



**STUDY REPORT SR 260/7 [2011]**

# **BEES** INTERIM REPORT

**Building energy end-use study - Year 4**

## **FROM WAREHOUSES TO SHOPS**

**Changing Uses in the Non-residential Buildings Sector**

Nigel Isaacs

# **BEES (BUILDING END-USE STUDY) YEAR 4: FROM WAREHOUSES TO SHOPS**

## **BRANZ Study Report SR 260/7**

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### **Reference**

Isaacs, N. (2011). BEES (Building energy end-use study) Year 4: From Warehouses to Shops - Changing Uses in the Non-residential Buildings Sector, BRANZ study report 260/7, Judgeford.



BEES publications can be downloaded from the BEES website - <http://www.branz.co.nz/bees>.

Following is a list of other reports in the BEES Year 4 series:

- Saville-Smith, K. (2011). BEES (Building energy end-use study) Year 4: Insight into barriers, BRANZ study report 260/1, Judgeford.
- Camilleri, M., & Babylon, W.M (2011). BEES (Building energy end-use study) Year 4: Detailed monitoring, BRANZ study report 260/2, Judgeford.
- Bishop, R., Camilleri, M & Isaacs, N. (2011). BEES (Building energy end-use study) Year 4: Delivered daylighting, BRANZ study report 260/3, Judgeford.
- Bishop, R., Camilleri, M & Isaacs, N. (2011). BEES (Building energy end-use study) Year 4: Achieved conditions, BRANZ study report 260/4, Judgeford.
- Bishop, R., Camilleri, M. & Burrough, L. (2011). BEES (Building energy end-use study) Year 4: Temperature Control, BRANZ study report 260/5, Judgeford.
- Bishop, R. (2011). BEES (Building energy end-use study) Year 4: Electrical loads, BRANZ study report 260/6, Judgeford.

# PREFACE

Understanding how energy and water resources are used in non-residential buildings is key to improving the energy and water efficiency of New Zealand's building stock. More efficient buildings will help reduce greenhouse gas emissions and enhance business competitiveness. The Building Energy End-use Study (BEES) is taking the first step towards this by establishing where and how energy and water resources are used in non-residential buildings and what factors drive the use of these resources.

BEES started in 2007 and will run for six years, gathering information on energy and water use through surveys and by monitoring non-residential buildings. By analysing the information gathered, BEES aims to answer eight key research questions about resource use in buildings:

1. What is the aggregate energy and water use of non-residential buildings in New Zealand?
2. What is the average energy and water use per unit area per year?
3. What characterises the buildings that use the most energy and water?
4. What is the average energy use per unit area for different categories of building use?
5. What are the distributions of energy and water use?
6. What are the determinants of water and energy-use patterns – e.g. structure, form, function, occupancy and building management etc?
7. Where are the critical intervention points to improve resource use efficiency?
8. What are the likely future changes as the building stock type and distribution change?

Understanding the importance and interaction of users, owners and those who service non-residential buildings is also an important component of the study.

Under BEES, non-residential buildings have been defined using categories in the New Zealand Building Code (NZBC), but in general terms the study is mainly looking at commercial office and retail buildings. These vary from small corner store dairies to large multi-storey office buildings. For more information on the building types included in the study please refer to BRANZ Report SR224 Building Energy End-use Study (BEES) Years 1 & 2 (2009) available on the BEES website ([www.branz.co.nz/BEES](http://www.branz.co.nz/BEES)).

The study has two main methods of data collection – a high level survey of buildings and businesses, and intensive detailed monitoring of individual premises.

The high level survey initially involved collecting data about a large number of buildings. From this large sample, a smaller survey of businesses within buildings was carried out which included a phone survey, and collecting records of energy, water use and data on floor areas. The information will enable a picture to be established of the total and average energy and water use in non-residential buildings, the intensity of this use and resources invoked by different categories of building use, answering research questions one to four.

The detailed monitoring of individual premises involves energy and indoor condition monitoring, occupant questionnaires and a number of audits, including appliances, lighting, building, hot water, water and equipment.

This particular report presents data and analysis drawn from the sample frame used for the high level survey. It evaluates and provides new knowledge about how changes in use between commercial and industrial buildings evolve over time. One of seven interim reports providing a snapshot of analysis completed to date, the data and analysis in this report will contribute to answering research questions six, seven and eight. When all data collection has been completed, further analysis will be reported on the full sample including relationships between end-uses, building types and services.

## SUMMARY

- Quotable Value (QV) records include the use category of a building. These have been compared to their current use by information gathered from the BEES Websearch on the first 1000 buildings in the BEES sample.
- About 30% of buildings that have a QV use category of Industrial Service or Industrial Warehouse are being used differently to this recorded classification.
- There are no significant differences in changes of use between different size buildings or between Auckland and the rest of New Zealand.
- A change in use can mean the design of the building is possibly not appropriate for its new use. This can have affects on energy use and how the Building Code (in particular H1 - Energy Efficiency) is applied to the building.

Over time buildings change use, but there is a cost in transforming a building from its originally designed use to a different one. While this has relevance to resource efficiency, particularly in relation to materials and land costs, it also raises issues about the extent to which changes in use may result in inefficient building performance – particularly in relation to energy consumption.

The BEES sample includes only buildings that are primarily used for office or retail. In order to determine whether buildings were eligible for inclusion, the study team obtained QV use category codes and then carried out web-based searches and site visits to check each building's current use. The study team investigated buildings that were classified as Liquor Outlets Including Taverns (CL), Motor Vehicle Sales or Service (CM), Office Type Use (CO), Retailing Use (CR), Service Stations (CS), Tourist Type Attractions (CT), Vacant Land (CV), Other Commercial Uses or where there are Multiple Uses (CX). The team also investigated buildings classified as Industrial Service (IS) and Industrial Warehouse (IW) in case they had subsequently changed use to office or retail.

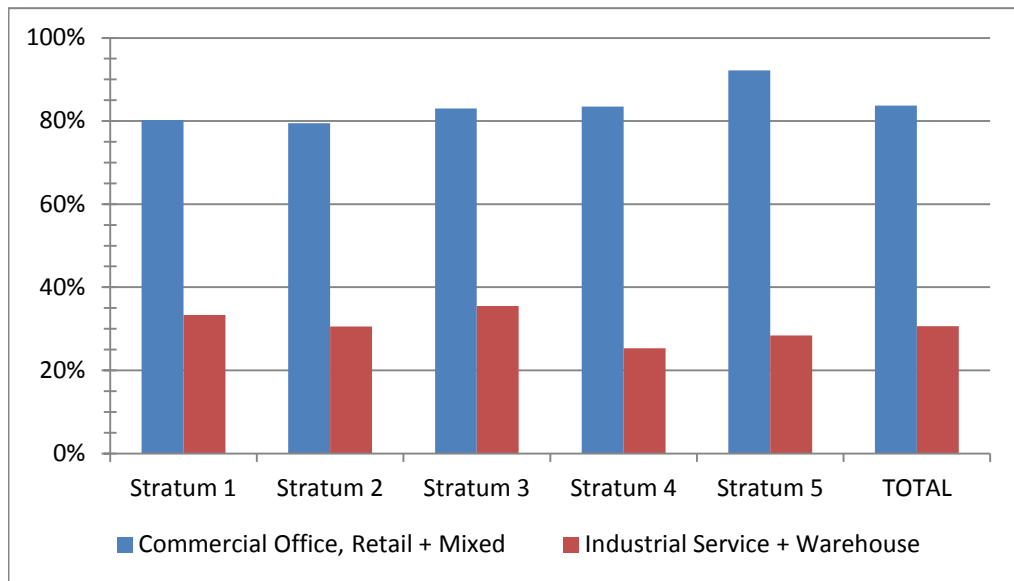
This analysis took the valuation use category codes allocated by QV and compared them with the uses found by the BEES project. If it is assumed that QV use categories for building records are allocated at the initial valuation and that they are updated as a result of a building consent, subdivision, sale or other inspection, then this would suggest that differences between the QV category and the use identified by BEES has resulted from a change in use after the allocation of the QV code. It needs to also be assumed that rules for allocating QV use category codes are consistently applied or, if there are in errors in application, that these occur randomly for the different floor area groupings and regions.

The analysis has shown that approximately 30% of buildings in the IS and IW QV use categories have changed to retail or office use (i.e. are eligible for inclusion in the BEES research). This is a significant proportion of buildings.

These proportions are about the same regardless of floor area size and there does not seem to be any regional difference between Auckland and the rest of New Zealand.

Figure A gives the percentage by count of eligible BEES buildings (office and retail buildings) by QV use categories and the floor area size (strata).

**Fig A: Analysis of QV use categories of buildings in the first 1000 of the BEES sample**



It appears from these findings that about 30% of industrial and warehouse buildings are being used in a way that would require the NZBC Clause H1 to be applied differently if they had been built for the new use – i.e. instead of Industrial they would be classified as Commercial uses.

The implications of this change-of-use for energy performance require further investigation. For example, what would be the energy consequences if a warehouse (IW) was changed to retail (CR) use without any of the energy efficiency activities that would be have been required should the building have been designed and constructed for this specific use? What would be the cost and consequences of retrofitting to meet these requirements?

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# 1. INTRODUCTION

The analysis in this report explores two questions:

- How much transformation from the two industrial categories to retail and/or office use has occurred? AND
- Are there any significant patterns in these transformations (e.g. do they occur in only very large or very small buildings and is there a difference between Auckland and the rest of New Zealand)?

To answer these questions the analysis compares the use categories representing their original use in the QV database and the findings from the BEES survey giving their current use. If there was a difference it is assumed there is likely to have been a change of use.

The initial BEES sample was selected from QV property category codes CL, CM, CO, CR, CS, CT, CV, CX<sup>1</sup>, IS or IW. At that time it was recognised the IS and IW use codes might have included a significant number of valuation records that did not contain eligible BEES buildings (i.e. containing office or retail spaces).

The IS and IW property category codes are described in the Land Rating Valuations Rules (LINZ 2002b, Appendix F) as:

- IS – Industrial Service usually has an interface with the general public as direct clients.
- IW – Industrial Warehousing with or without associated retailing.

The IS and IW categories were included in the original BEES sample based on a concern that a sizable number of these buildings had been transformed from industrial use (e.g. storage of product for whole distribution) to retail and/or office use (e.g. big box retail or barn style retail). These changes could have implications for the building's ongoing energy performance and possibly changes to the physical building to meet mandatory requirements, as different use categories of buildings have different requirements when built. For example, an office building is required to meet higher thermal envelope requirements than a warehouse.

This report provides an analysis of the first 1000 BEES building records in Size Strata 1-5. The building "original use" category was taken from the valuation database (valuation records provided by PropertyIQ and the Auckland City Council Valuation Department) and gave the BEES team their best estimate of the building's original use. The current use was established using Websearch and/or Streetsearch (for more detailed discussion see BEES Year 1 & 2, and BEES Year 3 reports).

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<sup>1</sup> CL – Liquor Outlets including taverns, CM – Motor Vehicle sales or service, CO – Office Type Use, CR – Retailing Use, CS – Service Stations, CT – Tourist Type Attractions as well as other amenities with an emphasis on leisure activities of non-sporting type, CV – Vacant Land, or and with low value of improvements, which when developed is likely to have a commercial use, CX – Other Commercial Uses or where there are multiple uses.

It is recognised this approach is subject to a range of potential errors, most of them both unknown in consequence and unable to be quantified. The valuation use category is allocated at the time of the most recent assessment – from the original plans, the first (historic) valuation visit or the most recent valuation. It is expected the use code would then be updated as a result of building consents, subdivisions, revaluations, sales or other inspections. The date of the latest updating is not recorded, so it is not possible to know how recently this has occurred.

The exact building uses that are included in the IS and IW categories are also unknown, beyond the formal definition. For example IW could include a warehouse with a small retail counter and a large, self-service wholesale warehouse or one with a large retail counter and a staff-serviced warehouse. There will always be situations where a given property's use is not clear-cut or may be open to interpretation.

For this report, the term Commercial is used to refer to Commercial Office, Commercial Retail and Commercial Mixed uses while Industrial refers to Industrial Service and Industrial Warehouse. The full titles are used to refer to the specific use category.

## 2. ELIGIBLE BUILDING RECORDS

### 2.1 Rules for determining eligibility of BEES buildings

Figure 10 (Appendix) provides the flow chart for the selection of buildings to be included in the study. The flow chart has been designed to be worked through on site (or on the phone before the visit) to determine whether it is worth investing BEES time in monitoring the building.

**Steps 1 and 2:** If the building is totally office or retail activities then it is included in the first step, while if there is no office or shop in the building then it is excluded at the second step.

There will always be buildings with mixtures of activities and the next three steps are designed to deal with these in a consistent way.

**Step 3:** If the office or retail type activity (e.g. factory office) only supports the other activities carried out in the building (e.g. industrial factory), then the data will be of limited use to BEES and the building will not be monitored; OR

**Step 4:** If the office or retail activity (e.g. staff cafeteria) is only open to staff in the building, then it will not be monitored; OR

**Step 5:** If the office or cafeteria (etc) is open to the public, but if this is only a tiny portion of the whole building (less than 5% of the floor area), then the building will not be monitored.

The BEES survey sampling strategy has been designed to give the best precision possible, whilst avoiding bias caused by the huge diversity of building types and sizes, and minimising the effect of other sampling issues. The sampling strategy finally decided upon entails selecting a random sample of non-residential buildings stratified into five groups by floor area. Each size group represents a similar total floor area and the number of buildings to be sampled from each group is the same. This is provisionally estimated to give a precision of 4% for total energy consumption on a sample of 1000 buildings. The sample is to be for all of New Zealand, without any geographic clustering. The possibility of geographic clustering, i.e. of selecting a relatively small number of geographic units from which the sample is drawn, has been examined carefully and rejected as leading to considerable difficulties in the design, completion and analysis of the survey, without any clear benefit in terms of precision compared to the alternative of surveying a smaller number of buildings for the same cost.

Within the five main floor area strata, further strata may be defined geographically or by use type to minimise bias due to non-response.

A number of potentially serious issues have been identified, for example, missing floor area or incorrect categories in the valuations roll. Strategies have been developed to handle these in a way that does not introduce bias into the survey estimates.

## 2.2 Eligible Building Records

The number and percentage of eligible BEES building records are shown in Table 1. For buildings less than 9000m<sup>2</sup> (Size Strata 1-4) the majority of Commercial were found to be eligible for inclusion in the BEES research, whereas almost the opposite was found for Industrial.

The three right-most columns (in grey) in Table 1 show all buildings records (including those over 9000m<sup>2</sup> – stratum 5). The larger buildings have similar eligible building proportions by category as the smaller buildings.

**Table 1: Proportion of Building Records Eligible by Use Category**

<b>Category</b>	<i>Total # Strata 1-4</i>	<i>Eligible</i>	<i>1-4 % Eligible</i>	<i>Total # Strata 1-5</i>	<i>Eligible</i>	<i>1-5 % Eligible</i>
<i>Commercial Office (CO)</i>	117	101	86%	162	145	90%
<i>Commercial Retail (CR)<sup>2</sup></i>	238	181	76%	278	220	79%
<i>Commercial Mixed (CX)</i>	130	113	87%	175	148	85%
<i>Industrial Service (IS)</i>	152	56	37%	176	61	35%
<i>Industrial Warehouse (IW)</i>	163	42	26%	208	56	27%
<b>TOTAL</b>	<b>800</b>	<b>493</b>	<b>62%</b>	<b>999</b>	<b>630</b>	<b>63%</b>

Table 2 provides the eligible building record counts by floor area strata for the five use categories. For information, the floor area range for each stratum are also given. Note: for the original sample frame for each floor area stratum there are 200 building records, so each stratum is 20% of the total building record count.

**Table 2: Eligible Building Record Count by Use Category and Floor Area Strata**

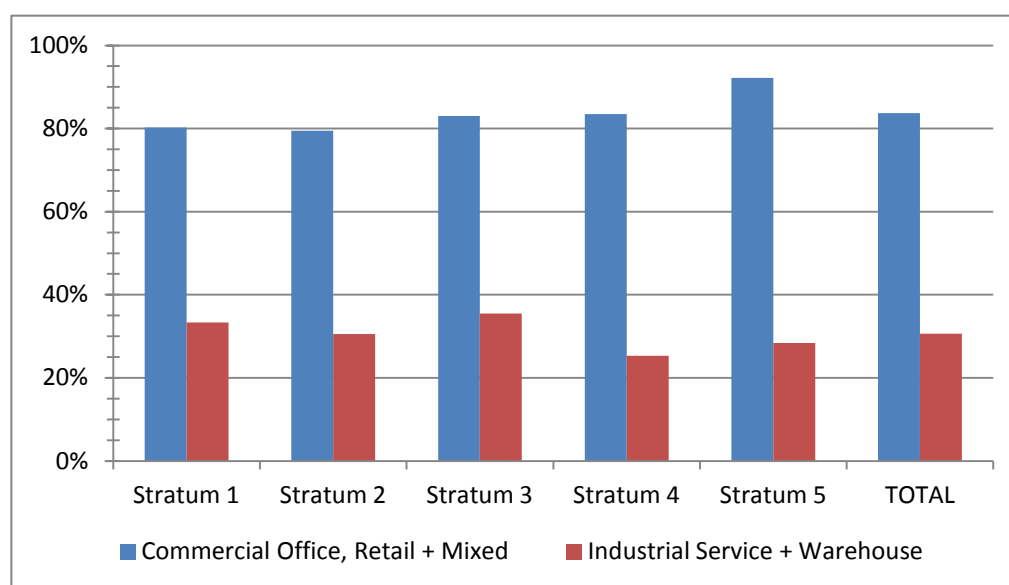
<b>Category</b>	Stratum 1	Stratum 2	Stratum 3	Stratum 4	Stratum 5	TOTAL
<i>Floor Area</i>	<i>0-649m<sup>2</sup></i>	<i>650-1499m<sup>2</sup></i>	<i>1500-3499 m<sup>2</sup></i>	<i>3500-8999m<sup>2</sup></i>	<i>9000m<sup>2</sup> and over</i>	
Commercial Office	22	20	25	34	44	145
Commercial Retail	76	47	33	25	39	220
Commercial Mixed	20	26	30	37	35	148
Industrial Service	15	17	15	9	5	61
Industrial Warehouse	3	9	18	12	14	56
<b>TOTAL</b>	<b>136</b>	<b>119</b>	<b>121</b>	<b>117</b>	<b>137</b>	<b>630</b>
<b>% of Eligible Total</b>	<b>22%</b>	<b>19%</b>	<b>19%</b>	<b>19%</b>	<b>22%</b>	<b>100%</b>

Table 3 provides the percent of eligible buildings, using the counts provided in Table 2, by category and floor area strata. Figure 1 presents the same data but grouped into Commercial and Industrial.

<sup>2</sup> BEES Retail includes Quotable Value categories CL, CM, CR, CS, CT and CV (see Isaacs et al. 2009, Table 7)

**Table 3: Percentage of Eligible Building Records by Use Category and Floor Area Strata**

<b>Category</b>	Stratum 1	Stratum 2	Stratum 3	Stratum 4	Stratum 5	Average
<i>Floor Area</i>	<i>0-649m<sup>2</sup></i>	<i>650-1499m<sup>2</sup></i>	<i>1,500-3499m<sup>2</sup></i>	<i>3500-8999m<sup>2</sup></i>	<i>9000m<sup>2</sup> and over</i>	
Commercial Office	88%	83%	86%	87%	100%	90%
Commercial Retail	78%	77%	75%	69%	100%	79%
Commercial Mixed	80%	81%	91%	93%	78%	85%
Industrial Service	39%	37%	39%	29%	21%	35%
Industrial Warehouse	19%	23%	32%	23%	33%	27%
<b>Average</b>	<b>68%</b>	<b>59%</b>	<b>61%</b>	<b>59%</b>	<b>70%</b>	<b>63%</b>



**Figure 1: Percentage of Eligible Building Records by Combined Categories and Floor Area Strata**

Figure 1 shows that as the floor area increases, a higher proportion of Commercial category building records were found to be eligible for inclusion in the BEES research. Table 3 shows that for Commercial Office category building records the eligible proportion is over 80% for all strata, reaching 100% for the largest size (Strata 5). For Commercial Retail building records, the eligible proportion falls from Strata 1-4, but increases to 100% for Strata 5. For Commercial Mixed, the proportions vary across the strata.

However, for the Industrial categories, Figure 1 shows the eligible proportion falls with increased floor area. Table 3 shows that each of these categories is trending in the opposite way – with increasing size there is a reducing proportion of eligible Industrial Service building records, while for Industrial Warehouse there is an increasing eligible proportion. Although for both categories, on average under one-third of the building records are eligible.

### 3. ELIGIBLE FLOOR AREA

Table 4 provides the equivalent of Table 2 for floor area for the five use categories, but while each strata is 20% of the sample frame building record count, the proportion of floor area varies. The second-to-bottom row provides the percent for each strata of the total eligible floor area. The bottom row, in *italic font*, provides the percentage of floor area by strata using the original sample frame – all of which are within 2% of the eligible percentages.

**Table 4: Eligible Building Record Floor Area by Use Category and Size Strata**

<b>Category</b>	Stratum 1	Stratum 2	Stratum 3	Stratum 4	Stratum 5	<b>TOTAL</b>
<i>Floor Area</i>	<i>0-649m<sup>2</sup></i>	<i>650-1499m<sup>2</sup></i>	<i>1500-3499m<sup>2</sup></i>	<i>3500-8999m<sup>2</sup></i>	<i>9000m<sup>2</sup> and over</i>	
Commercial Office	7437	19,655	58,927	183,668	744,306	1,013,992
Commercial Retail	21,795	44,507	78,108	124,134	629,209	897,753
Commercial Mixed	6512	25,047	61,895	182,747	587,810	864,011
Industrial Service	4919	16,400	29,976	48,511	109,869	209,675
Industrial Warehouse	1696	9099	40,765	61,597	290,586	403,744
<b>TOTAL</b>	<b>42,359</b>	<b>114,708</b>	<b>269,671</b>	<b>600,656</b>	<b>2,361,780</b>	<b>3,389,175</b>
% of Eligible Total	1%	3%	8%	18%	70%	100%
<i>Original Sample Frame %</i>	<i>1%</i>	<i>4%</i>	<i>9%</i>	<i>20%</i>	<i>69%</i>	<i>5,134,418</i>

Table 5 summarises Table 4 to highlight the importance of the Strata 5 floor area – even after the removal of the ineligible records, it is still 2.4 million square metres or 70% of the total non-residential floor area.

**Table 5: Importance of Strata 5 Floor Area**

	<b>Original Sample</b>	<b>Eligible Bldg Records</b>
% of original floor area	100%	66%
Strata 1-4 floor area (m <sup>2</sup> )	1,725,943	1,027,395
Stratum 5 floor area (m <sup>2</sup> )	3,398,394	2,361,780
Total floor area Strata 1-5 (m <sup>2</sup> )	5,124,338	3,389,175
Strata 1-4 floor area as % of total	34%	30%

If the BEES sample had been based only on the Commercial Office, Retail and Mixed categories, Table 6 shows that 630 building records would be eligible with an area of just under 3.4 million square metres. If the Industrial Service and Warehouse building records were excluded there would be 513 building records (a reduction of 19%) with an area of 2.8 million square metres (a reduction of 18%).

**Table 6: Building Record Count and Area by Category Grouping**

Category Group	Total			Eligible		
	Count	Area m <sup>2</sup>	Avg m <sup>2</sup>	Count	Area m <sup>2</sup>	Avg m <sup>2</sup>
Commercial Office, Retail and Mixed	613	3,145,285	5131	513	2,775,757	5411
Industrial Service and Warehouse	382	1,979,053	5181	117	613,418	5243
TOTAL	995	5,124,338	5150	630	3,389,175	5380
Industrial Service and Warehouse %	38%	39%		19%	18%	

Table 7 provides the percent of eligible floor area for the building records by category and floor area strata. Comparing the data in Table 7 with that in Table 3, on average 63% by count and 66% by area of the building records were eligible. The largest difference is for Stratum 1 Industrial Service, where 19% by count and 27% by area of the building records are BEES eligible uses.

**Table 7: Percentage of Eligible Floor Area by Use Category and Floor Area Strata**

	Stratum1	Stratum2	Stratum3	Stratum4	Stratum5	TOTAL
Commercial Office	92%	86%	85%	88%	100%	96%
Commercial Retail	83%	77%	75%	68%	100%	90%
Commercial Mixed	84%	82%	92%	94%	74%	79%
Industrial Service	37%	37%	37%	28%	25%	28%
Industrial Warehouse	27%	25%	33%	23%	37%	33%
TOTAL	68%	60%	60%	59%	69%	<b>66%</b>

Table 8 and Figure 2 summarise Table 3 and Table 7, providing a breakdown for the percent of eligible buildings for the combined use categories and the five floor area strata – 100% means all of the buildings by count or floor area (as appropriate) in the sample are BEES eligible uses.

**Table 8: Percentages of Eligible BEES Building Records – Count and Floor Area**

	Stratum 1	Stratum 2	Stratum 3	Stratum 4	Stratum 5	TOTAL
<b>Count</b>						
Commercial Office, Retail + Mixed	80%	79%	83%	83%	92%	84%
Industrial Service + Warehouse	33%	31%	35%	25%	28%	31%
<b>Area</b>						
Commercial Office, Retail + Mixed	85%	80%	82%	84%	91%	88%
Industrial Service + Warehouse	33%	32%	35%	25%	32%	31%

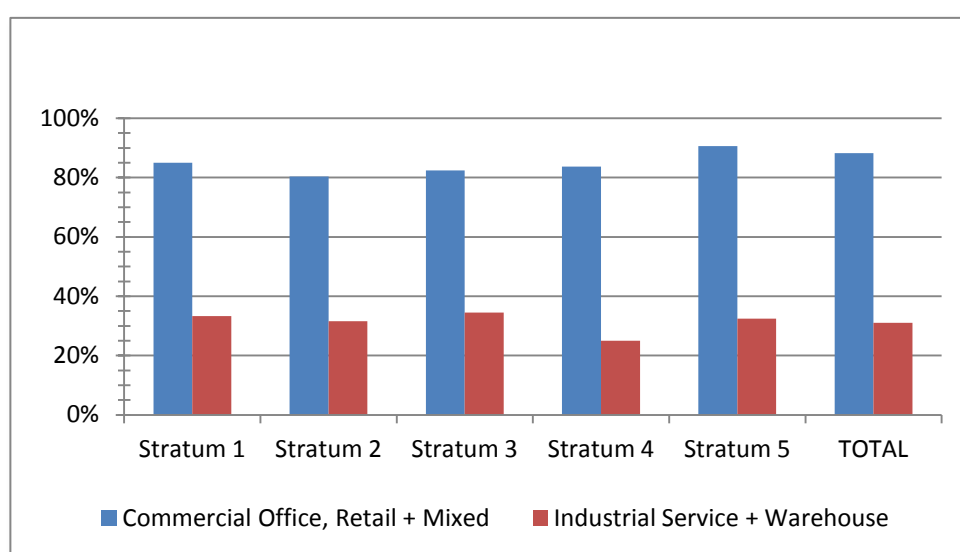
Table 8 and Figure 2 show that as the floor area size increases, there is a small increase in the proportion of the building records which were found to be eligible for inclusion in the BEES research. However, the proportions are very different for the two groupings.

On average 84% by count and 88% by floor area of the Commercial buildings are valid BEES buildings – that is, the large majority of these do not appear to have changed their use over time.

Conversely only 31% of the Industrial buildings both by count and floor area are eligible BEES buildings – suggesting again the majority (69%) of these buildings have not changed their use over time.

Table 7 shows that for Commercial Office category building records the eligible floor area is over 85% for all strata, reaching 100% for the largest size (Strata 5). For Commercial Retail' building records, the eligible proportion falls from Strata 1-4, but increases to 100% for Strata 5. For Commercial Mixed', the proportions vary across the strata, with the lowest (74%) for the largest floor area Strata 5.

However, for the Industrial Service and Industrial Warehouse categories, Figure 2 shows the eligible proportion varies with increasing floor area. Table 7 shows that each of these categories is trending in the opposite way – with increasing size there is a reducing proportion of eligible Industrial Service area, while for Industrial Warehouse there is an increasing eligible proportion – although Strata 4 Industrial Warehouse stands out against this trend.



**Figure 2: Percentage of Eligible Floor Area by Combined Categories and Floor Area Strata**



## 4. AUCKLAND VS REST OF NEW ZEALAND

Is there a difference in the proportion of eligible BEES building records for the different building categories in Auckland and the rest of New Zealand?

Table 9 gives the count and floor area for the eligible BEES building records by use category and region – either Auckland or Rest of New Zealand. Table 10 gives the relationship between the eligible and total building record count and floor area. Figure 3 (Commercial) and Figure 4 (Industrial) give percentage by count and floor area.

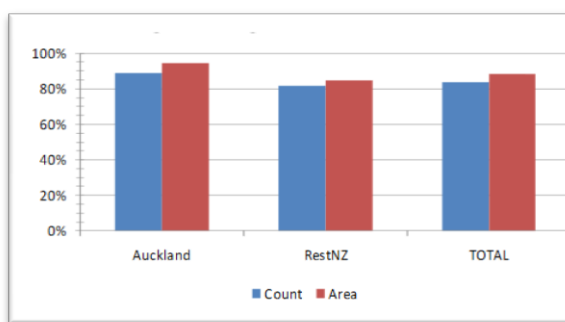
Thus, for example, Table 9 shows that in Auckland there are 60 building records in the Commercial Office category, with 488,072m<sup>2</sup> of floor area, which are BEES eligible. Table 10 shows this is 95% by count and 96% by floor area of the Auckland Commercial Office buildings in the sample. Figure 3 combines the Commercial Office, Retail and Mixed building categories, and shows that of this group 89% of the building records by count and 94% by floor area were eligible. Figure 4 provides this analysis for the Industrial Service and Warehouse building records.

**Table 9: Eligible BEES Building Records by Region and Use Category**

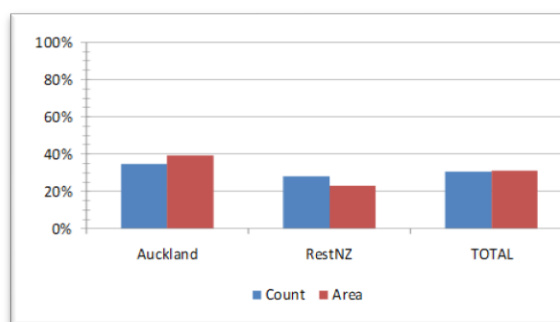
<b>Eligible</b>	<b>Count</b>			<b>Area (m<sup>2</sup>)</b>		
	<b>Auckland</b>	<b>Rest of NZ</b>	<b>TOTAL</b>	<b>Auckland</b>	<b>Rest of NZ</b>	<b>TOTAL</b>
<b>Eligible First 1000</b>						
Commercial Office	60	85	145	488,072	525,920	1,013,992
Commercial Retail	51	169	220	342,729	555,024	897,753
Commercial Mixed	49	99	148	255,046	608,965	864,011
Industrial Service	18	43	61	102,567	107,108	209,675
Industrial Warehouse	31	25	56	277,273	126,471	403,744
<b>TOTAL</b>	<b>209</b>	<b>421</b>	<b>630</b>	<b>1,465,687</b>	<b>1,923,488</b>	<b>3,389,175</b>

**Table 10: Percentage of Eligible BEES Building Records by Region and Use Category**

<b>% eligible</b>	<b>Count</b>			<b>Area (m<sup>2</sup>)</b>		
	<b>Auckland</b>	<b>Rest of NZ</b>	<b>TOTAL</b>	<b>Auckland</b>	<b>Rest of NZ</b>	<b>TOTAL</b>
Commercial Office	95%	87%	90%	96%	96%	96%
Commercial Retail	84%	78%	79%	93%	88%	90%
Commercial Mixed	88%	83%	85%	93%	75%	79%
Industrial Service	42%	32%	35%	49%	20%	28%
Industrial Warehouse	32%	23%	27%	37%	27%	33%
<b>TOTAL</b>	<b>65%</b>	<b>62%</b>	<b>63%</b>	<b>69%</b>	<b>64%</b>	<b>66%</b>



**Figure 3: Commercial Building Records by Region**



**Figure 4: Industrial Building Records by Region**

Figure 3 and Figure 4 give very similar messages to the analysis concerned with floor area strata shown in Figure 1 and Figure 2. Regardless of the region, a higher proportion of Commercial categories building records are used for BEES eligible purposes – on average in Auckland 89% by count and 94% by area are eligible, compared to 82% by count and 85% by area for the rest of New Zealand. For Industrial uses in Auckland 35% by count and 39% by area are eligible, while 28% by count and 23% by area are eligible for the rest of New Zealand.

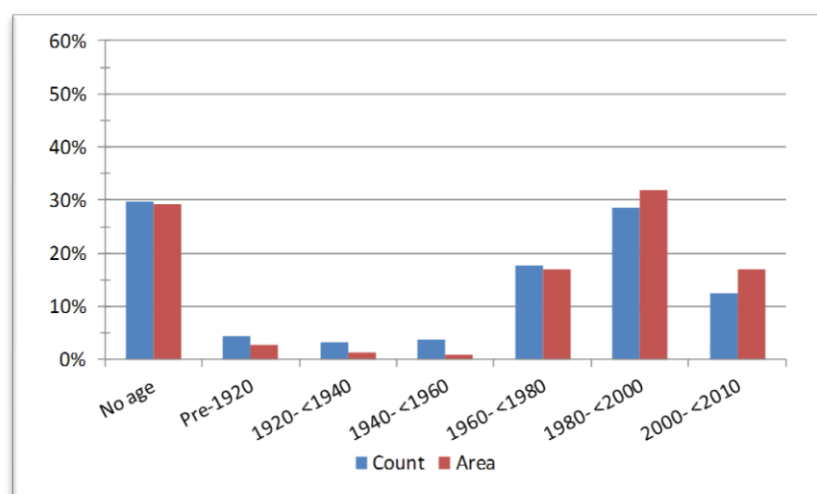
## 5. BUILDING AGE

Is there a difference in the proportion of eligible BEES building records by the nominal building age?

The valuation records each include an age category, coded as listed in Table 23 (Appendix A). It is recognised that as this age category is not widely used for valuation purposes, only limited checking is undertaken and there is no guarantee as to its accuracy. In cases where the building has been renovated, the age is given as “mixed”, while in some cases the age is simply stated as “unknown”.

For this analysis, the age category is applied to each nominal building or title, in the building record. For the purposes of this analysis the oldest age in a given building record has been used – e.g. if a building record includes valuation records giving the decade of construction as 1950, 1960 and 1970, then 1950 would be used for the analysis based on the building record. As the mixed age category may include a wide range of years of construction, for this analysis a building or a building with premises in this age coding, is treated as if the decade of construction is unknown.

Figure 5 gives the percent of eligible building records by decade of construction for count and floor area. Figure 5 shows there are a high proportion of building records that have no age available – 47% by count and 57% by floor area. Building records in the past 50 years (since 1960) are 49% by count and 36% by area.



**Figure 5: Percent of Total Eligible by Decade**

Table 11 gives the count of eligible building records by decade of construction and use category. Table 11 records 188 (92 + 96) or 30% of the building records by count had no decade of construction available. Table 11 also gives the percent of each age category that comes from Stratum 5. Table 12 compares the values in Table 11 with the total count (eligible and ineligible).

**Table 11: Count of Eligible Building Record Decade of Construction by Use Category**

Decade	Commercial			Industrial		TOTAL	% Stratum 5
	Office	Retail	Mixed	Service	Warehouse		
No age recorded	13	32	25	15	7	92	22%
Mixed ages	13	43	26	9	5	96	19%
Pre-1920	7	8	11	-	2	28	18%
1920- <1940	4	7	9	-	-	20	5%
1940- <1960	3	14	5	-	2	24	4%
1960- <1980	32	31	27	12	9	111	22%
1980- <2000	52	52	36	18	22	180	25%
2000- <2010	21	33	9	7	9	79	29%
TOTAL	145	220	148	61	56	630	22%

For example, Table 11 shows that 32 building records for Commercial Offices are recorded as being built in the two decades from 1960 to 1980 and there are a total of 111 building records in this time period. The building records in Stratum 5 (area over 9000m<sup>2</sup>) account for 22% of the total number in this period. Table 12 shows that these 32 eligible building records are 89% of the Commercial Office building records in this period, while the 111 building records in these two decades are 18% of the total building records.

**Table 12: Percentage by Count of Eligible Building Record Decade of Construction by Use Category**

Count Decade	Commercial			Industrial		TOTAL	% of Eligible
	Office	Retail	Mixed	Service	Warehouse		
No age recorded	93%	73%	76%	54%	27%	63%	15%
Mixed ages	100%	83%	84%	18%	19%	55%	15%
Pre-1920	78%	67%	92%		50%	76%	4%
1920- <1940	100%	64%	90%	0%	0%	74%	3%
1940- <1960	100%	74%	71%	0%	50%	69%	4%
1960- <1980	89%	76%	79%	33%	27%	62%	18%
1980- <2000	87%	85%	92%	40%	35%	67%	29%
2000- <2010	95%	89%	100%	50%	18%	60%	13%
TOTAL	90%	79%	85%	35%	27%	63%	100%
% of Eligible	23%	35%	23%	10%	9%	100%	

Table 13 gives the floor area of eligible building records by decade of construction and use category. Table 13 shows that 0.9 million square metres or 29% of the building records by area had no decade of construction available. Stratum 5 building records total 0.7 million square metres or 70% of the total area lacking an age of construction. Table 14 compares the floor areas in Table 13 with the total floor areas (eligible and ineligible).

**Table 13: Eligible Floor Area by Decade of Construction and Use Category**

Decade	Commercial			Industrial		TOTAL Area	% Stratum 5
	Office	Retail	Mixed	Service	Warehouse		
No age recorded	88,518	112,450	133,537	68,986	96,873	500,364	69%
Mixed ages	67,693	152,259	170,791	20,355	78,875	489,973	71%
Pre-1920	51,755	3,647	36,024	-	4322	95,748	70%
1920- <1940	27,908	4,070	14,717	-	-	46,695	47%
1940- <1960	1050	7,996	20,136	-	3870	33,052	42%
1960- <1980	283,157	33,600	145,837	65,425	44,312	572,330	70%
1980- <2000	305,256	311,296	289,791	41,226	129,114	1,076,683	68%
2000- <2010	188,656	272,436	53,178	13,683	46,377	574,330	75%
TOTAL	1,013,992	897,753	864,011	209,675	403,744	3,389,175	70%

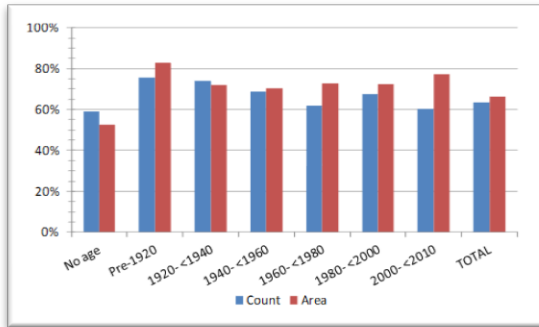
Continuing using the 1960 to 1980 period as an example, Table 13 shows 283,157m<sup>2</sup> (out of 572,330m<sup>2</sup>) of Commercial Office floor area is recorded as being built during this period. The building records in Stratum 5 (area over 9000m<sup>2</sup>) account for 70% of the total floor area in this time period.

Table 14 compares the eligible floor area with the total floor area by decade of construction and use category, showing the proportions of BEES eligible buildings for the different age and use categories. For example, the left column of Table 14 shows that 98% of the 1960 to 1980 offices are BEES eligible, while the rightmost column shows that the Commercial Office floor area is 17% of the total BEES eligible floor area.

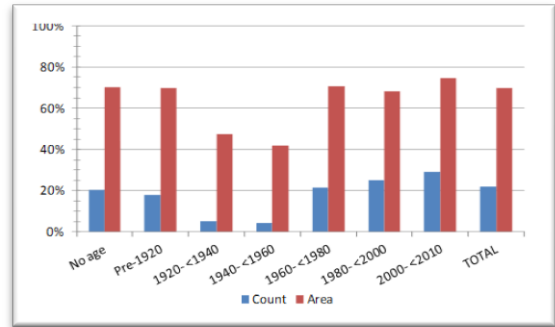
**Table 14: Percentage of Eligible Floor Area by Decade of Construction and Use Category**

Area Decade	Commercial			Industrial		TOTAL Area	% of Eligible
	Office	Retail	Mixed	Eligible	Decade		
No age recorded	96%	78%	65%	55%	47%	65%	15%
Mixed ages	100%	93%	86%	6%	24%	44%	14%
Pre-1920	78%	79%	99%		54%	83%	3%
1920- <1940	100%	44%	62%	0%	0%	72%	1%
1940- <1960	100%	87%	96%	0%	27%	70%	1%
1960- <1980	98%	69%	70%	65%	32%	73%	17%
1980- <2000	95%	93%	84%	29%	38%	73%	32%
2000- <2010	100%	96%	100%	57%	24%	77%	17%
TOTAL	96%	90%	79%	28%	33%	66%	100%
% of Eligible	30%	26%	25%	6%	12%	100%	

Figure 6 plots the percentage eligible for Strata 1-5 and Figure 7 the percent eligible for Stratum 5 – the same data as given in Table 11 and Table 13. Although Figure 6 shows a close link between the proportion of eligible count and floor area, Figure 7 illustrates the effect of the large floor areas in Stratum 5 when a relatively small number of eligible buildings have a disproportionate impact on the eligible floor area.



**Figure 6: Strata 1-5 % Eligible by Decade**

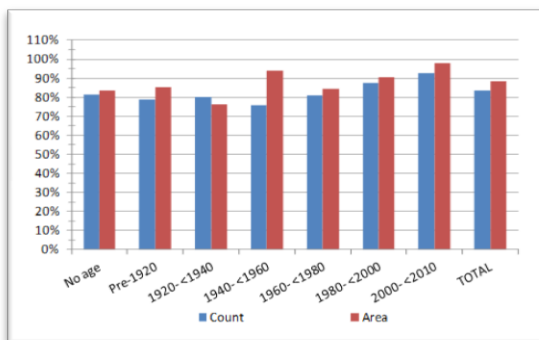


**Figure 7: Stratum 5 % Eligible by Decade**

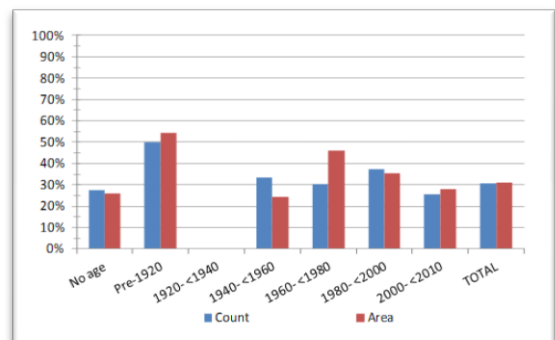
Table 15 along with Figure 8 for Commercial and Figure 9 for the Industrial building records, give the eligible proportions by decade of construction.

**Table 15: Amalgamated Use Categories by Decade of Construction**

Decades	Commercial		Industrial	
	Count	Area	Count	Area
No age available	81%	83%	27%	26%
Pre-1920	79%	85%	50%	54%
1920- <1940	80%	76%	0%	0%
1940- <1960	76%	94%	33%	24%
1960- <1980	81%	85%	30%	46%
1980- <2000	88%	90%	37%	35%
2000- <2010	93%	98%	25%	28%
TOTAL	84%	88%	31%	31%



**Figure 8: Commercial by Decade of Construction**



**Figure 9: Industrial by Decade of Construction**

## 6. NZBC REQUIREMENTS

The NZBC differentiates between Commercial and Industrial building stock categories as described in Table 16. These definitions are given in Clause A1, Schedule 1, of the N.Z. Building Code (Building Regulations 1992) which although titled ‘Classified Uses’ is defined as being classified according to type (schedule 1 Clauses 1.01).

**Table 16: Building Code Classified Uses – Non-residential**

<p><b>5.0 COMMERCIAL</b></p> <p><b>5.0.1</b> Applies to a building or use in which any natural resources, goods, services or money are either developed, sold, exchanged or stored. Examples: an amusement park, auction room, bank, car-park, catering facility, coffee bar, computer centre, fire station, funeral parlour, hairdresser, library, office (commercial or government), police station, post office, public laundry, radio station, restaurant, service station, shop, showroom, storage facility, television station or transport terminal.</p>
<p><b>6.0 INDUSTRIAL</b></p> <p><b>6.0.1</b> Applies to a building or use where people use material and physical effort to: (a) extract or convert natural resources, (b) produce goods or energy from natural or converted resources, (c) repair goods, or (d) store goods (ensuing from the industrial process). Examples: an agricultural building, agricultural processing facility, aircraft hanger, factory, power station, sewage treatment works, warehouse or utility.</p>

*Source: New Zealand Building Code Handbook (3<sup>rd</sup> Edition)*

Table 17 provides the current version (April 2011) of **NZBC Clause H1 – Energy Efficiency**. It can be seen that industrial buildings are treated differently from commercial buildings through the “limits on application” in Clauses H1.2(a), H1.2(c) and H1.3.6. The hierarchical nature of the NZBC means that limitations in H1.2(a) and (c) carry on through to the Verification Method or Acceptable Solutions<sup>3</sup>.

Schedule 2 of the “Building (Specified Systems, Change the Use, and Earthquakeprone Buildings) Regulations 2005 (SR 2005/32) now provides descriptions to be used in order to identify changes of use (as opposed to ‘type’). These uses are summarised in Table 18.

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<sup>3</sup> BEES is primarily concerned with resource efficiency in buildings and therefore H1 is the standard of most interest. However, it should be noted that when there is a change of use the building needs to comply with provisions in the Building Code relating to: means of escape from fire, protection of other property, sanitary facilities, structural performance, fire-rating performance and access and facilities for people with disabilities. It must also comply with the other provisions in the building Code (including H1) to at least the same extent as before the change of use.

**Table 17: Clause H1 – Energy Efficiency Provisions<sup>4</sup>**

Provisions ( <i>italic text are defined in the Building Act or NZBC</i> )	Limits on application
<b>Objective</b>	
<b>H1.1</b> The objective of this provision is to facilitate efficient use of energy.	Objective H1.1 applies only when the energy is sourced from a <i>network utility operator</i> or a depletable energy resource.
<b>Functional requirement</b>	
<b>H1.2</b> <i>Buildings</i> must be <i>constructed</i> to achieve an <i>adequate</i> degree of energy efficiency when that energy is used for— (a) modifying temperature, modifying humidity, providing ventilation, or doing all or any of those things; or (b) providing hot water to and from <i>sanitary fixtures</i> or <i>sanitary appliances</i> , or both; or (c) providing artificial lighting.	Requirement H1.2(a) does not apply to <i>assembly service buildings, industrial buildings, outbuildings, or ancillary buildings</i> . Requirement H1.2(c) applies only to <i>commercial buildings</i> and <i>communal non-residential buildings</i> whose floor area is greater than 300 m <sup>2</sup> .
<b>Performance</b>	
<b>H1.3.1</b> The <i>building</i> envelope enclosing spaces where the temperature or humidity (or both) are modified must be constructed to— (a) provide <i>adequate thermal resistance</i> ; and (b) limit uncontrollable airflow.	
<b>H1.3.2E</b> <i>Buildings</i> must be constructed to ensure that their <i>building performance index</i> does not exceed 1.55.	Performance H1.3.2E applies only to <i>housing</i> .
<b>H1.3.3</b> Account must be taken of physical conditions likely to affect energy performance of <i>buildings</i> , including— (a) the thermal mass of <i>building elements</i> ; and (b) the building orientation and shape; and (c) the airtightness of the building envelope; and (d) the heat gains from services, processes and occupants; and (e) the local climate; and (f) heat gains from solar radiation.	
<b>H1.3.4</b> Systems for the heating, storage, or distribution of hot water to and from <i>sanitary fixtures</i> or <i>sanitary appliances</i> must, having regard to the energy source used,— (a) limit the energy lost in the heating process; and (b) be constructed to limit heat losses from storage vessels and from distribution systems; and (c) be constructed to facilitate the efficient use of hot water.	Performance H1.3.4(b) does not apply to individual storage vessels that are greater than 700 litres in capacity. Performance H1.3.4(c) applies only to <i>housing</i> .
<b>H1.3.5</b> Artificial lighting fixtures must— (a) be located and sized to limit energy use, consistent with the <i>intended use</i> of space; and (b) be fitted with a means to enable light intensities to be reduced, consistent with reduced activity in the space.	Performance H1.3.5 does not apply to lighting provided solely to meet the requirements of Clause F6.
<b>H1.3.6</b> <i>HVAC systems</i> must be located, constructed, and installed to— (a) limit energy use, consistent with the <i>intended use</i> of space; and (b) enable them to be maintained to ensure their use of energy remains limited, consistent with the <i>intended use</i> of space.	Performance H1.3.6 applies only to <i>commercial buildings</i> .

<sup>4</sup> Source: [www.legislation.govt.nz/regulation/public/1992/0150/latest/DLM162576.html](http://www.legislation.govt.nz/regulation/public/1992/0150/latest/DLM162576.html). Accessed 18 Apr 11



**Table 18: Uses of all or parts of Buildings**

<i>Use</i>	<i>Spaces or dwellings</i>	<i>Examples</i>
<b>Uses related to crowd activities</b>		
CS	Crowd Small	enclosed spaces (without kitchens or cooking facilities) where 100 or fewer people gather for participating in activities
CL	Crowd Large	enclosed spaces (with or without kitchens or cooking facilities) where more than 100 people gather for participating in activities, but also enclosed spaces with kitchens or cooking facilities and where 100 or fewer people gather for participating in activities
CO	Crowd Open	spaces (other than those below a grandstand) for viewing open air activities
CM	Crowd Medium	spaces for displaying or selling retail goods, wares, or merchandise
<b>Uses related to sleeping activities</b>		
SC	Sleeping Care	spaces in which people are provided with special care or treatment required because of age, or mental or physical limitations
SD	Sleeping Detention	spaces in which people are detained or physically restrained
SA	Sleeping Accommodation	spaces providing transient accommodation, or where limited assistance or care is provided for people
SR	Sleeping Residential	attached and multiunit residential dwellings, including household units attached to spaces or dwellings with the same or other uses, such as caretakers' flats, and residential accommodation above a shop
SH	Sleeping Single Home	detached dwellings where people live as a single household or family, including attached selfcontained spaces such as granny flats when occupied by a member of the same family, and garages (whether detached or part of the same building) if primarily for storage of the occupants' vehicles, tools, and garden implements
<b>Uses related to working, business, or storage activities</b>		
WL	Working Low	spaces used for working, business, or storage—low fire load
WM	Working Medium	spaces used for working, business, or storage—medium fire load and slow, medium, or fast fire growth rates
WH	Working High	spaces used for working, business, or storage—high fire load and slow, medium, or fast fire growth rates
WF	Working Fast	spaces used for working, business, or storage— medium or high fire load and ultra fast fire growth rates
<b>Uses related to intermittent activities</b>		
IA	Intermittent Low	spaces for intermittent occupation or providing intermittently used support functions— low fire load
ID	Intermittent Medium	spaces for intermittent occupation or providing intermittently used support functions— medium fire load

Source: Schedule 2, Building (Specified Systems, Change the Use, and Earthquakeprone Buildings) Regulations 2005

The analysis presented in this paper does not explore the changes in use as set out in the Building (Specified Systems, Change the Use, and Earthquakeprone Buildings) Regulations 2005.

## 7. DISCUSSION

Should we worry about change of use for buildings originally classified as Industrial Warehouse or Industrial Service? If we do, what is the best way to deal with the change in use – should universal standards apply to all non-residential buildings as they are built? Should there be a requirement that with change of use, different standards should be applied or should guidelines be provided as to the best way(s) to transform a building from an industrial to a commercial use which results in adequate levels of energy efficiency?

Transforming buildings from the original design-use to another, currently more desirable, use has considerable value as a resource efficiency strategy, particularly in relation to materials and land costs. However, it does raise issues about the extent to which building use transformations risk creating inefficient building performance – particularly in relation to energy consumption, although there may well be other NZBC implications.

What are the potential energy (or other) impacts in transforming a building designed for industrial service or warehouse use into a building used for retail or commercial activities?

The development of bulk retail outlets, combined with a tendency for those outlets to be situated in buildings that were previously warehouses or in warehouse style buildings, has driven the perception that the transformation of large warehouses to retail/commercial use is widespread. This analysis has shown that these conversions appear to take place at a similar rate regardless of building size, although a small number of very large area IW or IS buildings may represent many times more floor area than a larger number of small area buildings.

This raises two questions for consideration:

1. What are the NZBC implications of about one-third of Industrial Warehouse and Service buildings changing their use (including energy efficiency and other NZBC requirements)?
2. Are these implications of such importance that they require either changes to the NZBC (i.e. of concern to the Department of Building and Housing) or the preparation of guidance documents (i.e. of concern to other Government agencies including EECA)?

This analysis does not attempt to address these questions – they require greater analysis than would be appropriate for the BEES project. The BEES research when complete will support further analysis that could consider this wider policy perspective.

## 8. CONCLUSIONS

What can BEES tell us about the use of IS and IW Buildings in New Zealand?

If it is assumed that each building record was allocated a use category based on the initial valuation and that this will have been updated as a result of a building consent, subdivision, sale or other inspection at some later date, then any change in use has happened after that point. It needs to also be assumed these rules are consistently applied or, if there are in errors in application, that these occur randomly for the size strata and regions. Although, it could be argued that small differences are not significant as the differences identified by this analysis are large.

The analysis has shown the proportion of IS and IW buildings that are eligible for BEES are approximately the same regardless of the floor area strata – there would appear to be no difference in the rate of change-of-use related to the building record floor area, and that about 30% of Industrial Warehouse or Service buildings have changed to retail or office use.

There also seems to be no regional difference between Auckland and the rest of New Zealand.

This analysis has shown that on average, about 30% of Industrial Service and Industrial Warehouse building records, both by count and floor area, are being used in a way that would require the NZBC Clause H1 to be applied differently – i.e. instead of Industrial they would be classified as Commercial uses. This analysis is based not on new buildings, but on existing buildings – it is not suggested that the NZBC Clause H1 requirements should be applied retrospectively, but rather the flexibility seen in changing building use should be considered. These changes apply across the Industrial Warehouse and Service buildings regardless of their floor area.

The implications of this change-of-use for energy performance require further investigation. For example, what would be the energy consequences if a warehouse (IW) was changed to retail (CR) use without any of the energy efficiency activities that would have been required were the building designed and constructed for this specific use? What would be the cost and consequences of retrofitting these requirements?

The analysis also helps us to work towards a better estimate of the total number and floor area of offices and shops in New Zealand. It has been shown that number of IW and IS valuation category buildings that are actually used for office or retail purposes is relatively small – just under one-fifth (19%) of the building records count or floor area, and this proportion does not change significantly with building record size or region.

Table 19 was taken from the BEES Year 3 Report (Isaacs et al, 2010)

**Table 19: Non-residential size strata (BEES Yr 3 report)**

<b>Floor Area Strata</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Total</b>
Minimum Floor Area	5 m <sup>2</sup>	650 m <sup>2</sup>	1500m <sup>2</sup>	3500m <sup>2</sup>	9000m <sup>2</sup>	
Approx. No. of 'Buildings'	33,781	10,081	4288	1825	564	<b>50,539</b>
% of Buildings	67%	20%	8%	4%	1%	<b>100%</b>
Total Floor Area (million m <sup>2</sup> )	9.9	9.6	9.5	9.6	9.8	<b>48.3</b>
% floor	20%	20%	20%	20%	20%	<b>100%</b>

If the adjustments for the proportion of eligible buildings by use and floor area strata (Table 3 and Table 7) are applied, the revised values are given in Table 20. Additional details by use categories are provided in Table 21 for count and Table 22 for floor area.

Table 20 suggests there are approximately 33,000 non-residential (retail and office use) buildings in New Zealand, with a total floor area of about 31,000 million square metres. In the largest floor area strata (over 9000m<sup>2</sup>), there are approximately 400 building records.

**Table 20: Adjusted Non-residential size strata**

<b>Floor Area Strata</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>Total</b>
<i>Floor Area</i>	<i>0-649m<sup>2</sup></i>	<i>650-1499m<sup>2</sup></i>	<i>1500-3499m<sup>2</sup></i>	<i>3500-8999m<sup>2</sup></i>	<i>9000m<sup>2</sup> and over</i>	
Approx. No. of 'Buildings'	22,915	5963	2617	1072	398	32,965
% of Buildings	70%	18%	8%	4%	1%	<b>100%</b>
Total Floor Area (million m <sup>2</sup> )	6.9	5.8	5.8	5.7	7.0	31.0
% floor	22%	19%	19%	18%	22%	<b>100%</b>
Average floor area (m <sup>2</sup> )	300	967	2200	5270	17,530	<b>940</b>

Note: rows may not add due to rounding errors

It is worth noting that in New Zealand there are approximately 1.4 million residential buildings with total floor area of 222 million square metres, giving an average floor area of 159m<sup>2</sup> (including any internal garage). Table 20 shows the approximately 33,000 non-residential buildings have a total floor area of 31 million square metres, giving an average of 940m<sup>2</sup> – or nearly six times more floor area per building.

**Table 21: Building Records by size stratum and use category – count**

<b>Use Group</b>	<b>Size Strata (Count)</b>					<b>Total</b>	<b>%</b>
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>		
Office Total	3709	997	547	314	131	5698	17%
Retail Total	12,806	2365	716	224	113	16,224	49%
Mixed Total	3446	1318	646	338	98	5846	18%
IS Total	2444	839	328	84	14	3709	11%
IW Total	510	444	379	113	42	1488	5%
Grand Total	22,915	5963	2616	1073	398	32,965	100%
%	70%	18%	8%	3%	1%	100%	

**Table 22: Building Records by size stratum and use category – floor area**

Use Group	Size Strata ('000m <sup>2</sup> )					Total	%
	1	2	3	4	5		
Office Total	1053	987	1222	1682	1978	6,922	22%
Retail Total	3687	2217	1572	1142	2085	10,703	34%
Mixed Total	1115	1285	1436	1817	1864	7517	24%
IS Total	751	812	657	415	259	2894	9%
IW Total	256	463	876	603	790	2988	10%
Grand Total	6862	5764	5763	5659	6976	31,024	100%
%	22%	19%	19%	18%	22%	100%	

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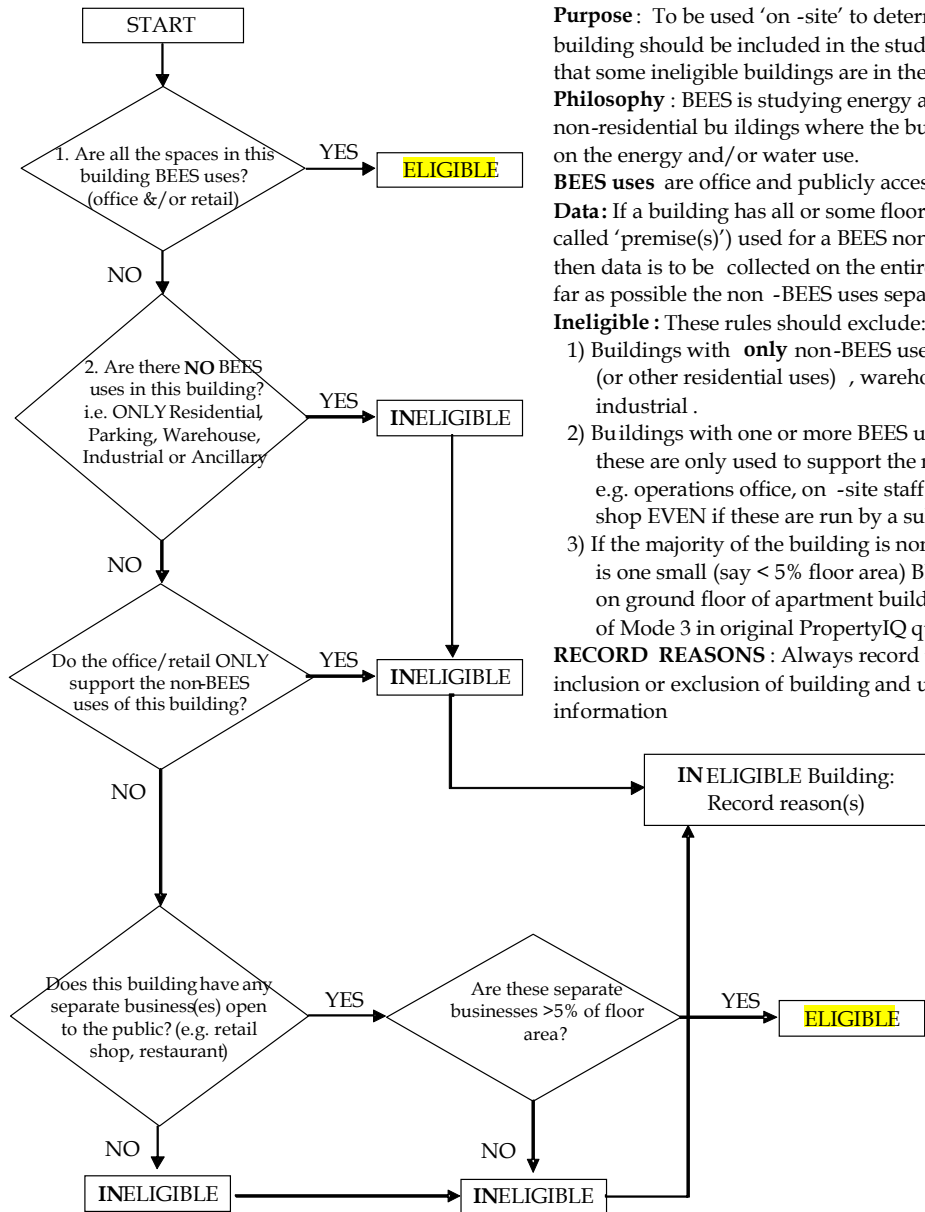
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# APPENDIX

## BEES Building Eligibility Rules – V6a, 14 Sep 09



**Purpose:** To be used 'on -site' to determine if the building should be included in the study, as it is possible that some ineligible buildings are in the sample

**Philosophy:** BEES is studying energy and water use in non-residential buildings where the building can impact on the energy and/or water use.

**BEES uses** are office and publicly accessible retail.

**Data:** If a building has all or some floor area (possibly called 'premise(s)') used for a BEES non -residential use then data is to be collected on the entire building, with as far as possible the non -BEES uses separated out.

**Ineligible:** These rules should exclude:

- 1) Buildings with **only** non-BEES uses e.g. apartments (or other residential uses) , warehouses , car parks or industrial .
- 2) Buildings with one or more BEES uses BUT where these are only used to support the non -BEES uses e.g. operations office, on -site staff restaurant or staff shop EVEN if these are run by a sub -contractor
- 3) If the majority of the building is non -BEES but there is one small (say < 5% floor area) BEES use e.g. shop on ground floor of apartment building (i.e. exclusion of Mode 3 in original PropertyIQ query)

**RECORD REASONS:** Always record the reason(s) for inclusion or exclusion of building and update web search information

Figure 10: Flowchart for determining eligibility of BEES buildings (from Isaacs etc al, 2009)

**Table 23: Valuation “Age” Coding**

**Age**

This entry records a coded indication (see below) of the decade within which the Principal Structure was built.

<b>Code</b>	<b>Erected</b>	<b>Code</b>	<b>Erected</b>
AAA	Prior to 1880	188	1880 - 1889
189	1890 – 1899	PRE	Pre 1920-actual decade unknown
190	1900 – 1909	191	1910 - 1919
192	1920 – 1929	193	1930 - 1939
194	1940 – 1949	195	1950 - 1959
196	1960 – 1969	197	1970 - 1979
198	1980 – 1989	199	1990 - 1999
200	2000 - 2009 etc	XXX	Principal Structure of various ages

A code is entered only when there is a single Principal Structure -otherwise the panel is left blank. The determination of what constitutes the Principal Structure is a matter of judgement by the valuer, depending on the particular circumstances of each property.

In some cases there is more than One Principal Structure, e.g.:

- Where an industrial property has several buildings of say 2500 m<sup>2</sup>, 1500 m<sup>2</sup>, 150 m<sup>2</sup> and 100 m<sup>2</sup>, the Principal Structure may be the 2500 m<sup>2</sup> AND the 1500 m<sup>2</sup> Buildings
- On a farm there are likely to be Principal Structures other than the house.

In a residential property with a separate garage and tool shed, the residence is the only Principal Structure.

Code PRE is used if the actual decade is not known but it is prior to 1920.

Code XXX is used when the Principal Structure consists of several portions erected in different decades or it has been substantially remodelled so that the original erection date no longer describes the structural quality.

(Source: LINZ 2002b - p47 – Appendix C LAND USE DATA.)