



JUNE 2006

HEATING, VENTILATION, AIR CONDITIONING & REFRIGERATION MECHANIC: OCCUPATIONAL SKILL SHORTAGE ASSESSMENT

Current Situation: Genuine skill shortage

Short-term Outlook: Genuine skill shortage

1 Executive Summary

1.1 Results from the 2005 Survey of Employers who have Recently Advertised suggest employers have had considerable difficulty in filling heating, ventilation, air conditioning and refrigeration mechanic positions in New Zealand. Only 48% of positions were filled within ten weeks of advertising and there was an average of only 7 suitable applicants for every 10 mechanic vacancies. This report considers these survey results in the context of trends in the demand for and supply of heating, ventilation, air conditioning and refrigeration mechanics.

Table 1: Employer Survey Indicators, 2005

	Fill Rate	Average Number of Suitable Applicants
Heating, Ventilation, Refrigeration & Air Conditioning Mechanics	48%	0.7
All Trades Surveyed	37%	1.0

Source: Survey of Employers who have Recently Advertised, Department of Labour.

- 1.2 Demand for heating, ventilation, air conditioning and refrigeration mechanics has grown strongly over the past few years on the back of a booming construction industry, and associated increased demand for the installation of air conditioning/heating units and systems. Also contributing to demand growth has been the uptake of new technologies, such as heat pumps, with increased focus by government and businesses on energy efficiency and environmental sustainability. Growth in demand is likely to continue in the short term on the back of sustained activity in the construction sector, and growing demand for air conditioning/heating units and systems in both new and existing buildings.
- 1.3 The supply of newly qualified heating, ventilation, air conditioning and refrigeration mechanics remained stable at an average of 33 per annum between 2001 and 2003, before increasing to 59 in 2004 and 62 in 2005. The number of newly qualified mechanics is likely to increase further in the next few years –

given growth in the number of new enrolments. It was not clear what impact migration was having on the supply pool of mechanics.

- 1.4 Due to the on-going disparity between the levels of supply and demand, the Department has assessed the heating, ventilation, air conditioning and refrigeration mechanic occupation as experiencing a **genuine skill shortage**.
- 1.5 Given that strong growth in demand for heating, ventilation, air conditioning and refrigeration mechanics is likely to continue in the short-term, the increased number of newly qualified mechanics is unlikely to be sufficient to eliminate the current shortfall of mechanics. The Department therefore foresees shortages in the number of mechanics, at best, easing only slightly in the short-term.

2 Introduction

- 2.1 The purpose of this report is to investigate skill shortages for heating, ventilation, air conditioning and refrigeration mechanics (HVACR mechanics) in New Zealand.
- 2.2 The following section presents key findings from the Department of Labour's (the Department's) *Survey of Employers who have Recently Advertised* (SERA). This survey provides an indication of employer's success in filling advertised vacancies for HVACR mechanics as well as other information on their recruiting experiences. The next two sections investigate trends in the demand for, and supply of, HVACR mechanics. The penultimate section presents some of the issues that arise from the matching of demand and supply in the labour market, such as wage rates. Finally, the 'Assessment' section considers all the information presented in the report and provides a view on whether the occupation is in shortage, and if so, the type of shortage being experienced. A short-term outlook for the shortage situation is also offered.



- 2.3 Further background to this occupational report, including a discussion of the methodology; a glossary of terms; and an overview of the Department's *Survey of Employers who have Recently Advertised*, including the survey questionnaire, can be found in the 'Background and technical note' at <http://www.dol.govt.nz/publications/jvm/trades/2005/background.asp>.

2.4 **Heating, Ventilation, Air Conditioning and Refrigeration Mechanics in New Zealand**

- 2.4.1 Heating and air-conditioning systems control the temperature, humidity and air quality in residential, commercial, industrial and other buildings. Refrigeration systems make it possible to store and transport food and other perishable items. Heating, Ventilation and Refrigeration Mechanics (code 72314 in the New Zealand Standard Classification of Occupations) install, maintain and repair such systems. This NZSCO occupation includes air conditioning mechanics¹. Some HVACR mechanics are registered electricians, given their need to install and repair electrical wiring.
- 2.4.2 The Department estimates that there were approximately 850 HVACR mechanics employed in New Zealand in 2005. Census 2001 figures indicate that almost the entire HVACR mechanic workforce is male (97%) and is employed full time (97%).

2.5 **Note on Occupational Classification**

- 2.5.1 Household Labour Force Survey and External Migration data from Statistics New Zealand are only available at the 3-digit occupational level, with HVACR mechanics falling in the 3-digit category *machinery mechanics and fitters*. As HVACR mechanics comprise only a very small proportion of this broader group (3% in the 2001 Census), trends in employment and migration cannot be assessed through these sources.

3 **Survey of Employers who have Recently Advertised**

- 3.1 This section presents the key SERA findings of employers' experiences in recruiting HVACR mechanics.
- 3.2 The SERA allows the Department to gain insights into skill shortages by investigating how difficult it is for employers to fill vacancies. A 'fill rate' is calculated for each occupation – this being the proportion of vacancies included in the SERA sample which were filled with an adequately qualified and experienced person within ten weeks of advertising. Occupations with fill rates lower than 80% are typically regarded as being in shortage, while fill rates lower than 40% usually indicate that the occupation is in acute shortage.
- 3.3 Results from the 2005 SERA show that only 48% of HVACR mechanic vacancies included in the survey were filled within ten weeks of being advertised, up from 37% in 2003. The fill rate for HVACR mechanics was greater than the fill rate for all surveyed trade occupations (37%). There was an average of only 0.7 suitable applicants for each HVACR mechanic vacancy compared with an average of 1.0 for all trade occupations surveyed.

¹ HVACR Engineers (NZSCO code 21451) who study, design and advise on HVACR systems and equipment are not included within the scope of this assessment report.

Table 2: SERA Results for HVACR Mechanics and All Trades Surveyed, August 2005

	Number of Employers	Number of Vacancies	Fill Rate¹	Average Number of Suitable Applicants per Vacancy¹
HVACR Mechanics	15	21	48%	0.7
All Trades Surveyed	885	1480	37%	1.0

Source: Survey of Employers who have Recently Advertised, Department of Labour.

1 The 'All Trades Surveyed' fill rate and average number of suitable applicants per vacancy figures were both weighted to compensate for any under or over sampling of individual trade worker occupations in the 2005 survey.

4 **Demand for Heating, Ventilation, Air Conditioning and Refrigeration Mechanics**

4.1 This section investigates trends in the demand for HVACR mechanics and the factors underlying these trends. Demand is measured by the number of HVACR mechanics required by employers at current wage rates.

4.2 **Historical Demand**

4.2.1 According to the Census, between 1991 and 2001 the number of employed HVACR mechanics grew by an annual average of 4.4% (see Table 3). This is a greater level of annual growth than that seen for all trades (-0.2%) and all occupations (2.1%). There was a falloff of -3.9% per annum in numbers of HVACR mechanics over the period 1996 to 2001, which could be due to a weaker economy over much of this time. Business demography data collected annually by Statistics New Zealand show very strong growth of 18% per annum since 2001 in the number of people employed in the Air Conditioning and Heating Services Industry². Two out of every five (41%) HVACR mechanics were employed in this industry according to the 2001 Census³.

Table 3: Employment of HVACR Mechanics, 1991-2001

	Annual Average Growth in Employment		
	1991-1996	1996-2001	1991-2001
All HVACR Mechanics	13.5%	-3.9%	4.4%
All Trades	0.0%	-0.4%	-0.2%
All Occupations	3.1%	1.2%	2.1%

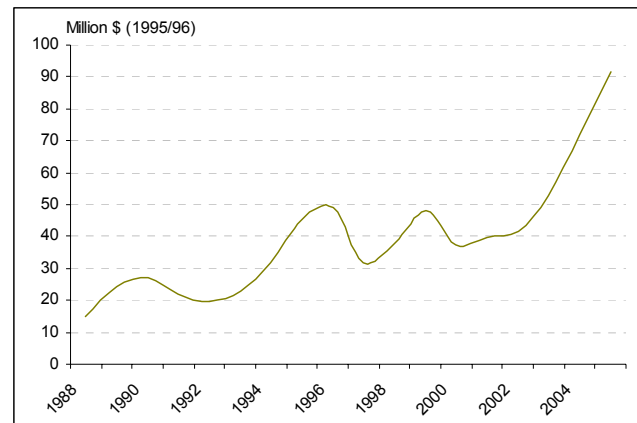
Source: Census of Population and Dwellings, Statistics New Zealand.

² HVACR Engineers and HVACR Mechanics are the two occupations that account for the largest proportion of people employed in the air conditioning and heating services industry (19% and 11% respectively in the 2001 Census). All other individual occupations account for less than 5% of the people employed in this industry.

³ No other industry (at the 5-digit level) employed at least 10% of the HVACR mechanic workforce.

4.2.2 Contributing to the growth in demand for HVACR mechanics has been strong growth in demand for the installation of heating and air conditioning units and systems in both new and existing apartments, other households, commercial, and industrial buildings. The value of imported air conditioning-related machinery increased from an average of \$23M per annum between 1989 and 1993 to an average of \$40M per annum between 1994 and 2002 (see Figure 1). Since then, there has been considerable further growth, with imports reaching \$92M in 2005⁴. This trend coincided with strong growth in both 2004 and 2005 in the value of non-residential building consents, and with very strong growth in residential building consents – although growth slowed in 2005 (see Appendix 1 for the Department’s construction industry demand overview).

Figure 1: Value of Imported Air Conditioning Machinery (1995/96 prices)



Source: INFOS, Statistics New Zealand.

4.3 **Future Demand**

4.3.1 While the residential building sector slowdown is likely to continue, large decreases in the prices of air conditioning units over recent years has made them more affordable to be installed in both new and existing residences. It is expected that non-residential building activity will remain strong in the short-term, with associated increases in demand for heating and air conditioning systems.

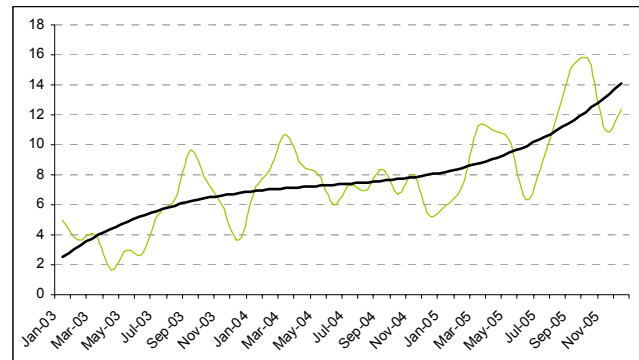
4.3.2 Technological changes/improvements are continuing to occur in the HVACR industry. Alongside this, improving energy efficiency will continue to be of key focus for government, businesses and homeowners. Environmental sustainability is also a key focus for government, with, for example, standards/protocols being implemented to replace ozone-depleting coolants (for example, R22/CFC) with more environmentally-friendly coolants. Also, the implementation of regional clean air policies is likely to see many residents continue to move away from traditional wood-fires to heat pumps. Demand for HVACR mechanics is likely to grow as a result of these focuses and the uptake by businesses of new HVACR technologies.

⁴ Overseas trade data on imports of air conditioning machines (excluding those used in motor vehicles) were sourced from the Statistics New Zealand INFOS system. The data were adjusted to take account of changes in inflation and exchange rates, by standardising to 1995/1996 prices.

4.4 **Changes in Market Conditions**⁵

- 4.4.1 The Department's Job Vacancy Monitor shows that the number of advertised vacancies for HVACR mechanics has generally shown a slowly increasing trend since January 2003. This suggests that recruitment conditions for employers have worsened as the market has become tighter.

Figure 2: Number of Advertised Vacancies for HVACR Mechanics



Source: Job Vacancy Monitor, Department of Labour.

5 **Supply of Heating, Ventilation, Air Conditioning and Refrigeration Mechanics**

- 5.1 This section investigates the various sources contributing to the supply of HVACR mechanics. Supply is measured by the number of people willing and able to work as HVACR mechanics at current wage rates.

5.2 **Training - National Certificate (Level 4) Qualifications and Equivalent**

- 5.2.1 This section investigates the growth in supply of *fully qualified* HVACR mechanics through training. This includes the awards of the National Certificate in Refrigeration & Air Conditioning Level 4, and the National Certificate in Heating, Ventilation & Air Conditioning (Mechanical Services) Level 4. These are the nationally recognised qualifications for HVACR mechanics which are designed by Competenz to meet the needs of employers of such mechanics. There are no other institutions that offer level 4 national certificate qualifications for this occupation.

- 5.2.2 New enrolments for this qualification have increased from 117 in 2001 to 192 in 2005, while total enrolments have grown from 327 to 474 over the same period. Due to the lag between enrolments and achievements, this upturn has only recently begun to yield an increase in the number of National Certificate Level 4 qualifications achieved. There were about 60 achievements in both 2004 and 2005, compared to only half this number, on average, in earlier years.

⁵ Analysis of the Job Vacancy Monitor suggests that it is an indicator of change in labour market tightness, or change in the degree of difficulty of recruiting staff. An increase in vacancies typically indicates increasing difficulty in recruiting staff and vice versa. While changes in demand usually dictate changes in labour market tightness, it can also be affected by changes in supply conditions, such as a rise in net migration.

Table 4: Number of Trainees Enrolled for and Achieving the Level 4 National Certificates Relating to Heating, Ventilation, Air Conditioning and Refrigeration (Competenz)

	Total Enrolled	New Enrolments	Achievements
2001	327	117	34
2002	379	130	31
2003	404	138	33
2004	421	137	59
2005	474	192	62

Source: Competenz.

5.2.3 The training rate for HVACR mechanics is given in Table 5. This indicator provides an approximate measure of the rate at which the supply of fully qualified HVACR mechanics can potentially grow through training. The training rate is calculated by expressing the number of trainees achieving the relevant qualification as a percentage of total employment in that occupation. The training rate for HVACR mechanics has been greater in the last two years than in earlier years. The training rate for HVACR mechanics in 2005 (7.4%) was considerably higher than that for all trades surveyed (3.3%). By way of comparison, the average training rate for HVACR mechanics in New South Wales, Australia⁶ in the three years to June 2005 was 4.0% - lower than the training rate in New Zealand over the last three years.

Table 5: Training Rate for HVACR Mechanics, 2001-2005

	HVACR mechanics	All Trades⁷
2001	5.6%	2.0%
2002	4.6%	2.2%
2003	4.5%	2.2%
2004	7.3%	2.7%
2005	7.4%	3.3%

Source: Department of Labour.

5.3 **Migration**

5.3.1 Employers were asked in the SERA Intensive if they thought HVACR mechanics were coming in to the country. Of the seven who answered this question, six believed that it was. Some employers noted some concerns regarding the limited HVACR experience and language skills of some immigrants.

5.3.2 Employers were also asked if they thought HVACR mechanics were going overseas. Of the seven employers who answered this question, all believed that it was. Key reasons for leaving the country were for additional money or to undertake an OE.

⁶ Australian national level estimates of training rates are not available.

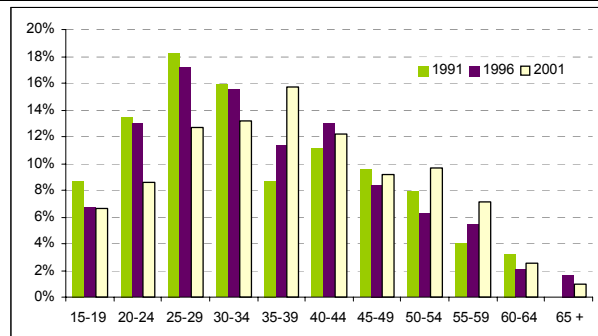
⁷ The training rates for 'all trades' were calculated for the 14 trade occupations that were examined in-depth using data from the SERA Intensive 2005. As the composition of occupations being examined changes from year-to-year, so will the training rates.

5.4 Retirements

5.4.1 Based on 2001 Census data, it is estimated that approximately 0.7% of the HVACR mechanic workforce retires each year (assuming a retirement age of 65). This equates to a loss of about six HVACR mechanics per annum. This is a low average retirement rate compared to that for all trade occupations (1.3%) and for all occupations (1.5%). Census

data shows an ageing of HVACR mechanics occurred between 1991 and 2001 (see Figure 3). The percentage of HVACR mechanics under 35 years of age decreased from 56% in 1991 to 41% in 2001, while the proportion in all age groups over 40 increased. By 2001, 42% of all HVACR mechanics were 40 years of age or older and the average age was 37, up from 35 in 1991. As the HVACR mechanic workforce ages, the number retiring each year will increase.

Figure 3: Age Profile of HVACR Mechanics, 1991-2001



Source: Census of Population and Dwellings, Statistics New Zealand.

5.5 Occupational Detachment⁸

5.5.1 Employers were asked if they thought HVACR mechanics left the occupation to go and do something different more or less than in other occupations. Of the eight employers who answered this question, six thought they left at about the same rate as in other occupations, while one thought they left at a higher rate, and one thought they left at a lower rate.

5.5.2 This tends to indicate that occupational detachment may not have a large impact on supply for this particular occupation, although one employer said that the physically demanding nature of the job can impact on decisions to stay in the occupation as HVACR mechanics get older.

6 Matching of Supply and Demand

6.1 This section considers some of the issues that arise from the labour market matching of the supply of HVACR mechanics with the demand for HVACR mechanics.

6.2 Salaries

6.2.1 HVACR mechanic wages are relatively high compared with other trades. The Labour Cost Index (LCI) measured an average hourly wage of \$23.42 for HVACR mechanics in June 2005 compared with an average wage for all trade workers of \$19.81 (see Table 6). According to the LCI, wages of HVACR mechanics have increased by 6.2% in the twelve months to June 2005, compared with 4.8% in all

⁸ 'Occupational detachment' refers to individuals who choose not to continue practising in their occupation but retain a connection to the occupation (e.g. move into a management or supervisory role, or retain professional registration), or who leave the occupation entirely (e.g. by changing occupation or withdrawing from the labour market).

trades. Many employers mentioned in the 2005 SERA that wage growth for HVACR mechanics was strong.

Table 6: Average Hourly Wage Rates for HVACR Mechanics⁹

	June 2004	June 2005
HVACR Mechanics	\$22.05	\$23.42
All Trades	\$18.90	\$19.81

Source: Labour Cost Index, Statistics New Zealand.

7 Assessment

7.1 This section considers all the information presented in this report on employers' recruiting experiences, supply and demand trends, and matching issues, and offers a view on whether there is a shortage of HVACR mechanics and the type of shortage. A short-term outlook for the shortage situation is also offered.

7.2 Demand for HVACR mechanics has grown strongly over the past few years on the back of a booming construction industry, and associated increased demand for the installation of air conditioning/ heating units and systems in both new and existing buildings. In contrast to the sustained strong growth in demand, the supply of newly qualified HVACR mechanics remained stable at an average of 33 per annum between 2001 and 2003, before increasing to 59 in 2004 and 62 in 2005. While supply has increased in the last two years (noting that about six mechanics retire per annum), there still appears to be a considerable disparity between supply and demand, and a shortage of HVACR mechanics has resulted. This is reflected in the low fill rate of 48% and there being only 0.7 suitable applicants per vacancy. This disparity that has developed as demand has outgrown supply indicates that the shortage of HVACR mechanics is a **genuine skill shortage** (see Box 1 for definition).

Box 1: Skill Shortage Definitions

Genuine Skill Shortage

Occurs when employers have difficulties filling their job vacancies because there are not enough individuals with the required skills in the potential labour market to fill the positions on offer.

Recruitment and Retention Difficulty

Occurs when there is a considerable supply of individuals with the required skills in the potential labour market but they are unwilling to take up employment at current levels of remuneration and conditions of employment. Retention problems are often a major contributor to this condition.

7.3 The strong levels of demand for HVACR mechanics are likely to continue in the short-term on the back of sustained activity in the construction sector, and growing demand for air conditioning/heating units and systems. The number of newly qualified HVACR mechanics is likely to increase further in the next few years – given growth in the number of new enrolments. However, this is unlikely to be sufficient to eliminate the current shortfall of HVACR mechanics. The Department therefore foresees shortages, at best, easing only slightly in the short-term.

⁹ The data shown from the LCI are unadjusted mean hourly rates. Caution should be taken with interpreting this information due to the relatively small sample sizes, particularly at the occupational level. Furthermore, the LCI is designed to measure changes in, rather than the actual level of, wage and salary rates.

For queries regarding this report please contact philip.spier@dol.govt.nz or info@dol.govt.nz.

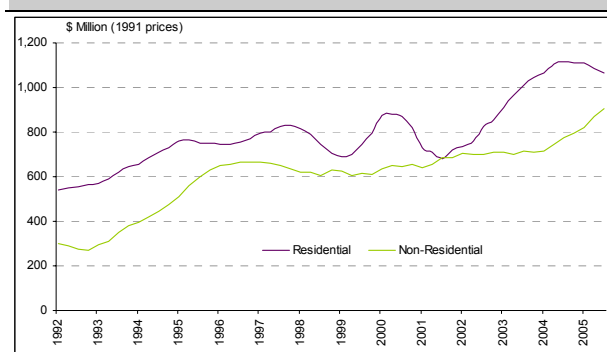
Disclaimer: The Department of Labour has made every effort to ensure that the information contained in this report is reliable, but makes no guarantee of its accuracy or completeness and does not accept any liability for any errors. The information and opinions contained in this report are not intended to be used as a basis for commercial decisions and the Department accepts no liability for any decisions made in reliance on them. The Department may change, add to, delete from, or otherwise amend the contents of this report at any time without notice. The material contained in this report is subject to Crown copyright protection unless otherwise indicated. The Crown copyright protected material may be reproduced free of charge in any format or media without requiring specific permission. This is subject to the material being reproduced accurately and not being used in a derogatory manner or in a misleading context. Where the material is being published or issued to others, the source and copyright status should be acknowledged. The permission to reproduce Crown copyright protected material does not extend to any material in this report that is identified as being the copyright of a third party. Authorisation to reproduce such material should be obtained from the copyright holders.

Appendix 1: Construction Industry Demand Overview

New Zealand has experienced four years of strong growth in construction activity, and although the rate of growth has recently slowed, growth remains high. Figure A1 shows the rapid (44%) growth in building work put in place which occurred between late 2001 and late 2005. The boom has resulted in construction industry employment growth of 42% over the same period. While growth in total building work put in place still remains strong (4% in the year to September 2005), it has slowed from an average growth rate of 11% per annum in the previous three years.

The strong growth in the construction industry has been driven predominantly by activity in the residential sector, although in the last year the non-residential sector has begun to catch up. Until recently, growth in the residential sector has been driven by a range of factors. These include: low real interest rates from early 2001 to early 2004, high population growth caused by record net immigration, strong wage and job growth, a

Figure A1: Building Work Put in Place, Residential and Non-residential



Source: Statistics New Zealand.

previous lull in building activity, and falling household sizes. However, in the year to September 2005, there has been a 4% decrease in the value of residential building work put in place. In contrast, there has been a 17% increase in the value of non-residential building work put in place driven most strongly by growth in commercial buildings. It is likely that the slowdown in the residential sector has freed up resources for growth in the non-residential sector.

Table A1: Construction Activity and Employment, Years to September, 2001-2005

	Year to Sep 2001	Year to Sep 2002	Year to Sep 2003	Year to Sep 2004	Year to Sep 2005
Work Put in Place (1991 \$m)	5,461	6,088	6,898	7,544	7,869
% Change		11.5%	13.3%	9.4%	4.3%
Residential Building Consents (number)	19,533	24,408	30,139	31,864	27,092
% Change		25.0%	23.5%	5.7%	-15.0%
Non-residential Building Consents (number)	16,680	17,143	15,799	16,432	16,647
% Change		2.8%	-7.8%	4.0%	1.3%
Construction Employment (Four Quarter Moving Average)	113.0	119.1	135.8	150.1	160.3
% Change		5.4%	14.1%	10.5%	6.7%

Source: Statistics New Zealand.

Outlook for the Residential Sector

The residential sector has slowed down in the last year after a sustained period of high growth. This slowdown is likely to continue because all the key drivers of that growth have turned. Interest rates have risen¹⁰, lower levels of net inward migration¹¹ have slowed population growth, the downturn in international students coming to New Zealand may negatively impact apartment building, and the high exchange rate may discourage offshore investors. Figure A2 shows there has been a downward trend in the number of residential consents issued since mid-2004. In the 12 months to September 2005 there was a 15% decrease in the number of consents issued for residential buildings, indicating that residential activity will continue to weaken. In addition, December 2005 Consensus Forecasts from the New Zealand Institute of Economic Research predict that residential investment will fall by 8.9% in the year to March 2007.

Figure A2: Quarterly Building Consents Issued, Residential and Non-residential (Number)



Source: Statistics New Zealand.

Outlook for the Non-residential Sector

Non-residential building activity grew strongly over 2005. This is reflected by a sharp increase in the number of non-residential building consents issued in 2004 (see Figure A2). Although the number of non-residential building consents issued began to slow over the second half of 2004, it has shown an upward trend in the first three quarters of 2005. The Department expects non-residential building activity to remain strong as construction resources are freed up from the downturn in the residential sector. An increase in the number of non-residential consents combined with increasing government and infrastructure expenditure indicates construction activity will increase in the sector over 2006.

Overall Outlook

The slowdown in the residential sector in 2006 is likely to be compensated by continued growth in the non-residential sector. Activity in the overall construction sector is consequently expected to remain at historically high levels. This will maintain the demand for labour at equally high levels.

¹⁰ The Reserve Bank of New Zealand increased its Official Cash Rate to 7.25 per cent in December 2005, a rise of 2.25 percentage points since the beginning of 2004.

¹¹ Net inward migration (permanent and long-term arrivals less departures) fell to 7,000 in the year to December 2005 from a peak of 42,500 in the year to May 2003.