

Sustainability and office building conversions: A comparison of Dutch and Australian practices.

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Abstract

Local Authorities worldwide are encouraging adaptation to reduce building related energy consumption and greenhouse gas emissions. The City of Melbourne is promoting the retrofit of 1,200 CBD properties before 2020 with sustainability measures as part of their policy to become a carbon neutral city, and the City of Amsterdam aims at cutting their CO₂ emissions with 40% by 2025. In Amsterdam, the oversupply of office space makes across use adaptation, conversion from offices into housing, an interesting development. The concept of adaptation is well developed in Europe, though the scale of some of the post war developments has created different forms of building perhaps less adaptable or suited to change. The need to adapt buildings and to reduce environmental footprints becomes more pressing over time as global concentrations of carbon dioxide increase. Moreover, the ageing workforce and the new way of working lead to a decline in the demand of office space, and so conversion becomes a possibility for dealing with obsolete offices. Applying knowledge of adaptation to examine the adaptation potential of office buildings in Melbourne and Amsterdam, it is possible to learn where similarities and differences exist and where new practices can be shared.

This paper addresses the question; *what are the possibilities for building conversions in Melbourne and Amsterdam?* Using Amsterdam and the Melbourne CBD as case studies, the research analysed the across use adaptation potential of office buildings in Amsterdam and in Melbourne CBD. The outcomes of this research show where similarities and differences exist and are relevant to all urban areas where adaptation of existing office buildings can mitigate the impacts of climate change and enhance the city for another generation of citizens and users.

Keywords: office, sustainability, building adaptation, Australia, the Netherlands.

Introduction

With the built environment contributing nearly half of all greenhouse gas emissions and governments looking for to lessen the part cities play in global warming reuse by building adaptation is a sensible means of reducing building related greenhouse gas emissions. Amsterdam attempts to cut CO₂ emissions by 40 % by 2025, compared to the levels of 1990. However, this far the emissions are increasing each year. Reducing energy use in (existing) housing and public buildings is one of three major actions mentioned in the program (Van Baren and Gouman, 2007). In Melbourne the 1,200 building program aims to reduce greenhouse gas emissions by 38% though the retrofit of 1,200 CBD commercial buildings by 2020 with sustainability measures as part of their policy to be carbon neutral. Other cities are developing carbon neutral strategies and see adaptation of the existing building stock as a means of meeting sustainability targets. It is possible to identify the nature and extent of adaptation, determine the relationship between adaptation and building attributes and hence the potential for sustainable retrofit through an examination of past adaptation practices.

Next to retrofitting or within use adaptation, conversion or across use adaptation to fit new uses of the existing building is a comparable sustainable development. Office building types that have outlived their original use become obsolete. The Amsterdam office market is currently (2011) imbalanced. 18.5 percent (1.3 million square metres) of the office space is vacant, and half this space has been vacant for three or more years, pointing towards obsolescence of the office space. In this market situation, the amount of available office space needs to be reduced and this can be achieved by demolition or conversion into new functions. Conversion is by definition a more sustainable approach, as large parts of the office buildings are reused, and moreover using sustainable measures in the adaptation the energy performance of the retrofitted buildings is improved. Conversion of obsolete office buildings took place on a large scale in New York in the 1980s, and in the 1990s on a smaller scale in cities like London, Rotterdam, Boston, Chicago, Vancouver, Toronto, Sydney, Amsterdam and Melbourne (Heath, 2001).

This paper addresses the question; *what are the possibilities for building conversions in Melbourne and Amsterdam?* Using Amsterdam and the Melbourne CBD as case studies, the research analysed the across use adaptation potential of office buildings in Amsterdam and in Melbourne CBD. The emphasis of this study was placed on the nature of the relationships between building adaptation events in Melbourne and Amsterdam and adaptation attributes identified as critical decision making factors. The outcomes of this research show where similarities and differences exist and are relevant to all urban areas where adaptation of existing office buildings can mitigate the impacts of climate change and enhance the city for another generation of citizens and users.

Drivers for conversion

Drivers for conversion of offices into other uses such as housing are typically social, economic and environmental factors. An important social driver known from other studies (Beauregard, 2005, Heath, 2001) is a renewed interest for city centre living and planning policies that reinforce this interest. Adaptive reuse is a sustainable development as it promotes urban intensification, retains embodied energy and encourages the use of public transport.

In Australia building adaptation is an “essential component of sustainable development” facilitating a glimpse of the past, lending character and identity to an area and providing footnotes to history (Department of Environment and Heritage, 2005). Bryson (1997) noted the potential danger that cities may face periods where large numbers of obsolete buildings might blight the region socially. Furthermore there is evidence that building adaptation increases value where an investigation of the impact of refurbishment on high density residential property in Hong Kong (Chau et al., 2003) found a 9.8 percent increase in property value compared to identical un-refurbished property in the same area.

In the Netherlands, the interest for adaptation is driven by a surplus in the office stock. As older buildings are left for preferred new buildings, the vacancy concentrates in the older stock and obsolescence occurs.

Obsolescence is first of all seen as a societal problem of economic and social decay. Uncertainty and social insecurity are visualised through vandalism and graffiti, break-ins and illegal occupancy (Chandler, 1991). Though an investor may spread the risk of obsolescence by building a diverse portfolio and only has to face building depreciation when selling, the owner of long term vacant office buildings also suffers a lack of income. Additionally, high vacancy hits building investors indirectly because of its negative influence on the market, though investors still tend to see the problem as somebody else’s problem (Remøy and Van der Voordt, 2007b). Adding up to this point of view, the investment market is layered; with new offices procured mostly by institutional investors who sell off older properties to smaller or private investors; such activity is an example of Atkinson’s sinking stack theory in practice (Langston et al, 2007).

As a result of the 2008 financial crisis, vacancy in office markets world-wide has been rising. The crisis has made the Dutch government realise that long term vacancy is a problem for the real estate market. While new commercial office buildings are being developed, increasing the footprint of the urban area, older properties remain vacant, occupying an increasing part of scarce land (Chandler, 1991. Ball, 2002). Adaptation of existing offices is a sustainable approach for addressing this vacancy; either by residential transformation or by within use adaptation to fit new demands for offices. Adaptations could contribute to a lower vacancy in the office market and at the same time add to the sustainability of the built environment.

Conversely in Melbourne CBD vacancy rates have remained low, increasing from 4.8% in July 2009 to 6.5% in July 2010 (Colliers International, 2010a, 2010b). In this market, a driver for adaptation is increase of yields and returns. The forecast is for significant increase in net effective rental levels in the short to medium term, with overall tenant demand expected to strengthen as the economy further recovers (Colliers International 2010b). In this market situation, conversion of offices into other functions is not likely to happen on a large scale. However, on a smaller scale, buildings that do not suit the needs of current and future office users may still be converted if the new function will increase the return.

Research method

Case studies of five completed conversions in Amsterdam were conducted. Only few conversions have been completed in Amsterdam, hence the study was going more in depth in order to understand the forces and mechanisms making conversions feasible. The case study evidence includes material from several sources; the situation before transformation was studied through documents; text, photos and drawings, and the situation after transformation was studied through documents and visits to the building. Interviews with stakeholders were held to gain insight in the process and to retrieve additional information about the situation before transformation. In any building project, several actors are involved. Ideally, two interviews were performed per project, one with the architect and one with the developer. The interviews were semi-structured, based on an interview protocol (Yin, 1989, Mason, 1996). Based on literature (Remøy and Van der Voordt, 2007b, Remøy and Van der Voordt, 2007a, Geraedts and Van der Voordt, 2007), criteria that were discussed in the case study interviews were defined.

A database of Melbourne CBD office buildings was assembled to understand the nature of adaptation using sources such as the commercial database Cityscope, and public databases such as PRISM (Victorian Government) and the Heritage database. Data from the Property Council of Australia, Google Earth and Google Streetview (www.google.com.au/maps) was used to gather building related data (Property Council of Australia 2007). Information relating to adaptation events was derived from the records for building permit applications. Finally, visual inspections and photographic records of CBD buildings were undertaken. Following validation, the database contains records for 13222 adaptation events to commercial buildings from 1998 to 2008. Given the objectives; to understand the nature of change of use adaptations, analysis of the database presents an opportunity to scrutinize adaptations using multiple sources.

The criteria used to examine change of use adaptation were number of adaptations, building age, construction type, external envelope, location of vertical services, size, aesthetics, accessibility, degree of attachment to other buildings, width, location, building quality, aesthetics, plan shape, height, listing, and owner profiles. These criteria allow the research to provide an overview of what has happened on a CBD scale with change of use adaptations to commercial buildings. This exploratory study aims to establish the nature and extent of change of use adaptations within the Melbourne CBD. The results presented in this paper are a uni-variate analysis of the data.

This paper adds to the body of knowledge of change of use adaptation in respect of analysing adaptations stock between 1998 and 2008 and comparing the similarities and differences to adaptations as a whole. The results of this research will enable the Cities of Amsterdam and Melbourne and other stakeholders worldwide to evaluate the desirability of developing and pursuing incentives to roll out a programme for change of use adaptations of office stock.

Defining the CBD area

The research investigated activity in a well developed, mature commercial market, the Melbourne CBD laid out in 1834 by Hoddle, which has been continuously occupied and is

the most mature property market in Victoria. The streets within the CBD area are as Flinders Street (southern boundary), Spencer Street (western boundary), Spring Street (eastern boundary) and La Trobe Street (northern boundary) highlighted in figure 1.

Figure 1 Melbourne CBD Street Names.



(Source: Visit Melbourne Victoria 2011)

Results Amsterdam

Physical attributes

All of the five conversions studied were typical free standing low-rise slab office buildings with a wide frontage and shallow depth. Two of the buildings (GAK building and Duijtjer) consider large scale buildings of 30 and 40 000 m². All 5 buildings have a structural frame of columns with free floors. These findings correspond with other studies (Remøy and Van der Voordt, 2007b) in which the building depth is found important for the conversion potential. Shallow buildings are often converted into apartments with external entrance galleries on the back of the building. Deeper buildings would be problematic for ensuring sufficient day light admittance. Also, deeper buildings suggest an internal corridor entrance, which is uncommon in Dutch housing. Corridors mean daylight admittance from one side only and are not favored as direct sunlight is found important.

In one of the cases, Sloterstyn, a lateral extension was made and the buildings frontage was extended. The building was also vertically extended by one floor. Also the buildings Plaats Royaal and Wilhelminastaete were vertically extended with one floor. The other two buildings, the GAK building and the Duijtjer, are so-called characteristic urban sceneries and vertical extension is not possible. From literature, extensions to the existing building are known to be a success factor, as it generates extra yield with only low extra investments.

Typically in the horizontal slab buildings, the main entrance was located at the center of the building with emergency exits at the heads of the building. The Duijtjer and the GAK

building are rather large (30 000 m² and 40 000 m²) and have several staircases and entrance cores. The multiple entrances added to the conversion opportunities of the building, as different entrances could be created for different uses of the different parts of the building and also the emergency exits were sufficient. The sheer size of these two buildings was seen as a risk and delayed the projects severely. At this moment both are still being developed.

The buildings and the building sites were well accessible. Two of the buildings (Wilhelminastaete and GAK) are detached, free standing buildings. The other three buildings were attached on one side only, and the Sloterstyn was attached also on the second front side through the conversion. In the interviews, the complicated location of the buildings was mentioned as a reason for conversion. If the location would be simpler and free standing, the demolishment and new construction might have been a more interesting option for redevelopment.

Location

The city center of Amsterdam is quite known for the changing use of the older building stock. The properties on the canals were built for mixed functions and their use has changed several times during their 300 year history. Newer office buildings in this part of the city are interesting for conversion as well, as the housing prices are high and can compete with the price paid for office space. 3 of the 5 conversions that were studied are located within this area (Plaats Royaal, Sloterstyn and Duijntjer) while the former GAK building is located west to the center, though still within the inner ring-road, and the fifth building, Wilhelminastaete, is located in Diemen, a sub center to the southeast of Amsterdam. The cases that are studied are representative for the conversions that have taken place. The buildings are centrally located, nearby public transportation, nearby commercial and social facilities, in mixed-use areas.

In the Wilhelminastaete case, the location was no longer considered suitable for offices, while the demand for housing for the elderly was rising. Plaats Royaal and Sloterstyn are located on Sloterkade, an attractive location that made conversion for high end apartments possible. Duijntjer is also located in the city center, and was bought for conversion by a combination of a commercial and a social corporation. Hence, the building will accommodate different types of dwellings in the rental sector. Finally, the GAK is located in a central but busy location. The characteristics of the surrounding housing areas and the level of noise from the nearby ring road makes it unsuitable for conversion for high-end apartments, as these groups of inhabitants require private outdoor spaces (balconies or terraces) and are not attracted by the working-class housing areas in the vicinity. For student housing, the location was found to be suitable, as it is also well connected by public transportation and with easy access to the universities and schools.

Legal and social attributes

The conversions that were studied all took place in post-war office buildings. The GAK building and the Duijntjer building are seen as architecturally characteristic buildings that should be conserved, though none of them are listed buildings. Though the Duijntjer

building has many times been nominated for the ugliest building of Amsterdam, the municipality is now conceding listing the building because of its important place in the history of urban development of Amsterdam. The application for listing was filed before the conversion request, and had to be taken into account as a given fact.

The facades of these two buildings are kept and as few adaptations as possible are made. The other three buildings all were typical seventies office buildings with long horizontal sliding windows and concrete facade elements, known as unattractive to the user and related to high vacancy rates (Remøy, 2010). The facades of these three buildings were substantially altered. From former studies (Remøy, 2010) it is known that such alterations to the facade are the most important building cost indicator. However, by altering the facades, the apartments became attractive to the target group for these high-end owner apartments.

Age

All the buildings studied were developed in the beginning of the 1970's, when most office buildings were developed in small scale office locations or in mixed neighborhoods. By the end of the 1970's, most office buildings were located in typical office locations. The buildings were typically more than 30 years old when conversion took place, and all buildings were physically outdated. Hence, also to assure continued use as offices, investments would be needed. In this context, conversion turned out to be feasible.

Occupants and owners

The buildings that were studied were all formerly in use by a single tenant or owner user. All buildings had been in use by one user only. When this user left the building, finding a new user was found impossible, or the owner already realized that the building was obsolete and redundant as an office building.

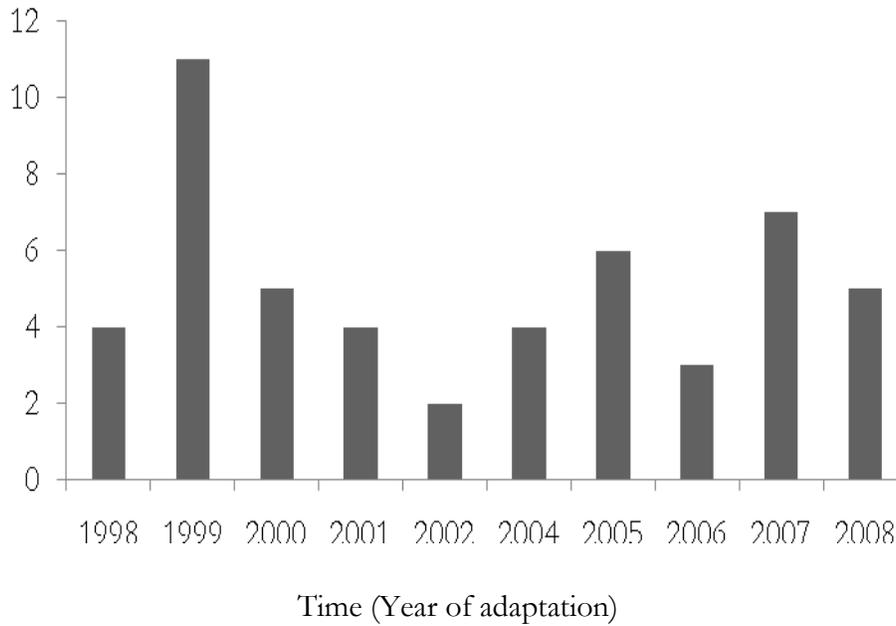
The owners of the buildings studied were large banks (Wilhelminastaete and Duijntjer) or public parties. The buildings represented property for own use, and were not as such investment objects. From existing studies (Remøy, 2010, Van der Voordt et al., 2007) this is known to be an important criterion, as the owner is not expecting high returns on obsolete buildings.

Results Melbourne

Overall the number of change of use adaptations in the CBD is very low compared to other types of adaptation. Only 51 cases are reported from 1998 to 2008 and there is a low level of activity throughout the time frame which peaked in 1999 with 11 projects (figure 2). In contrast 5290 major adaptation projects occurred in the same geographical area in the same period.

Figure 2

Number of change of use adaptations



Physical attributes

Of the 51 properties adapted 15 had a deep plan floor plate and only 3 had a wide frontage. When the type of building envelope is considered it is shown that 38.2% of works occurred to buildings with curtain walling, followed by metal cladding (23.5%), stone (20.6%) and brick (17.6%). When the structural frame is considered, 77.8% occurred to concrete framed stock and 22.2% to load bearing masonry construction. 77.1% of change of use project involved buildings with columns within the floor plates and therefore this does not appear to be a constraint within this market whereas it was found an issue in other markets (Arge, 2005).

None of the properties had any scope for lateral extensions; however there was scope of vertical extension in 31.4% of cases, though no vertical extensions were undertaken. Arge also noted (2005) that the location of the vertical services core was important in adaptation, with change of use 44.4% were to buildings with a centrally located service core, 22.2% to multiple services locations and 33.3% with service cores located to one of the property. This is a very different profile to all adaptations where 56.5% occurred to offices with centrally located services, 32.9% to properties with multiple vertical services locations and 10.6% to services located to one side of the property.

As far as building size is concerned smaller buildings are more likely to undergo change of use adaptations (35.1%). Furthermore buildings with narrower widths are more likely to undergo change of use adaptation compared to minor and major adaptations. For example 75.7% of change of use adaptation occurred to buildings up to 40 metres wide compared to 63.5% of minor adaptations and 49.2% of major adaptations.

Closely aligned to size is height, and change of use adaptations present a different profile compared to minor and major adaptations. For example, 36.8% of change of use works occurred to buildings of 6 or fewer storeys, whereas 9.4% of adaptation occurred to properties undergoing all adaptations. In Melbourne change of use adaptation favours lower rise stock. Percentages of adaptations to mid rise stock (7-20 storeys) is similar for change of use and all adaptations.

Accessibility of the building is an issue for ease of construction (Douglas 2006, Arge 2005) and here 34.2% were attached on two sides (terraced), 28.6% were attached on three sides and 20.0% were detached. Finally 17.1% were attached on one side only. The results appear to contradict earlier studies to some extent, in that the market is not put off adaptation on the basis of attachment to other buildings. The CBD is largely built out and therefore there is no other option but to adapt the stock that exists which is attached to other buildings to a great extent. As result most adaptations (33.3%) occurred to buildings where access to the building is from the street only.

Property Council of Australia building quality grade identifies the quality of the office property and ranges from premium (the highest) to grade D (the lowest). The results here indicate that no premium property underwent a change of use adaptation which is to be expected. Premium stock attracts the highest rental levels and has the highest level of amenity in the marketplace. Change of use was most likely to B and C grade stock accounting for 33.3% and 16.7% of works. Although ungraded stock also accounted for 33.3% of change of use work. D grade stock underwent least work at 5.6%. It appears that the market for change of use was with ungraded and B grade stock during the period. This is similar to all adaptations though it is a slightly higher proportion in both instances.

Location

Change of use adaptations were more likely to occur off the streets in the CBD most highly associated with adaptations, Collins Street and Bourke Street (Wilkinson & Remøy 2011). Collins Street and Bourke Street are the prime locations with high amounts of premium quality space and high levels of retail land uses to complement the office land use and account for 5. Most change of use adaptations occurred on Collins St (6 number) and Lonsdale (6) followed by Bourke St (4), La Trobe (4), Queen St (4) and William St (4). In comparison 27.7% of all adaptations occurred to properties located in Collins Street and 11.7% of change of use adaptations. There is a difference with change of use adaptation in Melbourne CBD when the attribute location is considered.

Legal and social attributes

Where historic listing is concerned 10.8% of change of use adaptations occurred to building having a listing or heritage overlay, compared to 24.1% of major adaptation works. It appears that because of the extent and nature of work involved in change of use that this type of adaptation is more likely to occur to buildings without any listing or overlay conditions.

As far as aesthetics go, there was a fairly even split between buildings which underwent change of use work. 54.1% were classed as having pleasing aesthetic qualities and 45.9%

were classed less aesthetically pleasing. In comparison in minor and major adaptations more attractive stock tended to be adapted overall (62.7% and 60.1% of the time respectively). Less attractive stock is only adapted 16.6% and 13.7% of the time in minor and major adaptations overall. Clearly aesthetics is not as significant for change of use adaptation because presumably the original uses associated with the building and their designs are not longer of overriding significance.

Age

Where age is reviewed most work occurs from 19-41 years with 54.7% of change of use taking place during this period and 38.7% occurring to stock over 42 years. This age profile is similar to all adaptations and it is concluded that age is not a significant attribute to determine change of use over other types of adaptation.

Occupants and owners

71.9% of buildings which underwent a change of use were leased, and 15.6% were vacant suggesting that change of use was required to find a new user group for the property. Of the properties adapted 30.3% were those occupied by a single user only. Just over half, 51.4% were to buildings occupied by a group of four users or less and this indicates buildings with lower groups of occupants are more likely to undergo change of use.

The owner profile shows that only 16.7% of works were undertaken by institutional investor owners compared to 77.8% undertaken by private owners. This result indicates that the change of use market is largely comprised of private owners rather than institutional or governmental owner groups.

Comparison: similarities and differences

In both the Amsterdam and the Melbourne cases, building structures with columns within the floor plates was found to be the most common type of construction. This kind of construction in many cases is linked to a curtain wall facade or a facade that otherwise is not loadbearing. Not loadbearing facades again can more easily be altered to fit larger windows and balconies.

In the Melbourne case, smaller buildings were found to be more likely to undergo a change of use adaptation, while the Amsterdam cases show that the conversion of the two larger buildings has taken considerably more time than estimated.

The Melbourne case shows that B and C grade offices are most likely to be converted. Such information is not retrieved in the Amsterdam case, but from literature the findings are recognized. The investments in these buildings are already depreciated, and so new investment can more easily be made.

The location of the converted buildings was found to be very important in the Amsterdam case, as it seems to decide the target group of the housing and hence the return and possibility for investments in the building.

The findings from Amsterdam and Melbourne are also consistent on the aesthetics of the buildings. A high quality facade is not a very important criterion for the conversion of office buildings. Quite often, the facades of office buildings are adapted or completely altered when the building is converted for other use.

The average age of converted buildings found in the Melbourne case corresponds to the Amsterdam study as well. The age is explained as buildings of this age would need to undergo renovation anyway; for conversion or for renewed office use.

The user profiles found in the Melbourne case was not recognised in Amsterdam. The Amsterdam office market has a high vacancy rate, and most buildings considered for conversion were vacant for several years. The same kind of owner profile is found in the Amsterdam and the Melbourne case. Owner users, being large private companies or governmental organisations, see property as accommodation, not as asset. Therefore, when the property is no longer used, it can be depreciated and sold for a 'fair' price for conversion.

Conclusions

There is little doubt that the drive for sustainability requires us to become more informed about retrofitting and converting existing buildings. The drivers for conversion may be social, environmental and/or economic as well as functional obsolescence. The global financial crisis of 2008 has helped to create a surplus of office buildings in Amsterdam whilst in the Melbourne CBD low vacancy rates in the office have persisted throughout the last decade.

Whilst the Amsterdam study focused in depth on five completed conversion projects, the Melbourne study adopted an analysis of 51 cases. Based on earlier work, only important adaptation attributes were considered in this paper (Wilkinson and Reed 2011). The analysis has identified that possibilities for conversion of office buildings exist in both cities. Conversions are inherently sustainable as embodied energy is retained and less waste material is created during construction works. Overall conversions are still rare events compared to within use adaptations in both cities (Wilkinson and Remøy 2011) however this may change as the imperative for sustainability gathers further momentum.

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