locations.

Heath (2001) describes office to residential conversions as a successful strategy for inner-city redevelopment in London and Toronto. During the 1990s, the Toronto city core was a monofunctional office district, which was depopulated after six o’clock in the evening. Office construction booms in the late 1980s and an economic recession in the early 1990s resulted in high vacancy rates, rent reductions, and tenants moving to newer accommodation with comparable rents (Barlow and Gann, 1995). Whereas the London planning authority was supportive though not proactive and conversions were mainly market led, the Toronto municipality introduced a planning policy to stimulate redevelopments. In Toronto, conversion and redevelopment contributed 9000 additional dwellings to the downtown in the 1990s. By 2000 the office vacancy had fallen back to acceptable rates and the buildings most suitable for residential use had been converted. Drivers for conversions in Toronto and London included demographics and household compositions with changing attitudes and housing demand, and the increased popularity of city-center living. In addition, new use was needed to activate obsolete offices (Heath, 2001). A third and most important driver was the rent gap between offices and housing; in some situations the return on housing was estimated to be 90 percent higher than for commercial property (Barlow and Gann, 1993).

Between 1992 and 1995, the New York downtown vacancy rate was 20 percent, caused by an economic downturn (Barlow and Gann, 1995). Reacting to this development, the New York City government initiated the Lower Manhattan Revitalization Plan to enable and subsidize residential conversion (Beaugerard, 2005). Subsidies were given for conversion of office buildings constructed before 1975. The government encouraged conversions into studios and small apartments, targeting first-time renters. The low rents made the apartments popular for other groups as well, although the area lacked basic services and facilities. The most important drivers for conversions were the tight housing market, a high supply of obsolete office buildings, and governmental policy. From 1995 to 2005 more than 60 office buildings were converted, and the number of residential inhabitants in the area grew.

In Tokyo, the office market collapsed in 2002–2003, and oversupply and economic decline were the drivers for conversion. Older offices in secondary locations became obsolete and were converted (Ogawa et al., 2007). As tenancy perspectives for new, large office buildings were still good, redevelopment was generally a more interesting option than conversion. The local government had little control over the urban developments, though recent focus on urban conservation might enhance conversion potential in the future (Minami, 2007).

The drivers for conversion in the Netherlands are similar to the Japanese drivers, as office vacancy has risen since 2002 (Remøy and Van der Voordt, 2007b, 2014). With a fundamental demand for housing, especially in the larger cities, residential conversion has proved successful. Sustainability is mentioned as a driver, although developers focus on the intrinsic sustainability of conversion: few specific sustainability measures are taken (Remøy, 2010). Prolonging the use and lifespan of heritage buildings is another important driver (Remøy, 2014). Keeping and developing the characteristics of a building or an urban area are found to be important for sustainable urban development.
In Australia, although sustainability is a key driver for building adaptation, economic considerations are also very important. Upgrading the existing building stock to improve sustainability and reduce CO₂ emissions before 2020 is a target for the City of Melbourne (Wilkinson and Remøy, 2011) and before 2030 for Sydney. The aim is shared by Perth in Western Australia, where high office vacancy and increased residential construction activity has been another driver for building conversion since 2000 (Bullen, 2007). The governing authorities in many Australian cities seek to encourage sustainability in adaptations to deliver emission reduction targets.

In the described cases, sustainability aims, urban policy, office obsolescence, and a tight housing market were the most important conversion drivers. These relate to political, economic, social, technological, legal, and environmental drivers. Political, economic, and social drivers consider residential conversion as a strategy to introduce housing in CBDs that have historically been mono-functional office locations. Moreover, residential conversion in central urban areas is seen as a possibility for realizing affordable housing in city centers. In large cities, housing affordability in central areas has become problematic for lower income groups and for the middle classes. Technological and economic drivers are most important in cities where the value of residential property is higher than the value of offices. Due to technological and economic changes, and quantitative and qualitative mismatches in demand and supply, several cities have struggled with high office vacancy and obsolete office locations. In these cases, market forces drive residential conversions; conversion is less expensive and faster than demolition and new build, and existing obsolete office buildings occupy central locations.

Changes in building acts or legislation can lead to legal obsolescence and are another driver for converting offices into new use. Changes in floor heights and fire escape demand, and increased Energy Performance Certificate (EPC) norms are examples that lead to legal obsolescence. Within use adaptation is a possibility, but conversion for new use is often chosen, especially in locations with a high market demand for housing. Finally, environmental drivers are increasingly important. Office users demand sustainable offices, and older property is left vacant and obsolete. Major adaptation or conversion is needed to accommodate new use.

**Barriers for conversion**

The barriers for conversion are categorized as political, economic, environmental, social, technological/physical, and legal. One of the obstacles for conversion is the specialized nature of the work and the competence of the actors in the real estate market. Developers and investors work within their own areas of expertise, and may have little understanding of related disciplines (Remøy and Van der Voordt, 2007b). Moreover, the market is sectorial; office investors do not invest in housing and vice versa, and moving from the office to the housing sector is therefore difficult. Socially, the infrastructure to support residential land use may not exist in a former, or predominantly, commercial area (Heath, 2001).

Legislation in the form of zoning plans and building laws is an important conversion barrier. In most countries, the building laws for housing are stricter than those for offices, especially in respect of fire escape, daylight admittance, and energy efficiency (Remøy and Van der Voordt, 2007b). Regulations can require structural alterations be undertaken that lead to higher costs or make conversion physically unfeasible (Bullen, 2007). In existing buildings, deleterious materials, such as asbestos, are a barrier where removal involves compliance with strict health and safety rules as well as incurring high costs (Remøy and Van der Voordt, 2007a).

Another issue arises when the original construction drawings of older office buildings are not correct; although this is not a technical barrier as such, it does make thorough inspection
of the structure vital (Remøy and Van der Voordt, 2007a). The main structure or fabric of older buildings may be aged and experiencing decay, for instance the concrete may be deteriorating. Repairs can be costly, and secondary construction may be required. Physically, apartments require more vertical shafts for electricity, water, and plumbing services than offices (Remøy and Van der Voordt, 2007a). In newer European construction, pre-stressed concrete is commonly used, which loses strength when the steel is cut and thus forming voids for services shafts is problematic (Remøy and Van der Voordt, 2007a). Overall, several technical barriers are revealed that threaten the economic performance of the building and the financial feasibility of the project.

**Location and building attributes favorable for conversion**

**Location**

Of the attributes that influence the conversion potential of buildings, the location of the property is significant in terms of accessibility and public transport, access to amenities such as food retailing, other retailing, leisure, and entertainment facilities (Wilkinson et al., 2014). Furthermore, access to services such as education, healthcare, and childcare is important for residential stock (Wilkinson et al., 2014).

**Building**

In addition, the opportunities and risks of conversion are very closely related to the physical characteristics of the existing building (Remøy and Van der Voordt, 2014; Wilkinson and Remøy 2015). Remøy and de Jonge (2007) defined building type characteristics that influence conversion potential, such as structural form and floor structure, façade, type, floor layout, and the length and depth of the building, as well as the number and location of stairs and lifts.

Typically, office buildings have high conversion potential when characterized by a wide span or bay width, with few columns, high floor to ceiling heights, and a high load bearing capacity. Conversely, poor acoustic insulation, high beams, and, in older properties, a dense structural grid reduce conversion potential.

In addition, interventions in the façade lead to substantial costs and reduce the conversion potential and economic feasibility. Features such as cantilevered floors and curtain walling reduce the possibility to add balconies and to subdivide the façade, to accommodate interior partitions and walls. On the other hand, well-maintained façades in good technical condition, and with a dense grid, increase the conversion potential.

It has been found that large floor plates and building depth increase the conversion potential of office buildings (Remøy and de Jonge, 2007). The location of lifts and staircases has a high impact on which layout is possible, because relocating stairs and lifts adds significantly to building costs. A high number of lifts in offices adds to a high conversion potential and elevator shafts can be reused as shafts for HVAC, water supplies, and sewerage. Table 18.1 summarizes the characteristics affecting office to residential conversions.

**International comparison**

Conversion, driven by various forces, occurs all over the world. In markets worldwide, such as New York, London, Brussels, and the main Dutch cities, the focus on conversion has been high since the 1990s, with increased importance after the global financial crisis, driven by high office
vacancies and high housing demand. Although office to residential conversions are still few in number in various CBDs, cities, including Sydney, show an emerging trend in conversion. Through international comparisons between cases in the Netherlands, Belgium, and Australia, some key lessons are identified that are applicable to other market and urban contexts worldwide.

**The Netherlands – Rotterdam**

“The Admiral” is the name of an office to housing conversion in a central location in Rotterdam, the Netherlands. The office building of more than 30,000 m² was built in 1989, and was vacant for several years. The building was converted into 600 rental studios and small apartments of 20–55 m², with commercial space on the ground floor. Moreover, 400 places for car parking were provided and 700 bike parking places. The project started in 2013, and was completed in 2015. Housing was not in the zoning plan for the area, and it had to be altered before construction could start. Neighbors filed a complaint about the zoning plan change, however, the plan fitted very well with the municipality’s aims to attract more young professionals to live in the city center. Hence, the municipality agreed to alter the zoning plan, but set some quality requirements for the housing, and required a reduction in the number of studios provided and an increase in the average size of the apartments. In addition, the appearance of the original façade, was “out-dated” and too “office like” and that was altered also. Furthermore, the fire safety requirements for housing led to substantial unforeseen, additional building costs. The municipality was closely involved in the whole conversion process; they drew up the original agreement, put the zoning change procedure in motion, supported the developer in the environmental permit application, and assisted in obtaining the construction site permit.

**Belgium – Brussels**

In 2009, the Thon Hotel Group decided to convert three obsolete office buildings in the Quartier Leopold (the EU area) into a hotel and apartments, with some retail space on the ground floor (Lasserre et al., 2011). Thon owned all three buildings, which together form a

<table>
<thead>
<tr>
<th>Structure and floors</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large floor spans</td>
<td>Columns; free plans</td>
<td>Dense grids</td>
</tr>
<tr>
<td>Columns; free plans</td>
<td>Constructed for heavy carriage</td>
<td>Low ceilings under existing beams</td>
</tr>
<tr>
<td>Façade</td>
<td>Small grid</td>
<td>Inadequate technical state, no attachment points for interior walls</td>
</tr>
<tr>
<td></td>
<td>Good technical state</td>
<td>Cantilevered floors: complicates adding balconies</td>
</tr>
<tr>
<td>Floor layout, length and depth</td>
<td>Deep buildings</td>
<td>Location of lifts and staircases</td>
</tr>
<tr>
<td></td>
<td>Excess number of lifts</td>
<td>Insufficient number of escape routes</td>
</tr>
<tr>
<td>Stairs and elevators</td>
<td></td>
<td>Excessive space occupied by cores</td>
</tr>
</tbody>
</table>

**Table 18.1 Summarizing typological characteristics that affect conversion capacity**
block, and could have decided upon demolition and new build, i.e. to increase the density of the site. However, after analyzing the possibilities, conversion was chosen as it was estimated to take less time, and required lower investment. Demolition and new build would take at least 5 years, whereas the conversion took half the time, just two and a half years; the conversion was completed in 2012. The original façades were removed, and replaced by a new homogeneous façade. To connect the three separate buildings, several technical and structural interventions were necessary. The corridors of the three buildings were connected to each other, several existing staircases and lifts were relocated, new stairs and lifts were added, and the buildings' foundations were reinforced. The plan fitted well within the local government's policy program for urban regeneration, “Region Bruxelles Capitale,” that aimed at developing a dynamic and sustainable urban environment. Sustainability in the terms of energy efficiency was important in this project. Heat pumps with a heat recovery system and solar panels on the roof are part of the measures that were taken.

**Australia – Sydney**

The Gantry project, at 139–143 Parramatta Road, Camperdown, Sydney, was completed in 2013 and comprises a former motor car works and a pottery warehouse dating from 1922 converted into four apartment buildings and 26 terraces located around a large landscaped courtyard. The developer was City Freehold Projects and the contractor Bates Smart. The project integrates new residential buildings to preserve the sites' industrial history. Over 190 residences are provided, including one and two bedroom single story apartments; two and three story terraces and three bedroom penthouses. New residential buildings were integrated within refurbished historic elements with four new five to six story apartment buildings and extensive landscaping over 18,500 m². Environmental and sustainability features include the landscaping elements to humanize the design and introduce local biodiversity, where no permeable ground surface or landscaping had existed. Landscaping increased from zero to 2,180 m² with the deep soil zone to 1,000m² to increase local biodiversity. These landscaped areas are serviced by rainwater collected from roofs and stored in tanks under a paved laneway. All buildings were orientated to maximize solar access and communal courtyards also benefit from good solar aspect. The amount of new materials and the amount of landfill waste were minimized, for example, by reusing brickwork for landscaping and salvaging steel roof trusses as an aesthetic feature (see Table 18.2).

**Conclusions**

This chapter has focused on evolving practices of conversion in the Sydney CBD in Australia and has examined the prevailing residential and office markets, before exploring the drivers and barriers to successful conversion, key location and building attributes, through a literature review and a comparison of international cases in the Netherlands, Belgium, and Australia.

It has been shown that conversion is well established in several countries. A variety of physical, economic, environmental, legal/regulatory, social, and political factors influence and impact the degree of conversion. Sustainability is an important driver for conversion, though mostly as an intrinsic value; conversions have the image of being sustainable. Still, few conversions are carried out that adopt specific sustainability measures. The most important drivers are related to the market and location, whereas building costs and estimated risks of conversion are the most important barriers.
Table 18.2 Key criterion for conversion compared

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Netherlands</th>
<th>Belgium</th>
<th>Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Central Rotterdam</td>
<td>Central Brussels</td>
<td>Camperdown, Sydney</td>
</tr>
<tr>
<td>Land use type (original)</td>
<td>Office</td>
<td>Office</td>
<td>Industrial (motor car works and pottery warehouse)</td>
</tr>
<tr>
<td>Land use type (after conversion)</td>
<td>Residential with ground floor commercial</td>
<td>Residential and hotel</td>
<td>Residential</td>
</tr>
<tr>
<td>Size of building</td>
<td>30,000m²</td>
<td>50,000m²</td>
<td>18,500 m²</td>
</tr>
<tr>
<td>Number of floors</td>
<td>14</td>
<td>8</td>
<td>5 to 6</td>
</tr>
<tr>
<td>Year of construction</td>
<td>1989</td>
<td>1960–1989</td>
<td>1922</td>
</tr>
<tr>
<td>Accommodation provided post conversion</td>
<td>600 studios and small apartments (20–55m²)</td>
<td>Hotel with 405 rooms</td>
<td>190 residences (including 1, 2 bed single story apartments, 2 and 3 story terraces and 3 bed penthouses)</td>
</tr>
<tr>
<td>Planning issues</td>
<td>Rezoning required for site</td>
<td>None, according to local policy</td>
<td>Heritage</td>
</tr>
<tr>
<td>Other regulation issues</td>
<td>Fire safety for residential</td>
<td>Fire safety for hotel and residential</td>
<td></td>
</tr>
<tr>
<td>Cost issues</td>
<td>Extra unforeseen costs associated with regulation and compliance</td>
<td>Lower investment and shorter construction and new build</td>
<td></td>
</tr>
<tr>
<td>Aesthetic issues</td>
<td>Out-dated and façade had an “office” look, not necessarily suited to housing</td>
<td>Out-dated office façades on 3 buildings were adapted to one new exterior</td>
<td>Introducing permeable ground surfaces to site to increase biodiversity and amenity</td>
</tr>
<tr>
<td>Drivers for conversion</td>
<td>Economic – high vacancy and low demand</td>
<td>Economic – high vacancy, high demand for other functions</td>
<td>Economic – accommodating increased population</td>
</tr>
<tr>
<td></td>
<td>Regeneration of the location Municipality stimulating housing development in the city centre</td>
<td>Regeneration of the location</td>
<td>Regeneration of the location Maximize solar access to buildings Communal gardens Reduce new materials use and landfill waste Reused brickwork for landscaping and roof trusses retained</td>
</tr>
<tr>
<td>Barriers for conversion</td>
<td>Regulatory, zoning plan, fire safety requirements</td>
<td>Technical, increasing load bearing capacity of the foundations, modifying and adding stairs and lifts</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors
The drivers for the Sydney market vary in scope and degree, for example, investment from China is having a major influence on values of residential property at the time of writing. To a lesser extent, planning and regulations are also driving residential conversion. Interestingly, there is a view that some buildings lend themselves easily to conversion and this is a driver. Financial considerations and risks were found to be the biggest barrier, along with aesthetics, planning, contamination, and technical issues. The Sydney CBD is a strong market within Australia, and different degrees of residential conversion, drivers, and barriers exist in other regional cities in New South Wales and other major State capitals within Australia.

The three case studies have similar drivers to those found in the literature review. Looking specifically at sustainability measures, no new information was found. The improvements in operational energy efficiency achieved when converting a building using the standards of the local building codes is seen as a significant improvement. Although these are not recognized as specific sustainability measures as such, conversion is a means to preserve embodied energy. Moreover, the retention of the existing building structure, fabric, and materials inherent in conversion are explained as sustainable. The lessons learned from literature and case studies are applicable to a large degree in the Sydney market, although the level of activity here is much lower and less developed than in some European cities. There are lessons from the European approach to conversions for Australian practice to learn, but also lessons for students and researchers about the applicability of research results from one case study in another context.

Knowing that 87 percent of the buildings we will have in 2050 are already built, conversions should be considered widely as a more important part of real estate development for a sustainable future. Conversions, to a large extent, are comparable to new construction. However, this chapter has shown that some specific aspects need extra attention, as conversion projects always deal with an existing location and building structure. Related to that, cost issues are more complex than for new construction. Furthermore, building law and planning regulations are often directed towards new construction. These aspects, together with the financial and environmental value of conversion, need to be studied more in detail to embed conversion as part of sustainable real estate practice.

References

Sustainable transformation through conversions


