



**LOW CARBON LIVING  
CRC**

**RP1009 Closing the Loop  
Building typology and stakeholder review**



## **Acknowledgements**

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## 1. Introduction

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This document is a component of the CRC for Low Carbon Living *Closing the Loop* project. It provides an overview of existing data around building energy performance in Australia to guide the selection of building typologies to be included into the research. This document also outlines key stakeholders in the property sector, and major trends amongst owners and tenants.

The information contained in this summary document is from industry available reports and datasets. Key documents reviewed include:

- *Zero Carbon Australia Buildings Plan (Beyond Zero Emissions)*
- *Baseline Energy Consumption and Greenhouse Gas Emissions In Commercial Buildings in Australia Part 1 - Report.* (Pitt & Sherry)
- City of Melbourne Retrofit surveys
- Colliers research
- *Mid-tier commercial office buildings in Australia Research (GBCA & EY)*
- *Building energy efficiency disclosure bill 2010*

## 2. Greenhouse gas emissions across building typologies

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It is difficult to determine a clear inventory of buildings in Australia that addresses age, use and current condition. It is predicted that 23% of Australia's total Greenhouse Gas Emissions come from buildings, with 10% from commercial and 13% from residential, equating to 234 PJ of energy consumed by commercial buildings in 2005, projected out to 596 PJ in 2050 (The Centre for International Economics, 2007). Despite this statistic being often referenced, the carbon from various types of commercial buildings is still largely assumptions based.

A 2012 report led by Pitt and Sherry was commissioned by the Department of Climate Change and Energy Efficiency to determine the energy used by commercial buildings and the associated greenhouse gas emissions. Until this time there was no clear evidence base on which building typologies should be targeted with policy. This report has modelled the total floor area and associated energy use for buildings in Australia based on available data out to 2020.

Figure 1 and Figure 2 show the total NLA and growth from 1999-2020, and the modelled greenhouse gas emissions.

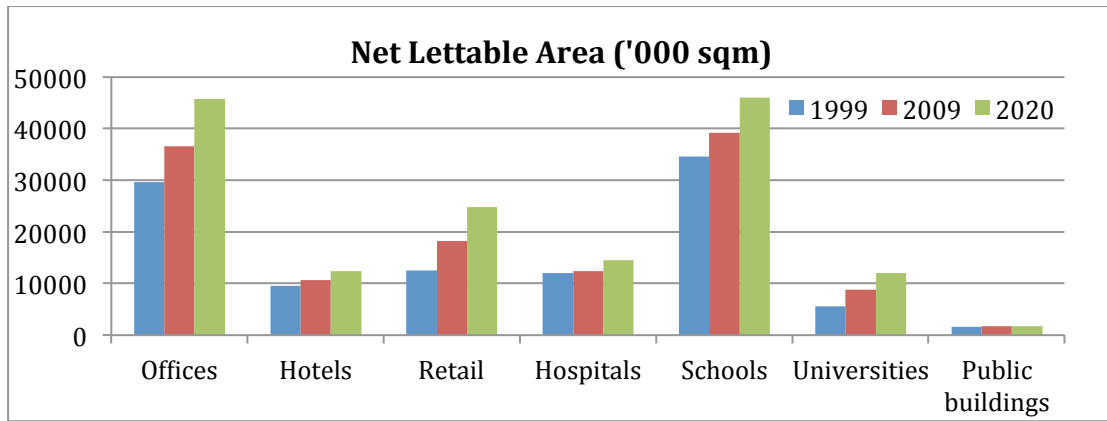


Figure 1: Total Greenhouse Gas Emissions, 1999-2020, Non Residential buildings. Adapted from (Pitt & Sherry, BIS Shrapnel, 2012).

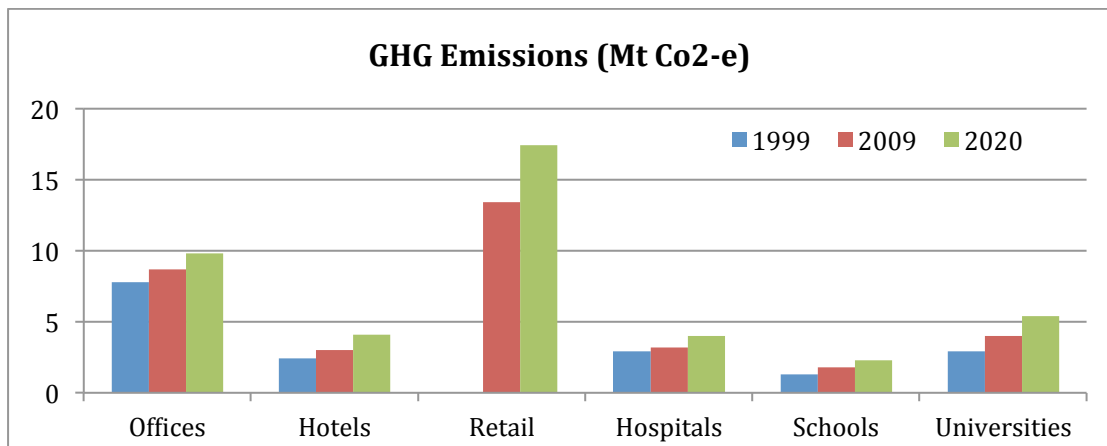


Figure 2: Total NLA, 1999-2020, Non Residential buildings. Adapted from (Pitt & Sherry, BIS Shrapnel, 2012)

From these graphs it is possible to see that standalone office buildings have the highest NLA on par with schools. However, the total GHG contribution from office buildings is the highest behind retail and is expected to stay that way into 2020. The energy intensity per square metre is shown in Table 1, however it is important to note that MJ/m<sup>2</sup> figures for education and hospital facilities are generalised and sub-spaces (i.e. laboratories, operating theatres etc) use varied levels of energy.

Table 1 Energy intensity of buildings (Pitt & Sherry, BIS Shrapnel, 2012)

| MJ/m <sup>2</sup>       | 1999 | 2009 | 2020 |
|-------------------------|------|------|------|
| <b>Office</b>           |      |      |      |
| Tenancies               | 400  | 385  | 368  |
| Base building           | 594  | 532  | 465  |
| Whole building          | 994  | 917  | 833  |
| <b>Hotels</b>           | 1209 | 1420 | 1652 |
| <b>Shopping centres</b> |      | 1605 | 1605 |
| <b>Hospitals</b>        | 1420 | 1542 | 1676 |
| <b>Schools</b>          | 166  | 178  | 191  |
| <b>Universities</b>     | 780  | 868  | 965  |
| <b>Public buildings</b> | 1111 | 947  | 768  |

Interestingly, when examining the growth rates of NLA and GHG between 1999 and 2020, hotels and schools have a larger growth rate in GHG, Figure 3. Total emissions from these typologies are still lower overall.

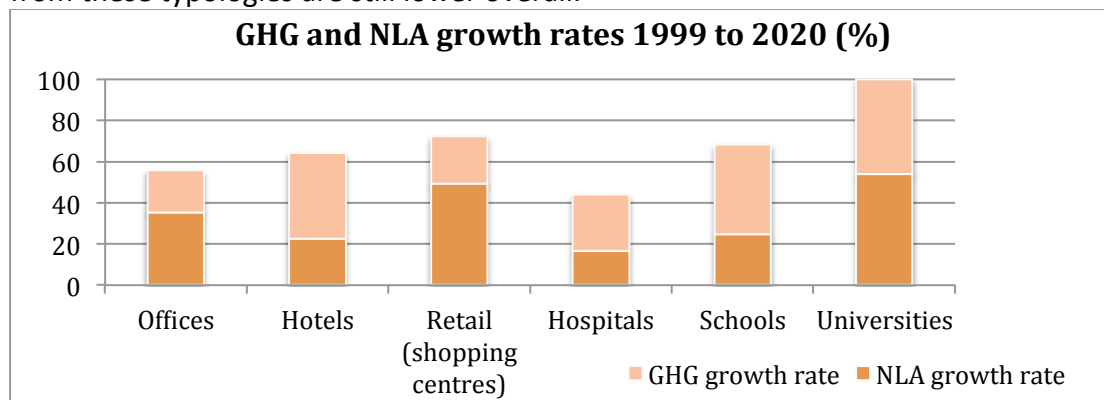


Figure 3: GHG and NLA growth rates 1999-2020

### 3. Commercial Property breakdown

#### PROPERTY GRADES AND AGE

The majority of commercial building stock in Australia is over 20 years old. Figure 4 shows approximate age breakdown of buildings. Nearly half of the total NLA for office buildings is predicted to be in B, C and D grade buildings, shown in Figure 5, Figure 6, Figure 7 and Figure 8.

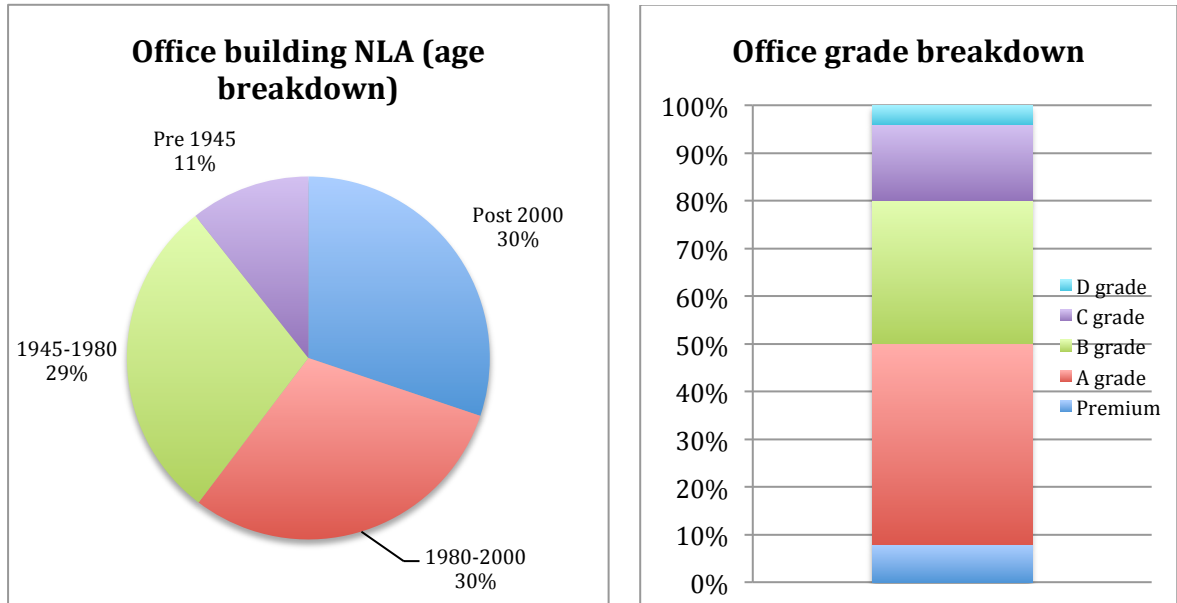


Figure 4: Building date of construction (Beyond Zero Emissions & Melbourne Energy Institute, 2013) and Figure 5: Office grades nationally (Ernst & Young Australia, 2015)

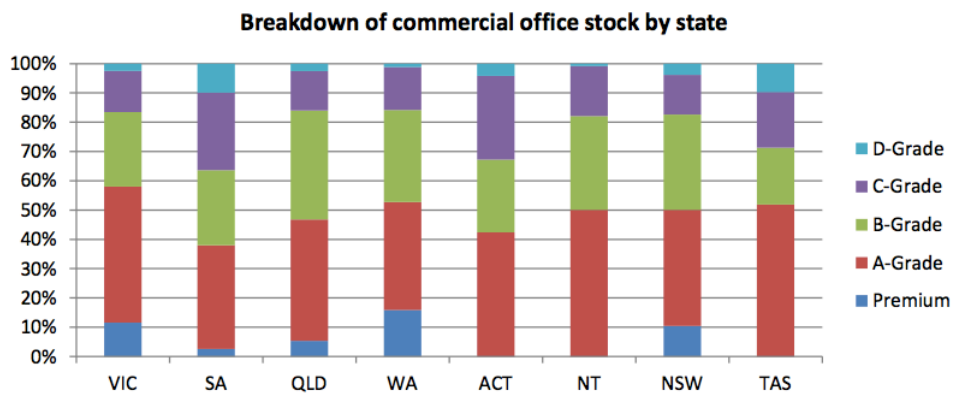


Figure 6: Office grades by state (Ernst & Young Australia, 2015)

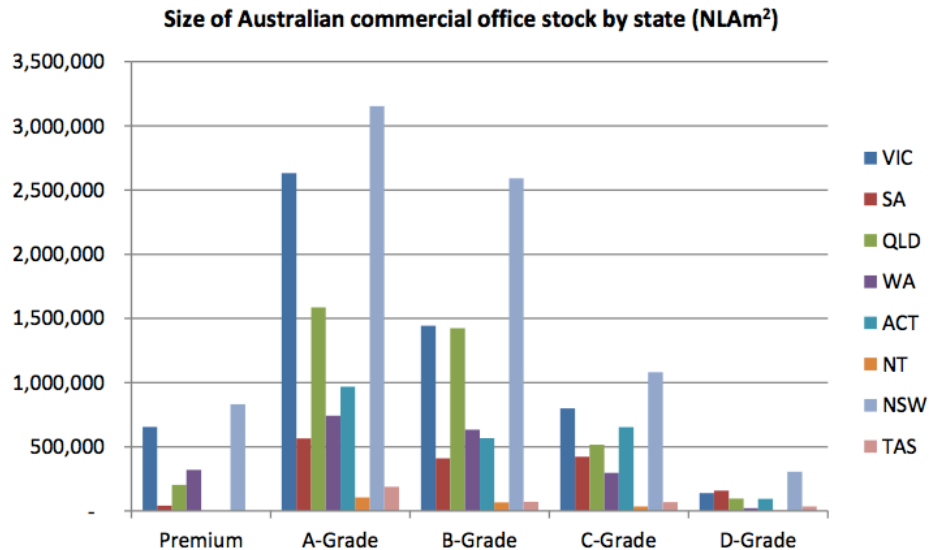


Figure 7: Size of office stock by state from 2015 PCA Office Market Report (Ernst & Young Australia, 2015)

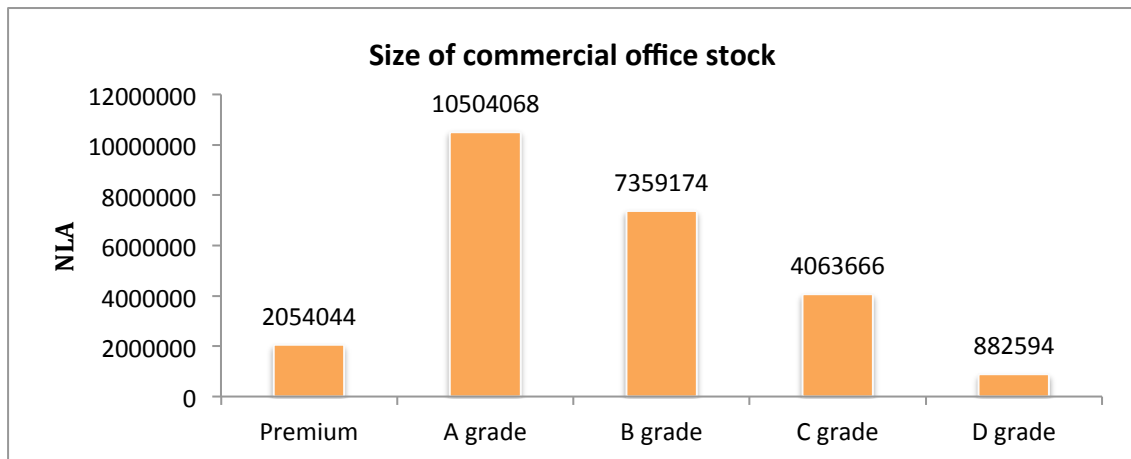


Figure 8: Size of office stock by PCA grade from 2015 PCA Office Market Report (Ernst & Young Australia, 2015)

**SUSTAINABILITY UPTAKE**

Premium and A grade buildings have adopted energy efficiency. Some research in Western Australia showed that 100% of Premium buildings had a NABERS rating, 80% of A Grade but only 26% of B grade (and 11.7 % D, 6.8% D) (Green Building Council of Australia, 2015). As the lower grade stock generally has smaller tenancies, these spaces don't trigger the mandatory disclosure requirements.

The Pitt & Sherry report showed that smaller office buildings are likely to have higher energy intensity. The intensity of energy use per square metre is shown in Figure 9.



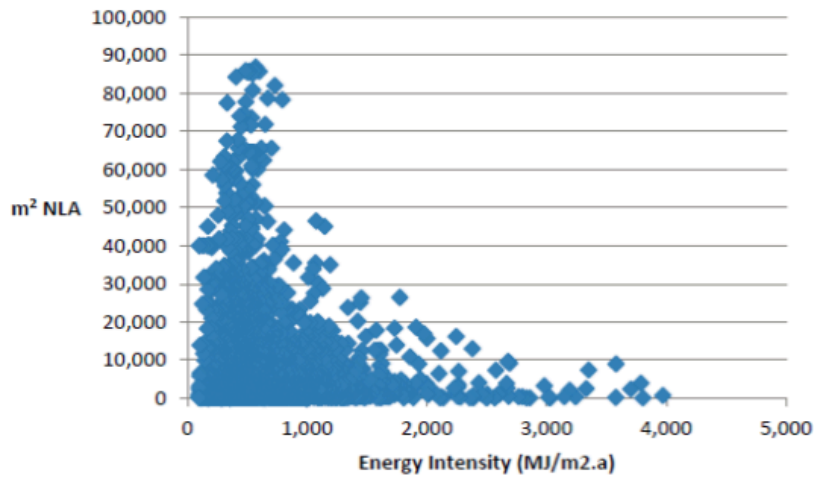


Figure 9: Energy intensity per square metre (Ernst & Young Australia, 2015)

The Ernst & Young report found that as institutional investors own larger, higher grade buildings they have strategies to continually upgrade these buildings over time, whereas mid-tier buildings still operate original plant and equipment. This is reflected in findings from the bi-annual Melbourne retrofit survey. The results in Figure 10 show that corporate (institutional) owners are more engaged in retrofit programs, they also have higher overall retrofit activity. The owners for mid-tier buildings seem to be incentivised by funding opportunities (i.e. green building fund) an equipment failure or continued vacancies.

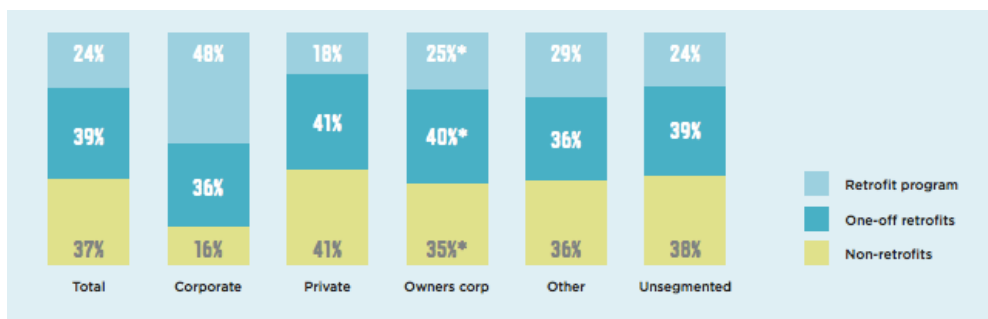


Figure 10: Retrofit activity by owner category (City of Melbourne, 2015)

### THE FUTURE USE OF B-D GRADE BUILDINGS

Colliers Research is showing there are 2 distinct markets for older buildings, commercial investment and conversion to other uses (such as residential). The climbing conversion rate suggests that C and D grade buildings will be converted rather than refurbished. B grade stock showed the most leasing activity in 2014 with tenants seeking increased value for money and high quality fitouts. Some of these assets will be undertaking major retrofits to improve performance to increase value.

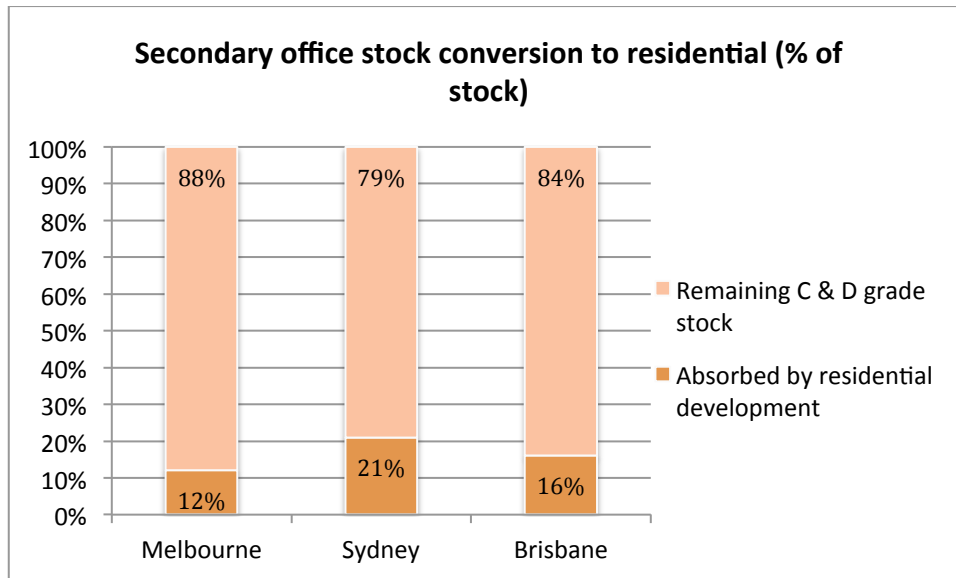


Figure 11: Colliers research (Colliers Edge, 2015)

#### 4. Building ownership

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Ownership of buildings can be broken into various segments (adapted from Ernst and Young 2015 and City of Melbourne Retrofit Survey, 2013), each with varying levels of sustainability awareness/adoption.

**Institutional/ Corporate Owners** – Institutional owners such as A-REITS (Australian Real Estate Institutional Trusts) own property portfolios. These groups tend to be more engaged around sustainability and understand the long term benefits and value of investing in energy efficiency and sustainability initiatives, and generally have a dedicated sustainability person. They will have a long term outlook with a longer ROI expectation. There are varied sizes of these types of investors, for example Stockland and Mirvac are large Institutional Investors and C-bus and Fortius are smaller.

##### **Non-corporate (Private)**

- Non-Corporate, private, small investor – these are usually property syndicates or wealthy property owners that own smaller portfolios of buildings (and smaller buildings) across various building classifications. The focus tends to be on yield and rental return rather than long term investment in energy efficiency and sustainability.
- Non-corporate non-organisational/ foreign owners – these owners may have had property handed down, or be foreign owners, and generally property management is not a core business. The property may have been purchased at a low cost base and there is little incentive to upgrade on equipment, unless there is major risk of vacancy. NABERS ratings are only targeted as part of the CBD program.

**Owner corporations** (strata titled properties) - smaller, individually owned tenancies. Gaining general consensus on how money should be spent is difficult, and motivations to upgrade depend on how much funding is available.

**Government and other organisations** - government, not-for-profits and other organisations. These governments generally own around 20% of mid tier stock.

**OWNERSHIP TRENDS**

Colliers research shows that ownership of offices is becoming more concentrated with institutional owners owning almost half of CBD buildings, in Figure 12. Offshore ownership is increasing and there is a continual trend of reduction in private and government ownership in the CBDs.

**CBD OFFICE OWNERSHIP BY TYPE, 2009 AND 2014 (% OF TOTAL STOCK)**

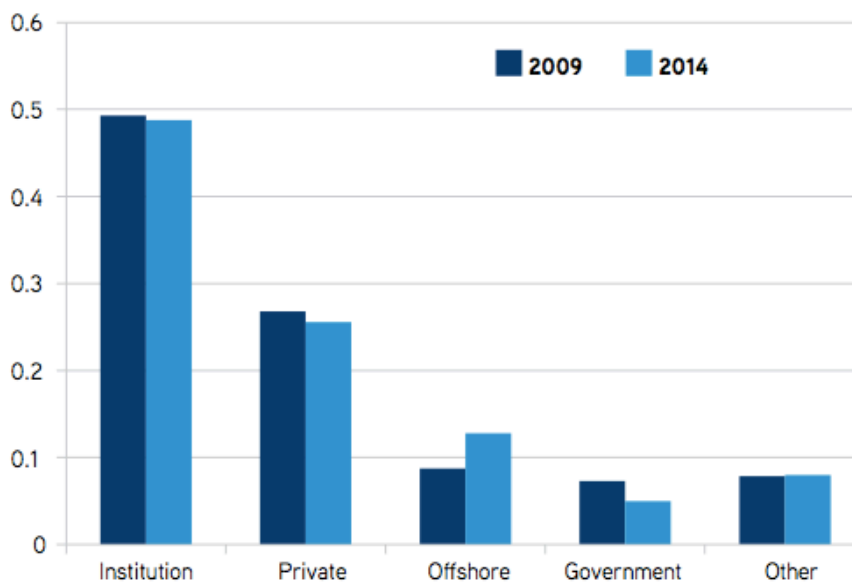


Figure 12: Ownership breakdown (Colliers Edge, 2015)

Ownership trends will vary city to city. For example, Perth and Brisbane have both traditionally seen much more fragmented ownership with individual private investors and this is now trending towards institutional owners moving into the market. Colliers points out that institutional ownership has jumped from 35 per cent of total stock to 54 per cent of stock over a five year time period in Perth, and government ownership is declining in all cities (Colliers Edge, 2015).

Colliers also show that CBD

| DOMINANT OFFICE OWNERS BY CAPITAL CITY CBD 2014 |               |               |
|---|---------------|---------------|
|   | 2009          | 2014          |
| 1   | Investa       | Dexus         |
| 2   | ISPT          | The GPT Group |
| 3   | AMP           | Investa       |
| 4   | The GPT Group | ISPT          |
| 5   | Charter Hall  | AMP           |
| 6   | Dexus         | Charter Hall  |
| 7   | Brookfield    | Brookfield    |
| 8   | Stockland     | Cbus Property |
| 9   | Lend Lease    | QIC           |

office assets are becoming increasingly concentrated amongst fewer owners. In 2009, the top 10 groups owned 29 per cent of total stock, in 2014, this has increased to 35 per cent.

Figure 13 shows the dominant office owners in CBDs.

Figure 13: Ownership office buildings (Colliers Edge, 2015)

## 5. Tenant profile

There is a lack of national data on the types of tenants in buildings. The graph below is particularly for the City of Melbourne but gives some idea of CBD tenancy characteristics. This was part of a Sustainability Victoria report ('The next Wave'). The tenants are classified into very broad categories, which can make it difficult to understand what types of tenants are in particular buildings. Without the understanding of stakeholders it is difficult to effectively target and communicate policy or programs.

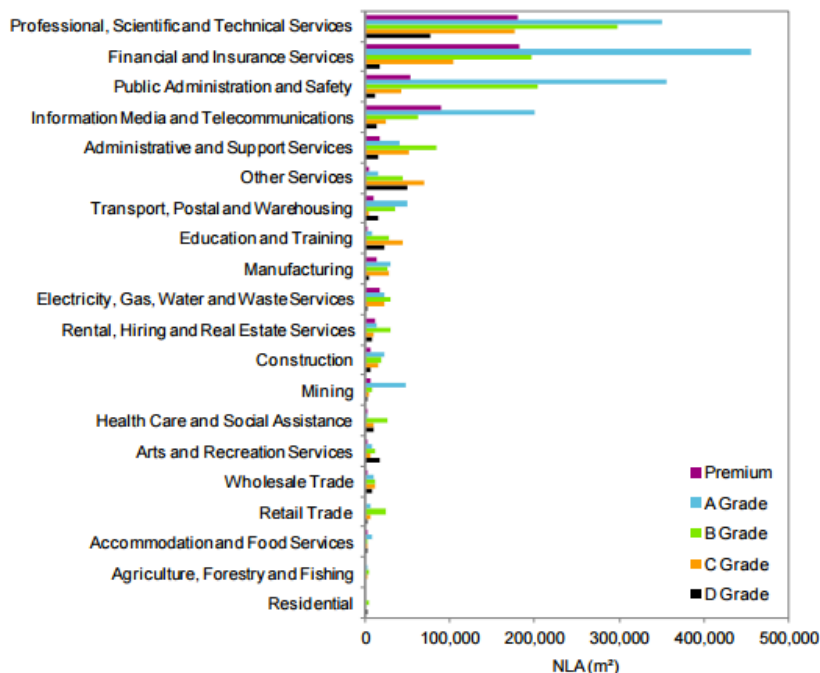


Figure 14: Tenancy profile breakdown (Davis Langdon, 2013)

### TENANT TRENDS

Colliers research showed some notable trends in the tenancy space (Colliers, 2014). Similar trends were supported in an office report from PWC and Urban Land Institute (*Emerging Trends in Real Estate 2016*), in particular around the growth of co-working and shared spaces.

- Growth in small to medium enterprises looking for space
- Lease activity for smaller space growing
- Trend for part-occupiers of floors
- Shorter lease terms
- Growth of activity based/ co-working spaces (for corporates as well as start-ups)
- Strong need to attract and retain staff with an increased focus on fitouts as well as:
  - o Green space/ break out spaces
  - o CBD offices (vs suburb)
  - o End of trip facilities
  - o Walkability and cycle-ability of surrounding area
  - o Fitouts that match the type of talent they are trying to attract

### **B-D GRADE TENANTS**

The EY report commissioned for GBCA on mid-tier buildings (B-D Grade) found that these types of buildings tend to attract smaller organisations with no corporate sustainability agenda and limited knowledge of energy efficiency. The cost per square metre is generally the most important concern when leasing a new space and other outgoings aren't factored in (i.e. energy use, base building costs). They have shorter leases and like to be located near to client base and transport.

Mid-tier tenants, such as small organisations, are generally time poor and are only interested in energy efficiency if it doesn't cost money or take too much time to implement. Tenants don't realise the impact certain fitouts (such as old fluorescent lights) have on energy costs, and don't believe they have the ability to influence these costs.

Tenants do not associate cheap rent and high energy outgoings, and do not even know what they could be paying in an energy efficient building. Furthermore facility managers are often lacking awareness and are spread across multiple assets so there isn't a lot of tenant support. Overall, if tenants aren't demanding better quality spaces, owners aren't driven to deliver these.

### **SPACE**

The City of Melbourne is the only local council to track workspace ratios for an entire CBD since 1992. Over the 20 year time period from 1992 to 2012, workspace ratios in the Melbourne CBD declined from 27.6sq m per person to 18.1sq m per person. The most dramatic decline was seen from 1992 to 2002 and this can be attributed to a large scale move by organisations to open plan working (Melbourne, 2013).

The most efficient users of space are the IT&T sector which now has an average of just 14.5sq m per person. Interestingly, the government sector have become less efficient in their use of space and workspace ratios actually increased between 2002 and 2012. This, combined with the large proportion of space that government occupies nationally, means that we consider any major changes to the way government occupy space will have the largest impact on occupancy across our CBDs.

MELBOURNE CBD WORKSPACE RATIOS BY MAJOR SECTORS 1992-2014

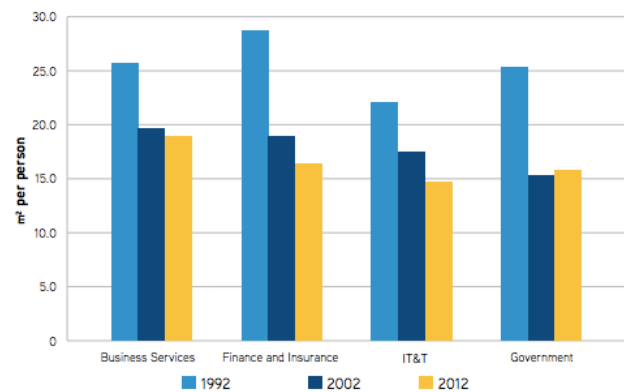


Figure 15: Changing space use (Retrofit Survey 2013)

## 6. Policy interventions (CBD program)

In order to meet GHG reduction targets in Australia, buildings were identified as requiring policy intervention. First proposed in 2004, a form of the Commercial Building Disclosure (CBD) legislation was a component of the National Strategy on Energy Efficiency (soon to be the National Energy Productivity plan). The legislation proposed to transition the voluntary NABERS Energy rating into mandatory, for space over 2000 m<sup>2</sup> being sold or leased. This requires eligible buildings to have a NABERS Base Building rating conducted and displayed. The Regulatory Impact Statement (RIS) for this legislation found that most buildings with ratings under the voluntary NABERS scheme were mainly Premium or A grade buildings, but in total, the majority of buildings in Australia did not have a rating (Commonwealth of Australia, 2010).

It is important that any findings from the CRC research could inform future regulation, particularly as health and productivity become more important factors to consider. The current review of the CBD program includes the importance of health and productivity in green buildings as a co-benefit.

The CBD legislation was introduced over 12 months with full disclosure requirements falling into place at the end of 2011. Figure 16 shows a graph in the growth of NABERS ratings after CBD legislation was introduced between 2010 and 2011. This is a simple demonstration of the power that regulation has in a failing market sector.

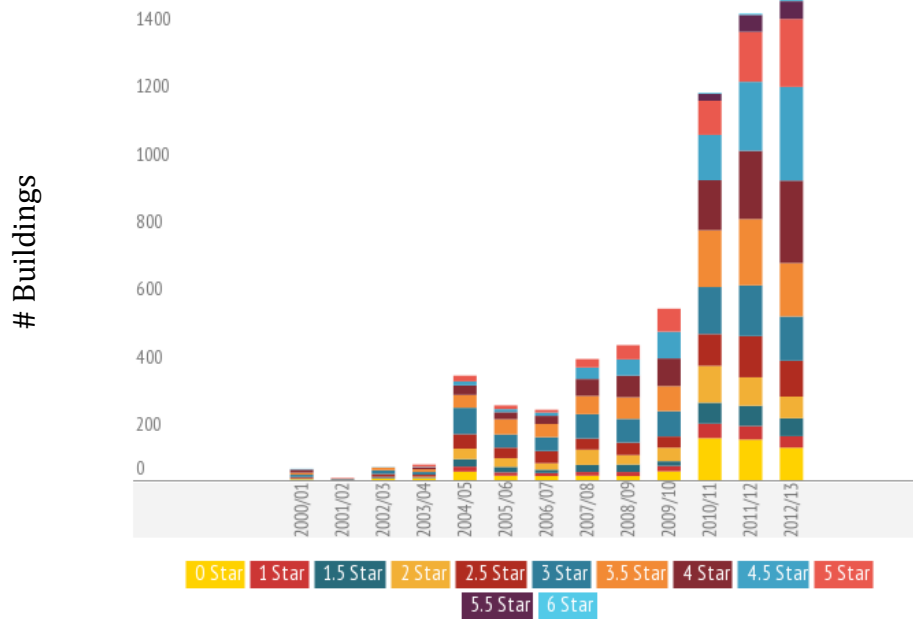


Figure 16: Number of total NABERS ratings on buildings before and after mandatory disclosure (adapted from (Hall, 2014))

### THE INFORMATION ISSUE – LACK OF TRANSPARENCY

Under the RIS, a number of issues were found which relate to the decision making process for tenants and buyers when it comes to energy efficiency and transparency of information in transactions for buildings. Some of these same issues could apply for the introduction of health and productivity requirements and/or ratings.

Current failures:

- Tenants felt they could *perceive the efficiency of the building through its newness or look/feel*, so didn't value an energy rating, however this perception is inaccurate.
- NABERS ratings are instigated by a building owner and in negotiation processes for a property, *tenants may not have the time or ability to access this information* for multiple properties they are considering. There is no body in Australia that represents tenants and building owners will generally hold greater power.
- Preferences such as location, views etc are more important and tenants are limited in their understanding of energy efficiency. The RIS refers to '*bounded rationality*' where *tenants are not able to process complex information and handle uncertainties in their decision making*. Therefore, energy efficiency is left out as a priority.

For an effective market there is the need for all parties to have access to sufficient information on which to base their decisions. Generally, the RIS found that the buyer

has less information resulting in the inability to not be able to distinguish between low and high quality energy efficiency criteria at the time of purchase (adverse selection). This is confounded by the fact that energy efficiency is a difficult attribute without specialist advice, and properties tend to be infrequent purchases so personal experience is difficult as a reliable decision making influence.

These failures mean that there is greater risk to return on investment for energy efficiency improvements without clear communication channels to potential lessees or buyers.

The RIS found a number of reasons as to why individuals may still not act on energy efficiency information even once the legislation is introduced (again these can be considered similar risks to being presented with health/well-being information):

- Properties can't be compared on a like-for-like basis, there may be differences in size or location
- There could be minimal choice in the market (i.e. large organisations have limited choice in tenancies to suit their needs)
- Low vacancy rates mean there are few options even available
- Presented with the energy efficiency information, they still don't select the efficient option which could be due to:
  - the potential energy efficiency savings are not sufficient to overcome other characteristics (i.e. location, amenities)
  - decision makers within organisations do not place a high value on energy savings and therefore do not pursue them as an option in property choice.

These are all issues that the research needs to consider. Even if health and productivity information is quantified, will tenants and owners disclose that information? And will people use that information in their decision making? It is likely that health and productivity information will have greater weight as the perceived value is higher to the bottom line.



## 7. NABERS Indoor Environment uptake

There are currently no NABERS IE ratings for tenancies in Australia. The majority are base building (44) with one whole building rating, bringing the total to 45 buildings. To obtain a NAERS IE rating is a costly exercise at this point, and likely to be embraced by the top end of the market, similarly to the Delos WELL Building certification. The introduction and launch of the revised NABERS IE protocol in 2014 is intended to increase uptake in the ratings.

Why there is a low uptake will be important to understand for this research. Even if a tool or rating is developed, it needs to be done so according to the needs of building owners and tenants. The PWC/ULI US survey found that sustainable buildings, and health/wellness features still rate relatively low on the spectrum to other issues.

At the moment it is costly to obtain a NABERS IE rating and is intrusive, requiring staff to be surveyed as well as the area tested. An organisation won't pay to obtain a NABERS IE tenancy rating for marketing purposes as they don't need to market the property to other tenants, There is however the growing focus on attracting and retaining staff which is where this rating would benefit tenants.

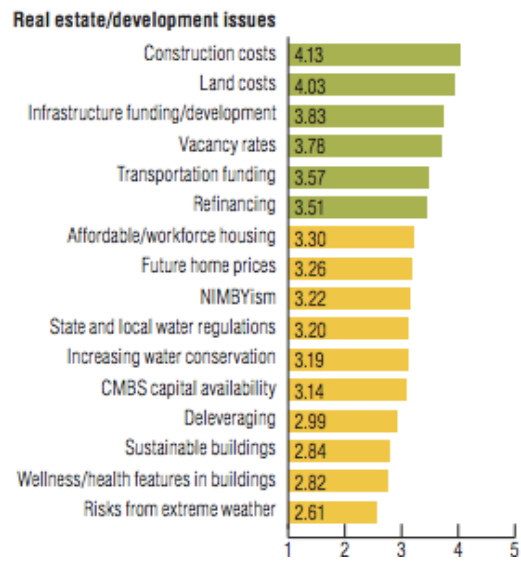


Figure 17: From Emerging Trends in Real Estate report (2015)

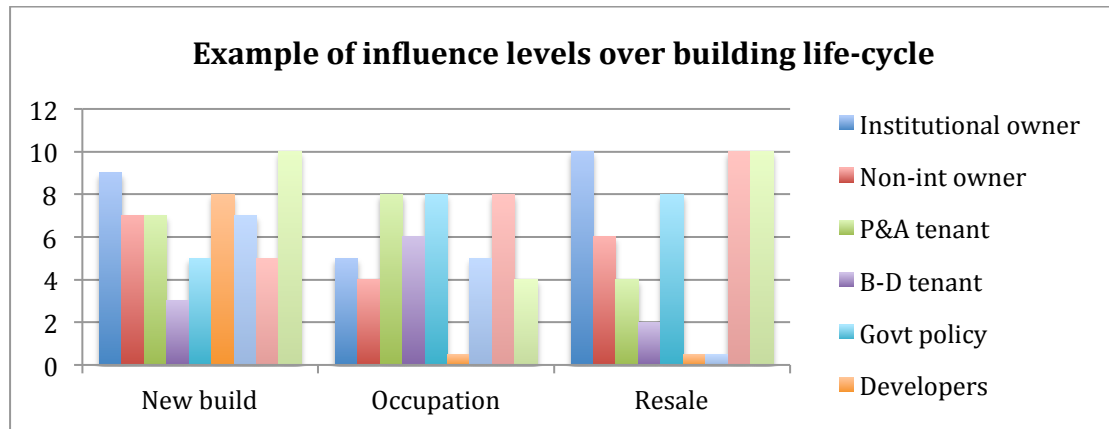
## 8. Key influencers on decision making

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The table below outlines key stakeholders and their influence over decision making for sustainability (new spaces, interventions into existing spaces).

|  | Influence level | Details  |
|--|-----------------|--|
| <b>Non 'Tier 1', smaller tenants (B-D grade)</b>         | Low-med         | The smaller the space and the total fee being paid, the less the influence the tenant has. They are usually unaware of sustainability benefits and won't pay extra   |
| <b>Large tenants, Tier 1 (Premium &amp; A)</b>           | High            | Large tenants can have significant influence over design decisions, they are usually aware of for both new and changes to existing space   |
| <b>Building owners (B-D grade)</b>                       | Med             | Changes to existing space can depend on negotiations between owners and tenants, and available funds. If tenants are willing to pay, owners will meet needs to avoid vacancy. Owners are generally driven by yield         |
| <b>Building owners (Premium &amp; A)</b>                 | High            | Owners will have shareholder interests and long term strategies in place for sustainability. Most of these buildings will have a NABERS energy rating already.   |
| <b>Property, facility and asset managers</b>             | Med             | The influence of the FM/property manager depends on priorities for the building. If energy efficiency is a priority it will be exercised, but if tenants/ owners aren't demanding it the focus will be on other priorities |
| <b>Developers</b>  | High            | Responsible for bringing everyone together<br>When addressing various investment issues, sustainability tends to be low priority in comparison   |
| <b>Government policy</b>                                 | High            | Mandatory policy has high level of influence. It currently targets buildings over 2000sqm but if this changes smaller spaces, and lower grade stock, will be also be influenced.   |
| <b>Financiers</b>  | High            | Finance sets the limit for the project. Over-budget project trade-offs may occur to reduce costs. Sustainability terms need to be in investor terms (i.e. asset value) and commitments made early in the project.          |
| <b>Design and Construction professionals</b>             | Med             | Design professionals (i.e. architects) have varied influence depending on the structure of the project, collaborative models bring more decision making power from the team  |
| <b>Commercial real estate professionals (ie. Agents)</b> | Med             | The impact that agents have on leasing a space (whether it be on behalf of the owner or seeking space for a tenant) is largely un-researched but expected to be medium to high.  |

It is important to consider that stakeholders will have changing influence over decisions during the life of a building. This is illustrated below, these influence levels at various stages will sought to be understood as the research progresses.



## 9. Summary and recommendations

As an outcome of the EY research into mid-tier buildings, the Green Building Council recommended a number of pathways into the future for improving the performance of these buildings, particularly for lower grade stock. These areas are pertinent for addressing future research and policy and will feed into the research outcomes where possible, these included:

### Building a robust evidence base

- Understand physical details on buildings (energy use, size, location etc) and the ownership and tenancy profiles
- Conduct further research that links efficient buildings with improved IEQ and tenant wellbeing and productivity

### Create a shift in knowledge

- Tailored tools and interventions for stakeholders, maximise stakeholder engagement opportunities
- Education for FM and service providers about upgrade options and strategies for influencing building owners

### Develop tools for improved building performance

- Raise awareness of existing tools
- Develop tools for owners and tenants to work together more cohesively
- Develop tools around occupant comfort and wellbeing

### Establish repetitive bodies and networks

- Create a central representative body as a source of trust information and resources, and to drive regulatory requirements
- Create further networking, exchange and collaboration in the mid tier sector

The table below shows some key statistics summarising the building typologies and stakeholders.

| ITEM                     | FOCUS  | EXPLANATION  |
|--------------------------|--|--|
| <b>Building typology</b> | Office buildings<br>Total Energy (PJ/yr): 46<br>Total NLA: 47.2M m <sup>2</sup><br>MJ/m <sup>2</sup> : 974.5 | Highest total energy use (behind retail) (MJ)<br>NLA increasing but GHG growth reducing due to effective policy and support<br>Lots of data is available<br>Easier to engage   |
|                          | Hospitals<br>Total Energy (PJ/yr): 46<br>Total NLA: 12.4M m <sup>2</sup><br>MJ/m <sup>2</sup> : 1297.3       | NLA and GHG growing, highest energy intensity behind museums (MJ/m <sup>2</sup> )<br>Hard to engage, minimal data<br>Varied sub-spaces (office, lab, theatres, waiting rooms, etc)   |
|                          | Education<br>Total Energy (PJ/yr): 46<br>Total NLA: 30M m <sup>2</sup><br>MJ/m <sup>2</sup> : 6.6            | NLA and GHG growing<br>Mid-range energy intensity (MJ/m <sup>2</sup> )<br>Varied sub spaces (office, lab, teaching, etc)   |
| <b>Office buildings</b>  | P & A grade: 50% of stock  | P & A have adopted energy efficiency and sustainability and will be a good focus for exemplar examples   |
|                          | B grade stock: 32%   | B grade buildings have approximately 25% update of NABERS ratings and low to medium sustainability update.   |
|                          | C-D grade: 18% of stock  | C-D grade stock is generally being converted for other uses (residential), particularly D grade.   |
| <b>Owners</b>            | Institutional: 50%   | Increasing assets being owned by core group of institutional investors<br>Higher understanding and implementation of sustainability, retrofit programs in place  |
|                          | Private: 26%   | Focus on yield and rental return rather than long term efficiency and sustainability   |
|                          | Foreign: 11%   | Low cost base, little incentive to upgrade unless risk of vacancy  |
|                          | Government: 5%<br>Other: 8%  | Government own around 20% of mid-tier (B-D) grade stock.   |
| <b>Tenants</b>           | Tier 1   | Premium & A grade, greater capacity to manage building internally  |
|                          | Other  | B-D grade, outsource FM and CRE responsibilities, time poor. Energy efficiency perceived as low/no value   |
|                          | Trends   | Different grades attract different tenants<br>Trends to smaller spaces, shorter leases, co-working/ABW<br>High quality fitouts to attract/retain staff<br>Mid-tier tenants still unaware of energy savings potential, owners aren't driven |

Stakeholders for Premium and A grade buildings (owners, tenants, agents etc) will have different needs, drivers and requirements than the mid-tier stock. Each stakeholder group will require a research strategy, and an understanding of cross-negotiations and how these impact decision-making (i.e. tenant and owner).

The B grade buildings and stakeholders show as a key area requiring assistance for increased sustainability initiatives. It is likely these stakeholders are more highly influenced by regulation. Educating and informing these tenants could drive the owners to make necessary changes and seek the evidence to support their decisions. This category are also demanding higher quality fitouts to retain staff which will align with the health and productivity outcomes.

Premium and A grade stakeholders have further maturity in energy efficiency and a growing interest in quantifying health and productivity outcomes. Green buildings are a standard, but there is still limited understanding around what features bring the most benefit, and integrating sustainability at early stage in decision-making is still a challenge.

It will be important to explore the current barriers for tenants to health/productivity, similar research to that in the Regulatory Impact Statement for the CBD legislation. It is likely some of the same barriers will exist. This process will ensure any tools and outcomes understand and solve the actual problem on the ground, and not what is perceived as the problem.

It will be important to be aware of trends and the future workplace, such as shorter lease times, smaller tenancies and the move towards activity based working. Any future tools developed need to be adaptive to such trends to ensure longevity.

## 10. References

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