

The Future Workforce: Melbourne's North Summary Report



1. MELBOURNE'S NORTH: WHERE ARE WE NOW?

Throughout the last 30 years Melbourne's North has been impacted by a number of external shocks, the closure of the automotive manufacturing sector being the latest. Over time the region has shown it can adapt to new circumstances.

Given macro-economic conditions that are not within the control of the region, including significant funding cuts to health and education, it is unlikely that the sectors that did the heavy lifting of adding new jobs since 2005 can continue to absorb the job losses from manufacturing closures or downsizing, particularly those in the automotive sector, as well as creating employment for the growing population of the region.

In the period 2005 to 2015 there has been employment growth overall but the distribution of occupations is changing. For jobs located in Melbourne's North the top three growth occupations (43 ANZSCO level) were Protective service workers at 6.4%, General clerical workers at 4.7% and Health professionals at 4.7%. A number of occupations declined and the largest of these was Machine and stationary plant operators, at -4.1%.

The largest occupations in terms of numbers of residents of Melbourne's North employed in an occupation were Sales assistants and sales persons at 33,733, Specialist managers at 32,664 and Business, human resources and marketing professionals at 31,926. The smallest number employed in any occupation was Farmers and farm managers (in the outer parts of Melbourne's North) at 927.

In terms of numbers of jobs located in Melbourne's North, the largest categories were Sales assistants and sales persons at 30,139, Specialist managers at 26,504 and Health professionals at 24,868. The smallest number employed in any occupation was Farmers and farm managers (in the outer parts of Melbourne's North) at 872. A detailed analysis is included in Chapter 2 of the full report.

A structural employment issue over the last 15 years is that Melbourne's North has not been able to capture anywhere near its share of high-tech employment, an effect compounded by the withdrawal of the automotive original equipment manufacturers (OEMs). This region's high-tech employment share is lower than that of the rest of Melbourne where the share of high, medium and low-tech employment was evenly split (Table 1). In Melbourne's North the share of high-tech employment is low and that of the medium and low-tech categories high compared to the metropolitan average. A critical strategy for the region will be to attract a greater number of high-tech industries.

Table 1: Hours of work (industry) by industry technology ranking – share of total (per cent)

Melbourne's North	2000	2014	Change in share
High	25.6	23.8	-1.8
Medium	37.4	38.0	0.6
Low	36.9	38.2	1.3
Rest of Melbourne	2000	2014	Change in share
High	31.8	32.1	0.3
Medium	32.3	33.3	1.0
Low	35.4	34.6	-0.8

Source: Derived by NIEIR: ABS Census and Labour Force.

The *Melbourne's North Food and Beverage Growth Plan* (Northern Melbourne RDA/NORTH Link 2014) identifies the future significance of this manufacturing sub-sector to the study region. This strategic plan for the industry outlines the success factors and actions that are required to grow the regional industry from a turnover of \$2.6 billion in 2014 to \$5 billion in 2024, creating an additional 7,000 jobs for the region in doing so. The implementation of this plan will have a significant impact on the region's economic growth.

1.1 Youth unemployment

While youth unemployment levels in Melbourne's North declined in the nine or so years leading to the global financial crisis, post global financial crisis there has been a continuous rise in the levels of youth unemployment, in part reflecting the damage to businesses and the resulting economic changes. The mining investment boom and its accompanying high Australian dollar also had a negative impact on employment in this manufacturing stronghold. The trend of increasing youth unemployment continues to intensify and will not be helped by the latest round of manufacturing closures in the automotive industry.

NIEIR estimates for 2015 suggest there are 15,218 unemployed in the 15 to 24 age group in Melbourne's North and the number is increasing. Hume, Whittlesea (both outer growth areas), Moreland and Darebin have the highest numbers of unemployed young people. NIEIR estimates for 2015 show that there are 1,079 unemployed young people in Yarra and this figure rises to 3,414 in Hume. In part these numbers reflect higher levels of engagement in tertiary education in areas of gentrification such as parts of the inner north. The outer regions have difficulties in aligning jobs growth with relatively rapid population growth. All regions are likely to have a cohort of young people who have completely dropped off the radar.

1.2 Infrastructure investment

Infrastructure investment in transport systems, telecommunications, schools, hospitals and other public amenities has to continue at a faster pace than in the past if employment generation is to have any prospect of keeping up with the growing population of the region.

Whatever training effort is made in a region, the resulting enhanced skills of residents will only be translated into jobs by public and private investment. For Melbourne's North in 2014, construction capital installed was \$43,000 per capita (2012–2013 prices) compared to \$54,000 in the rest of Melbourne, which indicates a capital stock deficiency in the study region of 20%. This in turn suggests a capital deficiency (which includes investment in equipment) of \$15 to \$20 billion, which is considerably more than the capital deficiency of 25 years ago. This indicates that there would be a significant benefit in relation to new employment opportunities and higher skills development in Melbourne's North from fast track public and private investment. Cumulative capital investment in a region is a core driver of economic activity and growth, and a determinant of economic activity.

1.3 Industry and education

The online survey results for this study show that the linkages between industry and education in Melbourne's North are currently poor. This is partly due to the size of the businesses that make up the regional economy. A large number of businesses in Melbourne's North are small to medium sized enterprises (SMEs). Smaller businesses, because of the daily pressures of meeting production or sales targets and so on, tend to have less capacity to engage in activities that include links to education and research. There is also a sense that these linkages have been weak in the region because that has been the culture in the past. It is now clear that, particularly at post-school level, education providers understand the significance of these links in helping the business community find suitably educated and skilled employees, and students leaving education and training find satisfying employment and careers.

Because of the significant changes to industry and employment now and in the future, individuals will need to take a lifecycle approach to their education and training needs. Education and training providers have opportunities to assist individuals to transition their employment but this can only work when individuals are proactive in seeking knowledge and new skills, and are adjusting their own skill sets to meet the demands of changing industry requirements. This approach is far better than thinking about education and training only as a result of redundancy and industry closure.

Concerning the relationship between education, training, research and industry, the need is for a more cohesive system that communicates and integrates pathways and opportunities more effectively. In the tertiary sector there is a clear recognition that the employability of graduates is of foremost concern. The quality and relevance of what is being provided by educators and trainers is core to the success of the education and training system and to the participation of employers who may be sceptical about the ability of training providers to meet their needs.

The view of many of the respondents to *The Future Workforce: Melbourne's North* research was that the demand driven model of the VET training system is not necessarily in the interest of employers or students. It relies on significant understanding of the occupation and skills needs of industry, which student customers of the VET system are unlikely to possess. The demand driven model is an element in the fragmentation of what must be a cohesive system if return on investment by government is to be effectively rewarded.

TAFE providers are dealing with competition from two main sources: registered training organisations (RTOs) and changes to Australian Tertiary Admissions Rank (ATAR) scores at university level that mean universities are also entering what was traditionally the TAFE market for students.

The TAFE system has been the part of the educational and training system closest to industry in Melbourne's North and was regarded as critical gateway between industry and education. NIEIR studies have shown that where TAFE systems have been eroded there can be skills problems at a later time in specific regions, particularly in times of economic boom and periods of high labour demand.

University campuses have been important as hubs for research and learning, and for attracting companies that wish to benefit from the knowledge being generated by these physical localities. In a virtual world, at a time where a physical location is less attractive for a university to invest in, the conundrum will be how to maintain high levels of engagement between universities and industry. Melbourne's North is fortunate that it does have a strong physical presence and major

campuses for La Trobe University, RMIT University and the Australian Catholic University. Deakin University is increasing its presence in Melbourne's North, particularly engineering programs in association with manufacturing, and has established its Learning Centre in Hume. Victoria University has established a presence in Melbourne's North with its learning facility in Broadmeadows. Residents of Melbourne's North are also attending the University of Melbourne and Monash University, travelling to these campuses. Relationships between universities and the TAFE sector are strengthening, with guaranteed entry pathways from some TAFE courses to university programs.

The strengths universities bring to Melbourne's North should be leveraged to the advantage of the region's industries and service organisations. An analysis of the Australian Research Council's Excellence in Research for Australia (ERA) rankings at La Trobe University and RMIT University shows that Melbourne's North has above world standard research strength in a range of sciences including medical sciences, computing, maths, engineering, design, arts, history and culture. The mix of excellence in research appears to have significant relevance to the future business development goals of the region and makes the linkages between universities and industry even more important.

1.4 Career guidance

Career guidance available to school students is inadequate and underfunded. Teachers have little time to spend with each student and there is more disconnect from industry as processes and technologies change. Not focusing on assisting young people to improve the journey from education and training to employment is costly, as it means more students and more apprentices drop out of courses and employment pathways they do not fully understand. The solution is a better integration between industry and education.

An example of how poorly funded career guidance and low levels of connectivity between schools education and industry are likely to be costly is the dropout rate from technical/trades apprenticeships, which NIEIR calculations suggest has been running at close to 50% (49.4%). The high dropout rate for apprentices is happening for a range of reasons. The problem is more severe in the younger age group and differs between industry sectors.

Increased investment in strengthening the linkages between various components of the pathways through education and training for employment, through career guidance at school and through Local Learning and Employment Networks and similar organisations, will improve the viability of courses offered by tertiary institutions by reducing the high drop-out rates currently experienced in the Victorian system. A detailed analysis of education and training in Melbourne's North is included in Chapter 3 of the full report.

1.5 Fast track investment

Melbourne's North is at a stage in its complex development, with its facilities, clusters, universities and skilled residents, where fast track investment in the region should be regarded as a strategic imperative for both Melbourne and Victoria. Poor infrastructure provision should be seen as a barrier to employment since it influences the attractiveness of a region to residents and businesses.

The Northern Melbourne RDA/NORTH Link report *Northern Horizons: 50 year infrastructure strategy for Melbourne's North* (April 2014) identifies road congestion as being relatively severe, with the slowest travel speeds in the peak periods. There is a divide between good public transport access in the inner north and poor access and services in the outer. A significant issue is the lack of sufficient public transport, particularly fast rail, to Melbourne Airport.

The report also identifies a shortfall of social infrastructure, particularly in the outer areas, including pre-schools, childcare, secondary schools, arts and culture, sports facilities, cemeteries, general practitioners, allied health and courts. There is particularly poor distribution of aged care facilities, hospital emergency departments and community centres.

Key findings

Education and training

- Research confirms relatively poor links between education providers and industry in Melbourne's North.
- Careers guidance suffers from limited funding and is underinvested, resulting in a disjointed system and in particularly low levels of completion of apprenticeships and other courses. These are both expensive and wasteful.
- The whole educational system needs to be far more cohesive, with employability as a key goal throughout the system.
- Individuals must take responsibility for lifelong learning practices and this idea must be taught. For residents of Melbourne's North who are over 25 years old, lifelong learning activities need to be actively encouraged.
- Low levels of foreign language teaching are creating a monolingual business culture despite the rich cultural composition of the population. Particularly, there is a lack of Asian language skills in the non-Asian community and this is bad for business development and exports.

- The current VET review will need to sort out, as a matter of urgency, the problems (mainly alignment to industry training requirements and quality problems) created by recent VET funding models. This is vital as high quality VET training is essential for businesses in Melbourne's North.
- In Melbourne's North, the TAFE share of education has declined while the university share has grown.
- The physical presence of tertiary institutions and their campuses will grow in importance and are crucial in building clusters of excellence in high-tech and knowledge economy employment.
- The region's universities have particular strengths in research as described by their ERA rankings. Industry in Melbourne's North should be encouraged to build on these strengths.
- Leaving school early can be a lifelong impediment to finding secure employment.
- As Melbourne's North has gentrified the culture of education has grown, with many migrant families keen to see their children attend university. This process has strengthened the region's capacity to deal with change in employment more successfully because the contemporary workforce needs to be more adaptable.

Skills

- Closure of the automotive manufacturing sector does not only mean the loss of jobs, it means the loss of skills formation and skills demand in Melbourne's North.
- Youth unemployment is a growing problem for the region. Providing opportunities for young people to work is vitally important in developing the future workforce and for skills formation. Proactive measures are required.
- Long term unemployment, particularly at a time when technological changes are rapid, means that, without lifelong learning strategies, skills rust.

Employment

- Research for this report shows that it is unlikely that the sectors that have contributed strongly to jobs growth in Melbourne's North in the last 10 years (such as Health care and social assistance, Education and training, Retail, Construction and Transport and logistics) can do all the heavy lifting of replacing the number of jobs falling out of the automotive manufacturing supply chain.
- The creation of new jobs will have to come from proactive interventions.
- Research suggests that many automotive manufacturing workers are staying in their current positions until their firm closes or scales down. This will mean a large number of redundancies in a relatively short period in 2016–2017.
- Despite transition programs, pathways for redundant automotive workers to new and equal value employment are not always clear. There are obvious opportunities but many of these are relatively small scale in terms of job numbers.
- Strategies should be developed to improve the high-tech capacity of firms, particularly in the outer north, and to engage more of the region's highly skilled households to participate in employment locally rather than having to travel to the Melbourne CBD for employment.
- The region as a whole should be proactive in ensuring local area hot-spots of long term unemployment by location, occupation and industry are dealt with quickly by targeted programs. Disadvantaged households under-invest in education and training.
- Many young people are working in the retail, food and hospitality sectors. How this translates into longer term employment may be an issue and could be masking a problem to come.

Industry sectors

- Food process manufacturing provides a significant opportunity for Melbourne's North. These opportunities are detailed in the *Melbourne's North Food and Beverage Growth Plan*.
- Capacity of SMEs in Melbourne's North to engage with R&D activities is often limited by their scale and financial capacity.
- Global influences on the local economy need to be clearly understood by organisations and businesses in Melbourne's North if they are to benefit from the opportunities that these changes will bring.

Investment

- To offset the impact of job losses from the closure of the automotive manufacturing sector, fast track capital investment in infrastructure projects based on Northern Melbourne RDA/NORTH Link's *Northern Horizons* report are required.
- It is imperative to step up action to encourage global firms to establish regional headquarters in Melbourne's North, particularly around university clusters.
- Venture capital and the entrepreneurial system in the region need further development.
- Development of high-tech and other industry clusters is crucially important as a strategy to strengthen the Melbourne's North economy and as a way of encouraging specialist industry skills and high-tech innovations and inventions. Transport infrastructure developments will assist the productivity of these clusters.
- Consistency of sound policy approaches is essential to future investment in the region.

Social capital

- The message is clear. Despite a difficult period ahead, eight local governments, organisations such as NORTH Link, the Northern Melbourne RDA and the educational institutions have done enough work on strengthening the region's economic structure to make fast track investment in the region a strategic lever to improve the economic performance for the whole of Melbourne.
- Links and collaborations between industry, industry organisations and tertiary institutions are becoming even more important as the knowledge economy continues to develop.

2. OPPORTUNITIES AND SOLUTIONS

Factors influencing employment and skills formation are global, national and local, which means that the probability of a region being able to influence global trends is close to zero. A region's influence on national circumstances is also typically slight, with circumstances surrounding the closure of the automotive manufacturing industry and funding cuts to education being two such examples.

Given these external factors, the success of a region depends on local action and response to external influences. Working together in a region to a detailed economic plan, a blueprint for how the region should transition and a clear understanding of what the region will become are even more critical in current circumstances.

2.1 Global trends

Global megatrends that are having a very significant impact on the shape and location of industries include:

- digital technologies and systems (autonomous systems, robotics, artificial intelligence, big data, intelligent systems) and the 'internet of things'¹
- knowledge intensity and a high-tech workforce – global move to require STEM (science, technology, engineering and maths) skills for sustainable and well paid employment
- international competition for high-tech employment
- ageing societies at home and overseas (by 2050 in China, 25% of the population, or around 400 million people, will be over 65)
- renewables, climate change and sustainability trends and their macro influence on economic systems and employment – energy and transport – storage systems/localised grids
- the rise of Asia and a 3 billion middle class consumer base by 2050.

These megatrends are disruptive of industry and are an ever-present danger to businesses and organisations that do not adapt to change quickly enough. They also represent great opportunity and these opportunities are explored throughout the report.

¹ The internet of things is the network of physical objects or 'things' embedded with electronics, software, sensors and network connectivity, which enables these objects to collect and exchange data.

2.2 National trends

Economic influences beyond the control of anybody in the region include the recent high value of the Australian dollar, now declining. The highs were driven by the Australian mining investment boom (from which Melbourne's North derived little benefit) and the global financial crisis. Both of these influences created difficulties, particularly in terms of competitiveness and market development opportunities, for the region's manufacturing industries.

The Australian motor vehicle manufacturing industry is located primarily in Adelaide and Melbourne, and the withdrawal from the Australian market of the three remaining OEMs will have pronounced regional effects. For Australia, the loss of jobs by the end of 2017 is projected to be around 1.8% of total jobs available that year, or a reduction of 0.56 percentage points in the employment growth rate for each of the three years of the closure process. The equivalent loss of gross national product is a little larger at around 2.3%.

NIEIR modelling shows that the withdrawal of the automotive manufacturing sector OEMs, and the impact of these closures on other companies in the automotive manufacturing supply chain and beyond by the end of 2017, is likely to mean an impact on Melbourne's North resident employment equivalent to 18,000 less jobs than would have been the case if the industry had remained in Melbourne's North and elsewhere.

The automotive manufacturing closures as projected will have a negative impact on gross regional product (GRP) in Melbourne's North of around \$2.5 billion by the end of 2017, compared to the position had the automotive industry manufacturing OEMs remained. In addition, these closures are likely to have an adverse impact on the region's economic complexity and on skills formation, both vital for competitiveness and productivity in a globalising economic system.

The impact of the closures will go beyond the loss of skilled employment. They mean the loss of regional exports (the automotive manufacturing industry having been a significant contributor), the consequential growth of imports in the form of new cars and the effect of these on the balance of trade nationally.

NIEIR research of national trends for its annual *State of the Regions* report (ALGA) concludes that all regions in Australia would be assisted by an all-of-government approach to policy making. While the most successful competing nations have long term plans for economic and social development, Australia's policies have been far from consistent. What is required is a coherent approach to regional policy making that improves performance region by region.

The structure of workplace employment is changing, as are the job specifications of traditional occupations. How these changes are managed will be important in improving skills formation and productivity. Changes include increasing levels of insecure short term, part-time and contract employment. Therefore employers may be less likely to train employees as the value of training from an employers' perspective is diminished. Global outsourcing of employment, technology, growing inequality and slow economic growth all make the task of increasing the number of jobs in the local economy much harder. Job loss can also reflect productivity gains. These trends make the foundation skills of numeracy and literacy and higher end STEM skills increasingly important as foundations to lifelong skills development and improved flexibility for workers to move between industries and occupations. Disruption of clear pathways to employment during this period of change may also drive the significance of online tertiary education.

In 2014 the fastest growing employment industries in Australia were: Health care and social assistance; Professional, scientific and technical services; and Public administration and safety.

The largest employing industries in 2014 were: Health care and social assistance; Retail; Construction; Manufacturing; and Professional, scientific and technical services.

The fastest growing occupational groups in 2014 (Australia) were: Professionals; Community service workers; Managers; Technicians and trade workers; Sales workers; and Machinery operators and drivers.

Across Australia the fastest growing jobs in 2014 were: Carers, aged and disabled; Sales assistants; Registered nurses; Clerks; Child care workers; Retail managers; Accountants; Advertising and sales managers; Electricians; and Education aides.

Skills in 2014 – national features:

- a decline in skills shortages overall because of the soft job market and higher levels of education and training
- in emerging industries skills were an issue, including in the area of digital transition of industry sectors
- employability skills were an issue, including understanding technology, problem solving, working in a team, communication skills, planning and using initiative.

2.3 Melbourne's North: Focus for action

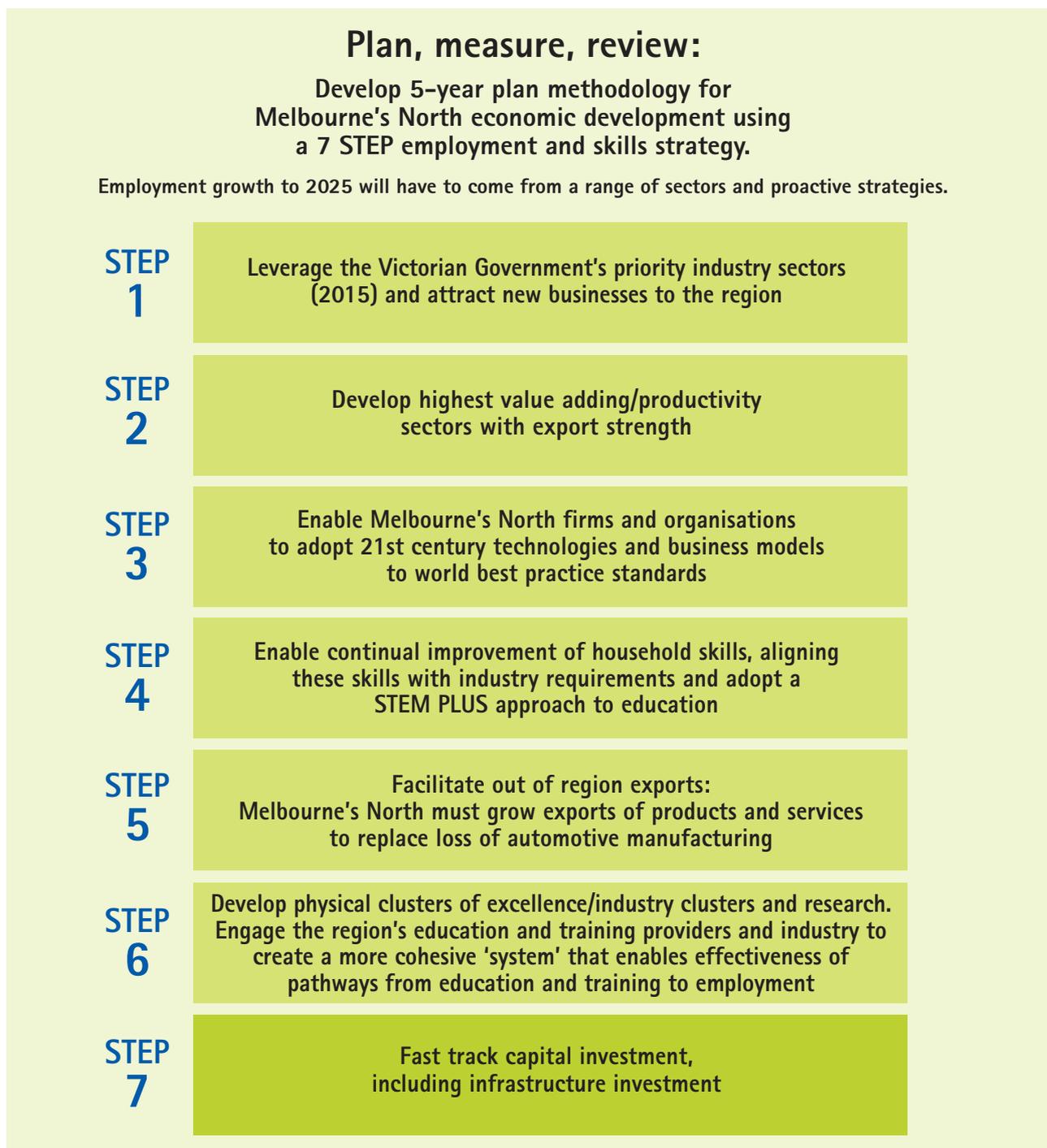
The most effective way Melbourne's North can influence these matters is by working together as a region clearly defined in its purpose. One of the strengths of Melbourne's North is that the region has shown a capacity for cohesion through organisations such as NORTH Link and there is ample evidence of local governments working together and in partnership with the Victorian Government. These things will become increasingly important and will serve to define the region by 2025.

Despite the power of the macro influences facing the Melbourne's North economy, regional levers do exist to improve the employment outlook and employment distribution in Melbourne's North. Strategic investment in infrastructure, including road and rail, schools and hospitals is one such lever. Particularly given significant population growth, Melbourne's North is well placed to benefit from these investments.

Employment development strategies in Melbourne's North will embrace two sets of ideas:

- a focus on stimulating and encouraging existing growth industries such as Health care and social assistance, Education and training, Construction, Professional, scientific and technical services, Retail and Transport and logistics to ensure these sectors continue to add employment and demand for industry skills
- to provide an environment and culture that fosters Victoria's future industries such as Food process manufacturing, New energy technologies, Construction technologies, Medical technologies and pharmaceuticals, and the Creative and digital economy.

A 7 STEP employment and skills strategy provides the pathway to future employment and skills development in Melbourne's North (Figure 1). The next step will be to develop a five year action plan guided by the seven strategies detailed in the following chapter.



3. WHERE WILL FUTURE JOBS COME FROM?

As Melbourne's North is competing with other regions to attract and retain businesses and the skilled households required to stimulate jobs growth, it is important to consider the opportunities that are likely to arise over the next 10 years. Analysis of these opportunities will create a framework and action plan for the future of industry, employment and skills in the region.

Industry and jobs growth will reflect national trends with greatest growth coming from the Health care and social assistance, Education and training, Construction and Professional, scientific and technical services sectors. Given the closure of the automotive manufacturing sector, the region cannot rely on these trends: it must be proactive in its strategies to replace and grow employment.

3.1 A 7 STEP employment and skills strategy

The 7 STEP employment and skills strategy will align the region's occupations and skills more closely to higher productivity and high-tech industries.

STEP 1: The Victorian Government's priority industry sectors (2015)

Victoria has established a new group of priority industry sectors. These are:

- Medical technologies and pharmaceuticals
- New energy technologies
- Food and fibre
- Transport, defence and construction technologies
- International education
- Professional services.

In addition, another three areas have been identified for consideration: Logistics, warehousing and transport; Experience economy – tourism and events; and Community services/not-for-profits.

As the government will focus assistance on these industries it is important to understand which sectors should be the focus for Melbourne's North. The larger scale industries in the region that align with these priority areas are: Health care and social assistance, Manufacturing (including Food and fibre, Medical technologies and pharmaceuticals, New energy technologies), Transport and logistics, Construction, Professional services, Accommodation and food services, and Education and training.

Table 2 shows that, in 2015, Professional services was the highest employing industry sector (25,329) followed by Community services (15,899). New energy and Transport technologies have declined over the past 10 years, reflecting that some of the priority areas are not large employers in the region and may even be in decline. Professional services are likely to be focused on local markets. However, this does not preclude developing capacity to export services outside the region or overseas.

There are opportunities for each priority sector to be developed in Melbourne's North with International education, Professional services, Logistics, warehousing and transport and Community services most likely to offer significant opportunities. However, there is scope to develop other sectors over time. See later chapters for a more detailed analysis.

Table 2: Melbourne's North – Industry employment by priority industry sector composition

Industry	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Medical technologies and pharmaceuticals	2,104	2,092	2,144	2,226	2,283	2,411	2,501	2,469	2,404	2,392	2,407
New energy technologies	2,514	2,451	2,416	2,360	2,310	2,358	2,350	2,246	2,168	2,113	2,093
Food and fibre	10,677	10,296	10,267	10,319	10,229	10,453	10,460	10,274	10,534	10,984	10,690
Transport, defence and construction technologies	12,074	12,410	12,349	11,413	10,565	10,153	9,535	8,774	8,329	7,984	7,816
International education	2,581	2,793	3,430	4,225	5,189	5,156	4,503	4,069	3,998	4,534	5,116
Professional services	16,707	17,196	18,094	19,294	20,003	21,779	23,911	24,521	24,085	24,509	25,329

Table continued

Industry	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Logistics, warehousing and transport	7,173	7,470	7,914	8,376	8,388	8,598	9,034	9,448	10,457	10,550	10,130
Experience economy – tourism and events	3,842	3,856	3,853	4,066	4,411	4,798	5,049	5,314	5,459	5,330	5,396
Community services/not-for-profits	10,878	10,959	11,098	11,968	12,922	13,883	14,586	15,316	15,862	15,624	15,899
TOTAL	89,518	90,190	92,868	97,434	100,312	104,556	108,683	110,176	111,209	111,622	112,341

Source: Derived by NIEIR: ABS Census and Labour Force.

STEP 2: Development of highest value adding/productivity sectors

In determining industry priorities it is important to assess how each industry sector or sub-sector contributes to GRP growth and hence the wealth of the region. Table 3 shows the increase in value added by 40 of the 86 ANZSIC 2 digit industries, although offset by industries such as Manufacturing which as a whole made a negative contribution. However, Food product manufacturing contributed 0.6% growth to the 37% total.

Table 3: Melbourne's North – Industry drivers of GRP growth 2004-Q2 to 2014-Q2 (% addition to GRP in 2004)

1. Hospitals	2.8	21. Public administration	0.7
2. Professional, scientific and technical services (except computer system design and related services)	2.5	22. Waste collection, treatment and disposal services	0.7
3. Other store-based retailing	2.4	23. Warehousing and storage services	0.7
4. Air and space transport	1.7	24. Motor vehicle and motor vehicle parts retailing	0.7
5. Auxiliary finance and insurance services	1.7	25. Water supply, sewerage and drainage services	0.6
6. Social assistance services	1.5	26. Food product manufacturing	0.6
7. Computer system design and related services	1.5	27. Transport equipment manufacturing	0.6
8. Administrative services	1.3	28. Machinery and equipment wholesaling	0.6
9. Road transport	1.3	29. Public order, safety and regulatory services	0.5
10. Medical and other health care services	1.2	30. Gas supply	0.5
11. Finance	1.1	31. Other goods wholesaling	0.5
12. Building construction	1.1	32. Publishing (except internet and music publishing)	0.4
13. Preschool and school education	1.1	33. Basic material wholesaling	0.4
14. Transport support services	1.1	34. Basic chemical and chemical product manufacturing	0.4
15. Food and beverage services	0.9	35. Telecommunications services	0.4
16. Tertiary education	0.9	36. Electricity supply	0.4
17. Residential care services	0.9	37. Grocery, liquor and tobacco product wholesaling	0.3
18. Rental and hiring services (except real estate)	0.8	38. Adult, community and other education	0.3
19. Food retailing	0.8	39. Non-store retailing and retail commission based buying	0.3
20. Property operators and real estate services	0.7	40. Personal and other services	0.3
TOTAL			37.1

Source: NIEIR modelling using ABS Census, Labour Force, National Accounts and Australian Taxation Office, taxation statistics.

Each industry sector has a multiplier impact throughout the region. The high-tech industries generate the highest flow-on effect, which is why Melbourne's North has a strategy to assist the region's industries to become more knowledge intensive. High-tech industries require strong knowledge-creation infrastructure, high speed broadband, access to tertiary and research institutions, and modern transport systems within their employment catchment.

High-tech companies are locating in regions where highly skilled households want to live and where there is reliability of

journey to work times and cultural amenity, often in inner regions of the city. The goal to 2025 should be to expand the characteristics of the inner ring outward to attract high-tech companies and highly skilled households.

STEP 3: Encourage Melbourne's North firms and organisations to adopt 21st century technologies and business models to world best practice standards

Strategies must be put in place to enhance knowledge intensity of existing businesses. During the consultation process the following concerns emerged about:

- the capacity for SMEs to engage in research and training activities
- the capacity for SMEs to work with new technologies and systems, particularly given financial and time constraints
- the quality of management systems, in particular, processes and business and market analysis.

The internet is the foundation infrastructure for future innovation. Contemporary business environments require very high broadband speeds and capacity, and the provision of service equity, so that customers can be served efficiently. Internet speeds are still patchy and continue to lag behind competing nations in our region. Table 4 compares a selection of key regional cities (Asia Pacific), with Melbourne and Sydney having average broadband speeds well below the global average. Australia's mobile internet speeds are typically higher than landline speeds but costs are higher, with large volume data transfers too expensive to be an alternative solution.

Table 4: Internet speeds May 2015 – Melbourne compared

City	Broadband					Mobile	
	Download	Upload	Quality	Value	Promise	Download	Upload
Melbourne	14.58	5.83	82.88	7.96	67	20.53	11.77
Sydney	14.31	4.89	77.63	7.48	68	21.31	12.85
Australia	16.30	4.30	80.80	7.63	70	20.04	8.65
Global average	23.08	10.61	84.36	5.21	86	12.24	5.01
Jakarta	8.61	4.93		9.83	92	7.56	2.45
Bangalore	11.55	7.71		3.98	86	7.67	1.64
Bangkok	18.60	5.31		2.19	91	8.96	4.71
Ho Chi Minh	19.49	18.32	88.50	1.54	96	3.28	0.80
Auckland	23.58	11.05	86.43	6.25	90	25.91	11.38
Christchurch	34.29	16.32	89.47	4.78	90	31.10	16.72
Shanghai	36.36	17.53		1.08	107	22.16	7.31
Taipei	50.76	25.08		1.60	97	33.48	13.36
Seoul	59.65	49.87				21.92	10.13
Tokyo	76.33	66.76				16.62	6.11
Hong Kong	101.17	97.71		2.87	92	14.62	7.12
Singapore	123.07	101.79	88.06	2.60	100	17.72	7.82
Australia ranked, globally	65 of 202	111 of 202	34 of 41	52 of 63	59 of 64	16 of 118	15 of 118

Notes: **Quality:** Connection quality – how stable is the internet connection and how fast can a connection between two points be established. Higher is better.

Value: The cost of internet in the region, how much \$ per MB/s ISP charges, e.g. Value 7 = a 10Mbps cable connection cost about \$70/month. Lower is cheaper.

Promise: The median ratio of Actual download speed to the download speed subscribed to ('promised speed'), e.g. a 67 means 6.7M End-user speed expected for 10Mbps Cable subscription. Higher is better.

Source: Ookla May 2015.

The USA has been successful in innovating new technologies and products because it has a long term vision, backed by R&D and capital, to take innovation to the marketplace as finished product. Importantly, information communications technology (ICT) is perceived as a business opportunity. In Australia the online economy has been slow to develop and is dogged by relatively poor and patchy telecommunications infrastructure, with the future still poorly defined.

Australia has, as does Melbourne's North, significant research capacity. Critical questions to be considered include: how can local business benefit from this research; how can research be more effectively brought to market using Australian investment; and how can local companies be included in the production process?

There are significant opportunities from technologies in evolution that could change the way we do business. These technologies will have major implications for the structure of businesses in Melbourne's North.

Online distribution of physical objects and 3D printing

Instead of shipping manufactured components across the globe, the specifications for the physical object are transmitted to a 3D printer nearby to where the object is required. The economics of 3D printing are likely to mean a reduction in the cost differentials between the manufacturing centres of Asia and Australia. Advanced supply chain characteristics such as just-in-time and lean manufacturing will be greatly enhanced and should result in improved productivity. 3D printing is transformative and a driver of innovation and invention, creating opportunities for design and engineering R&D and online exports (intellectual property exports).

3D printing and education

3D printing may also transform classroom learning and particularly the teaching of STEM subjects, with students having access to 3D printers in the classroom via their own laptops.

4D printing

As 3D printing technology and additive manufacturing grow in sophistication, applications to intelligent materials manufacturing become a reality. There are many applications as the technology creates the possibility of programmability of non-electronic materials, important to innovation in medicine. Other sectors with future applications include ICT products, construction manufacturing, automotive and aerospace.

Associated skills

Knowledge of 3D printing technologies will be required for jobs in engineering, design and architectural professions, and technical and scientific professions.

Oil and gas

Over time renewable energy technologies will inevitably put pressure on financing the carbon based energy sector as investors are increasingly concerned about being left with stranded assets such as coal power infrastructure.

A major change in transport systems and technologies is the predicted increase in the number of plug-in vehicles. The RMIT University engineering school believes that the most likely trend will be for Australian families to have one petrol or diesel powered vehicle for longer distances and an electric car for local travel.

Battery technology and energy systems

Storing energy efficiently and in compact and relatively lightweight systems has presented a major challenge for researchers. Progress has been strong, as this technology is important to both households and industry.

Potential for digital displacement: Industry business models at risk

The rate of change caused by technology innovations is increasing, therefore so is the risk of digital disruption. The constant environment of change needs a very different set of management skills and knowledge; old fashioned company boards are likely to be placing their businesses at risk. Companies should be encouraged to have at least one ICT expert at board level so the implications of transformative change and digital disruption, including opportunities, are properly understood

STEP 4: Continual improvement of household skills, aligning these skills with industry requirements

Skills are central to the success of any region and the skills available in households within a region's employment catchment are one of the core drivers of the region's economic performance. A region rich in high-tech skills is likely to have much greater prospects of attracting high-tech firms. Future skills demand is analysed in Chapter 6 of the full report.

STEP 5: Melbourne's North must grow exports of products and services

Growth of exports is critical to future economic and employment growth in the region. The added economic complexity of exporting products and services also adds to the range of skills and expertise required in businesses in Melbourne's North, particularly when conducting international exports. Exports require global knowledge skills, and a deep understanding of markets, regulations and the particular requirements and customs of each international export market.

Replacing the loss of exports from the closure of the automotive manufacturing sector, which had a high level of out of region exports to other parts of Australia, will be no small task.

In the World Economic Forum publication *Global Enabling Trade Report 2014*, Australia is ranked 23rd overall compared to New Zealand at 4th position in the Enabling Trade Index. Australia received a low score in the foreign market access pillar (134th out of 138), reflecting the high tariffs faced abroad by Australian exporters. The report also mentioned the bottlenecks in Australia's ports and rail infrastructure because of priority given to various mineral exports. In 2013, the most problematic factors were: identifying potential markets and buyers; high cost or delays caused by international transportation; and access to imported inputs at competitive prices.

Many businesses in Melbourne's North see countries in the Asian region as their natural export markets. It would be wise to make a detailed assessment of the potential of recent Free Trade Agreements (FTAs) to improve market access for export out of Melbourne's North.

China

China is Australia's largest trading partner and Victoria's largest goods export market. It accounts for around one third of Victoria's international student intake. The relevant FTA is the China–Australia Free Trade Agreement (ChAFTA).

The blueprint for China's 13th Five-Year Plan (2016–2020) is now being drafted in a spirit of 'innovation and reform'. The emphasis of this plan has implications for the businesses in Melbourne's North, particularly if the plan turns its attention on using domestic household consumption in China as the driver of economic growth. Discussions in China are also focused on continuing the development of service industries, aged care and health as the proportion of older people increases rapidly. The government is focused on the need for clean energy, renewable systems and energy efficient housing and transport.

In the next five years Melbourne's North businesses could supply goods and services for household consumption and business to business services ranging from biotechnologies and medical technologies to professional services relevant to a broad range of sectors (see full report for comprehensive lists).

Japan

Japan is Australia's second largest trading partner, with most exports in the post-war period being raw materials including coal and iron ore. In return Japan has sent Australia high value added manufactures. It is important that knowledge economy exports from Australia to Japan become the new focus.

The relevant FTA is the Japan–Australia Economic Partnership Agreement (JAEPA).

There is a view that encouraging young Japanese to engage in international education to broaden their understanding of other cultures and markets might assist economic development in coming years.

Food security is an issue in Japan since the large earthquake in 2011, the resulting tsunami and the Fukushima Daiichi nuclear disaster.

Melbourne's North could supply households with: education and associated services, English language teaching (ELT) products and services, aged care services, branded food items and beverages, and tourism services. Business to business services could include: food, biotechnology, medical technologies, computer systems and software, energy related technologies and professional services across a range of industry sectors.

South Korea

Korea is Australia's third largest export market. A large proportion of these exports are coal, iron ore, aluminium and beef. Education and tourism dominate service exports. The relevant FTA is the Korea–Australia Free Trade Agreement (KAFTA).

South Korea is a forward looking country, with strong achievements in heavy industry and more recently rapid intensification of its knowledge economy including sophisticated ICT systems, a move to renewable energy and a focus on education. The internet is as important in Korea as it is in China and Japan. The move to an 'internet of things' economy is likely to progress rapidly.

In the next five years, Melbourne's North could supply the following for household consumption: education and associated services, ELT products and services, ICT (notably publishing/digital content), aged care services, branded food and beverage items, and tourism services. Business to business services could focus on: food, biotechnology, medical technologies, energy related technologies and renewables, computer systems and software, and professional services.

India

India is Australia's fourth largest export market by virtue of its large population. India is a complex and diverse nation undergoing a modernisation of its economic system, though import duties (and levels of bureaucracy) remain high. Environmental issues are a major concern with clean energy, air, water and food strategically central to society and future economic development.

India's middle class has grown rapidly and therefore so has the nation's household purchasing power. The idea of providing new technology products to the poorest communities should not be discounted, especially in the area of infrastructure, for example waste disposal systems and energy solutions.

The leading export to India is education and in Victoria Indian students are the second largest group of international students. However, Victoria needs to take extra care in managing its reputation in India following a series of attacks on Indian students.

Household consumptions could include: education and other services, aged care services, branded personal items, health, branded food items and tourism services. Melbourne's North could provide business to business services from medical technologies and engineering to infrastructure services, green technologies and professional services.

South East Asia

The Victorian Government takes a regional approach in describing ASEAN member markets. ASEAN comprises Malaysia, Singapore, Indonesia, Philippines, Vietnam, Brunei Darussalam, Cambodia, Lao PDR, Myanmar and Thailand. Sensitivity to prices varies markedly across the region. The member countries of ASEAN are diverse, with at least 14 commonly spoken languages and a number of different currencies. The scale of populations, stage of economic development, wealth and business opportunities also vary across the region.

The relevant FTAs are AANZFTA – ASEAN; MAFTA – Malaysia; SAFTA – Singapore and TAFTA – Thailand. Two more trading agreements are under negotiation: IACEPA – Indonesia and RCEP – Regional Partnership Agreement – ASEAN which also involves its existing FTA partners – Australia, China, India, Japan, Republic of Korea and New Zealand.

Economic integration of the ASEAN member countries will be strengthened by the formation of the ASEAN Economic Community (AEC) by the end of 2015. AEC has the potential to significantly change trading relationships between regions.

Export opportunities for household consumption could include: education and other services, aged care, consumer goods including branded personal care items, health, value added food products and healthy food options, and tourism services. Business to business opportunities range from aviation, medical technologies and architectural services to internet related services and e-commerce. Refer to the full report for a comprehensive list of potential export opportunities for South East Asia.

Indonesia is a significant economic and regional partner for Australia, being our 12th largest trading partner and 11th largest export market in the 2013 calendar year. Austrade estimates that there are more than 400 Australian companies operating in Indonesia.

Trans-Pacific Partnership

The Obama-led Trans-Pacific Partnership (TPP) was signed in early October 2015 after five years of negotiations. It cuts trade tariffs and sets common standards in trade for 12 Pacific Rim countries (including the US, Japan and Australia), with a collective population of around 800 million. The negotiations are still to be ratified by lawmakers at the national level. China is not involved in the TPP, but the Obama administration would like to see China accept most of the standards set out by agreement. The TPP is an achievement in as much as it has negotiated around the very different approaches and standards applying across signatory nations, including environmental protection, workers' rights, and regulatory coherence as well as the protection policies countries have for particular industry sectors such as agriculture.

In conclusion, the skills and occupations required in Melbourne's North for intensive export development include:

- management occupations with particular knowledge of target markets and culturally appropriate sales negotiating skills
- legal and accounting occupations with analytical skills, market opportunity value/FTA opportunities/market access requirements, legal and cultural
- logistics specialists with knowledge of export/import procedures in selected markets
- marketing occupations with knowledge of business to business and consumer marketing in selected markets
- quality controllers with knowledge of targeted export markets and quality and legal requirements – health standards and so on.

STEP 6: Develop physical clusters of excellence/industry clusters and research

NIEIR has developed an analysis of economic development that highlights the critical role of clusters of particular activities. In summary:

1. Continuing business as usual maintains the general trend that areas furthest from the CBD are at an increasing disadvantage in terms of growth in per capita household incomes, access to hours of work, and higher unemployment and underemployment rates.
2. The greater the level of economic activity within an employment catchment the greater the benefit to residents within that catchment. The ideal outcome is to have a high correlation between household skills and the skills demanded by industry in the catchment.
3. Cumulative regional investment is the core driver of the level of economic activity within a region. This represents a lever for governments to improve economic performance by allocating public investment to a region.
4. The level of household skills within the employment catchment of a region is a driver of economic performance.
5. Different industries have different economic multipliers; high-tech industries have the largest multipliers but require high skilled households. High-tech industries are sustained by continuous innovation, which is why the physical presence of universities creates an ideal habitat for clusters to develop.
6. Cultural and community infrastructure development is required to underpin economic development.
7. The specialised scope of the CBD will need to increase to underpin the metropolitan knowledge economy, and employment and the scale of the CBD must increase at least in proportion to the growth in overall metropolitan scale to absorb its share of employment.

The greater the spatial distribution and population deviates from the seven principles above, the lower will be investment outcomes and productivity.

Clusters deliver on these critical issues. In Melbourne's North there are now a number of successful and strengthening clusters at some distance from the CBD, creating strong employment outcomes and with the capacity to grow further.

These clusters include:

- the Austin: health
- Melbourne Airport: transport and logistics
- La Trobe University: bio-science
- RMIT University: health sciences, engineering and food science
- Melbourne Wholesale Fruit, Vegetable and Flower Market: food and food process manufacturing
- industrial parks and freight hubs.

Melbourne's North already has a track record in running a series of successful incubators including:

- Brunswick Business Incubator
- DECL (general purpose business incubator in Alphington)
- artDECL (creative and digital arts incubator in Northcote)
- The Station (co-working space in Northcote)
- Banyule digiDECL (co-working space in Heidelberg West).

The clusters in Melbourne's North provide opportunities to develop high-level business incubators, driven by industry, university and government in partnership with strong links to international expertise and capital.

The kinds of programs that could be developed or further enhanced in Melbourne's North and would help the universities with the problematic task of bringing research outcomes to market include:

- materials technology, particularly in relation to 3D and 4D printing
- ICT: security systems and big data
- medical and health sciences: medical devices
- other Victorian Government priority industry sectors and high ERA rankings from the region's universities.

STEP 7: Fast track infrastructure investment

Northern Melbourne RDA/NORTH Link's *Northern Horizons* report sets out the infrastructure task in Melbourne's North over the next 50 years. The report describes the process of prioritising future infrastructure projects and programs for Melbourne's North which involved the identification, through consultation and document review, of over 300 potential transport, social, utility, environmental and economic projects and programs. These were independently prioritised on the basis of the current and future need the project or program will address and the associated triple bottom line benefits.

The report highlights connectivity as a particular problem for Melbourne's North and this issue was certainly raised during consultation. Congestion and delays have a serious impact on productivity and are a large and negative factor when trying to attract new businesses to particular parts of Melbourne's North.

To assist with employment and productivity issues over the next decade, infrastructure improvements will need to concentrate on connectivity issues and infrastructure that directly influences employment and knowledge capacity. As previously stated, cumulative capital investment in a region is a core driver of economic activity and growth, and a determinant of economic activity. Refer to Chapter 16 of the full report for a detailed analysis of the impact of infrastructure investment on economic development.

4. OCCUPATIONS AND SKILLS FORMATION

4.1 Workers in transition

The crucial issues for Melbourne's North will continue to be the major shifts in labour demand, what happens to workers who are made redundant in one industry sector, and how they transition to new forms of employment. Currently the major changes occurring in the automotive industry create challenges for the workers and the organisations providing support and assistance, especially in Hume and Whittlesea. The full report details the Australian and Victorian Government support schemes in place for the workers impacted by the closures.

The key issues facing the Melbourne's North workforce in transition are:

- the trend for automotive manufacturing sector workers to want to remain in their current positions until their firm closes, which means a significant number of redundancies within a comparatively short period 2016–2017
- workers made redundant from any particular manufacturing industry find it difficult to transition to a different industry and forms of employment because the nature of the new work may require very different skills and capabilities
- the pool of suitable transition jobs in the region is likely not to be large enough to make transition to equivalent employment income possible for many workers.

The employment fallout from the closures in the automotive manufacturing industry is running parallel to a youth unemployment crisis that is particularly severe in regions of disadvantage.

4.2 The Future Industries Fund (FIF)

The Victorian Government has established the \$200 million Future Industries Fund to support six high-growth sectors that have potential for extraordinary economic growth – to create jobs and attract investment in Victoria. These sectors are:

- Medical technologies and pharmaceuticals
- New energy technologies
- Food and fibre
- Transport, defence and construction technologies
- International education
- Professional services.

In addition, another three areas have been identified for consideration: Logistics, warehousing and transport; Experience economy – tourism and events; and Community services/not-for-profits.

Additional elements of Victoria's economic growth plan include:

- \$100 million Back to Work Scheme
- \$500 million Regional Jobs and infrastructure Fund
- \$508 million Premier's Jobs and Investment Fund (including the \$60 million Start Up Fund).

Assuming that digital technologies and automation will continue to reduce the need for human labour in existing businesses if productivity is to be improved, it will be critical for Melbourne's North to participate in developments and opportunities in the digital economy and beyond. Strategic action is required to ensure that the necessary skills and know-how are developed in the region.

4.3 Industry Skills Fund (ISF)

The ISF is a key element in the Australian Government's Industry Innovation and Competitiveness Agenda and will provide over 250,000 training places and support services for industry. The fund prioritises SMEs, including micro businesses, and is delivered through the AusIndustry Single Business Service. The fund priority areas are: Advanced manufacturing; Food and agribusiness; Medical technologies and pharmaceuticals; Mining equipment, technology and services; Oil, gas and energy resources; and Enabling technologies and services.

The *Boosting the commercial returns from research strategy* (May 2015) is the Commonwealth Government's attempt to strengthen Australia's innovation system, including work on the establishment of the Medical Research Future Fund.

4.4 Science and industry collaboration

The British Government's analysis of the opportunities for relationships between British and Australian innovation policy, particularly the UK's Catapult Centres, notes that less than 5% of Australian businesses work with the scientific research community – ranking the country last in the OECD on this measure.

The Australian Government has implemented a number of policies to increase innovation:

- announced in October 2014, the \$400 million Industry Innovation and Competitiveness Agenda will deliver less regulation, a higher skilled workforce, and policies that encourage innovation and improved infrastructure
- establishment of Industry Growth Centres in the next three years to improve science and industry collaboration; these focus on the government's priority industry sectors.

In addition, the similarities between the UK's Catapult Centres and the new Australian Centres offer scope for partnerships in shared access to SMEs and research.

4.5 Future skills

The report introduces the concept of STEM PLUS skills. STEM means scientific, technology, engineering and maths knowledge, which are important in many occupations and industry sectors both in Australia and overseas. Research for this report suggests that if businesses are to succeed in the increasingly globalised environment, they will require STEM PLUS skills, which include broader knowledge about cultures and markets, communication and language skills (spoken and written), and an understanding of visual language (design) and the benefits of ICT.

In the global environment many different kinds of jobs are likely to be sourced offshore where they can be performed more cheaply. Other jobs will continue to be lost to technology and productivity improvements. These STEM PLUS skills will equip individuals to respond and compete in the global workforce.

Greater levels of entrepreneurship are also required to build on the skills and high-tech capacity of a region. This means graduates who understand how entrepreneurship works and can identify opportunities for start-up businesses. These businesses will require STEM PLUS skilled employees.

4.6 Skills, jobs and the digital economy

Among the most important future skill sets will be those that enable the development and ongoing function of the digital economy. No industry sector or business will escape this transition.

Industry sectors are being impacted by:

- cyber security, which has become critical to a range of industries from aerospace, defence and intelligence to government, banking, healthcare, manufacturing and telecommunications
- the revolution in the financial services industry, which enables crowd funding and peer-to-peer lending
- the higher education MOOCs (Massive Open Online Courses), which have opened up access to tertiary education in terms of cost, distance and age
- the rapidly changing rates of knowledge diffusion, which will require continual upgrading of existing skills and learning new skills
- the vast changes in the new way of doing things – from big data informing market intelligence and cloud services enabling outsourcing of business services, to mobile computing impacting on the way people work and spend their leisure time.

These new ways of doing things require a highly skilled workforce and high broadband capability with bandwidth capacity and fast speeds.

4.7 The contemporary workplace

Despite the trend away from the full-time employment model, businesses will continue to need a core team of long term employed with technical, innovation, market and corporate knowledge. The core team will increasingly require a pool of skilled labour in the Professional services sector, for example, web design, social media, law and financial services, creating a complex and growing network of global outsourcing. Businesses will require experts to manage these outsourced services and will include an ICT expert and other specialists on their boards.

Clusters are defined by how easy it is for people to share knowledge and this makes the presence of university campuses in a region very important. The viability of clusters is also impacted by travel times; to maintain Australia's liveability competitive advantage, it is important to keep resident travel times at an acceptable level.

4.8 Skills, education and training

Changes to the vocational training system and the establishment of RTOs have occurred as the result of historical issues:

- industry has outsourced and concentrated on short term profitability, with the responsibility for training shifting from employer to employee
- the abolition of large government organisations that once took on an important training role
- the ideological fetish for competition which drove the restructuring of the VET training system
- TAFE institutions did not keep up with industry changes and expectations.

Today with more students and the demand driven model, too many students are studying a range of training courses without knowledge of employment outcomes. RTO registration should require demonstration of the strong need for training, and training programs must be strictly assessed for quality outcomes.

As ATAR scores are lowered, universities are attracting VET type students; this is either an innovation or a problem in waiting. The role of universities and TAFEs need to be considered in a broader strategic framework and in relation to industry and skills outcomes rather than just letting them compete.

Traditionally, universities have been rewarded for pure research and the number of publications in leading and peer reviewed international journals. This approach has fostered specialisations that may not be particularly helpful for teaching or solving applied problems in the local context. Researchers can be encouraged to create closer ties with industry if suitably recognised within the system.

4.9 Arts sector

It is important to continue to invest in the arts, particularly because the sector provides work opportunities for young people. In Melbourne's North opportunities exist to develop more artists' workspaces, smaller scale arts festivals and arts infrastructure. Given the region's strengths in manufacturing and product creation, there is also a strong case for the establishment of a Design Museum. This would enhance the region's cultural amenity and enrich the design capacity and reputation of firms in Melbourne's North.

CASE STUDY: the skills young people need			
<p>Foundation skills</p> <p>Literacy Language Numeracy</p>	<p>Technical skills</p> <p>Related to disciplines (eg science, technology, humanities, engineering, business studies)</p>	<p>Skills that help young people be enterprising</p> <p>Confidence and agency Creativity and innovation Enthusiasm for ongoing learning Ability to critically assess information Working with others Communication Project management Financial literacy Digital literacy Global enthusiasm</p>	<p>Career management skills</p> <p>Self-awareness Decision-making to build career Job-seeking Use of career services/information Lifelong learning Work-life balance</p>

Source: Foundation for Young Australians, "Improving Young Australians' Transition from School to Work – Findings from the Worlds of Work (WOW) evaluation 2014", Table 4, p. 11, December 2014.

4.10 Melbourne's North: Top 10 occupations (number employed) by industry sector 2015

The largest occupation in terms of number employed across all sectors were Sales assistants and sales persons at 30,139, Specialist managers at 26,504 and Health professional at 24,868.

NIEIR modelling shows the top 10 manufacturing occupations are in decline in terms of number employed. Factory process workers, the largest category, had 10,373 workers in 2005 but this declined to 7,163 by 2015. The only growth occupation in this sector was Food trades workers, currently not in the top 10, with 1,126 workers.

All top 10 occupations in the Construction sector are growth occupations. Construction trade workers (13,492) and Electro-technology and telecommunications trade works (4,939) were the largest groups.

In the Wholesale trade sector the top 10 occupations have grown in the past 10 years. The greatest number of workers in this section is Specialist managers, increasing over the past five years to 3,904 workers. The Retail trade sector employment is dominated by Sales assistants and sales persons, growing by 4.4% in the last five years to 21,094 workers. The full report contains more detailed analysis.

4.11 Occupations and skills formation – Key findings

- Developing skills and know-how relating to the digital economy is vital to the region's future prosperity.
- Universities should move towards rewarding research activities in the way they have traditionally done with publishing output and, in doing so, create closer ties between industry and the university.
- Local governments have an important role to play in ensuring the availability of high capacity broadband in their area and the provision of wi-fi in public places.
- The arts sector improves a region's image and helps build the skills required for new economy businesses.
- Countries that have a distinct VET training system tend to manage training and pathways to employment in a more structured and coordinated manner.
- Social capital, regional networks and organisations are vital to future development of the Melbourne's North economy and employment.
- STEM PLUS provides for workers who need to be more flexible and learn entrepreneurial, creative and technical skills.
- Sectors that have the capability to export need highly skilled STEM PLUS employees.
- The regional composition of the Professional services sector in Melbourne's North should be investigated. While it is likely that many professional service firms in Melbourne's North are small in scale and focussed on local markets, research for this report suggests there may be a significant opportunities to grow the sector and its exports.

5. KEY INDUSTRY SECTORS

The following pages analyse opportunities for and barriers to the ongoing development of the Victorian Government priority sector industries. A key purpose is to consider how these sectors will grow markets, jobs and skills. Each sector is considered in its broader industry and economic context, as some priority sectors are sub-sectors of a larger industry group. While Advanced manufacturing is not itself a Victorian Government priority sector, it does play a significant role in at least three of the priority sectors.

As part of the research for this report, industry roundtables were held for the following sectors: Advanced manufacturing, Medical technologies and pharmaceuticals, New energy technologies, Food and fibre, Professional services, Transport and logistics, and Community services.

5.1 Advanced manufacturing

Advanced manufacturing is a knowledge intensive industry that produces a range of products requiring high levels of R&D, advanced materials, advanced processes and high levels of design within a complex and often global supply chain.

The complexity of this sector requires that businesses have:

- highly skilled workers
- close relationships with the providers of education and training
- strong links with universities and their R&D expertise.

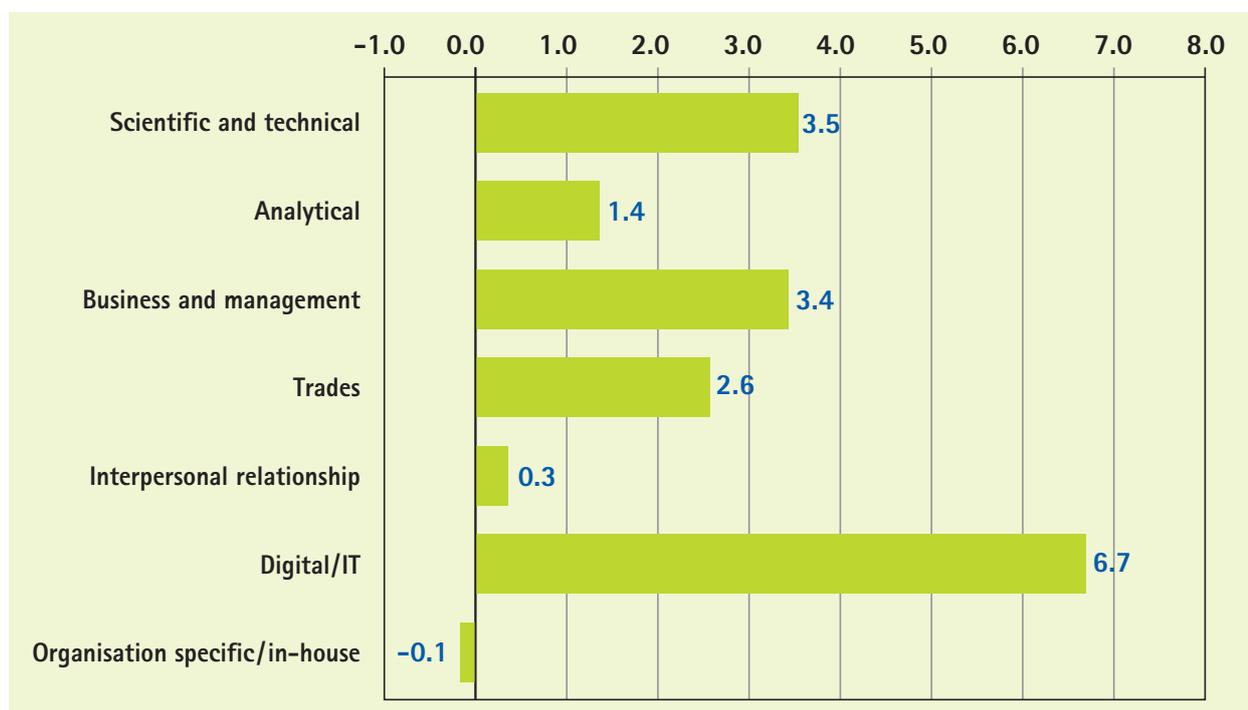
The impact of digital technologies is pronounced, with great changes to the product development cycle compared to traditional processes of design, engineering, planning, manufacturing and service blending.

In Australia, advanced manufacturing opportunities exist for:

- highly customised or bespoke product manufacturing for local markets with a low level of competition from international suppliers because of scale
- high value products where the intellectual property rights reside with the manufacturer (although these manufacturers may still be offshore).

In the USA and the UK, advanced manufacturing is gaining strength. There are complex reasons for the growing interest in the sector, including a focus on R&D, concerns about the quality of offshore manufacturing, greater levels of automation that have improved competitiveness, an understanding of its strategic importance and that the know-how is central to the country's industrial foundations, and the importance of keeping the skills within the economy and the country. Responding to a Confederation of British Industry/Pearson survey, UK employers state that they prefer graduates with STEM qualifications and would like to see a boost in the number and quality of these graduates.

Figure 2: Manufacturing sector – online survey change in skills 2015 to 2025 (%)



Key findings

- Advanced manufacturing skills are required to drive a number of Victorian Government priority industry sectors, so STEM PLUS skills are essential to the future economic prosperity of the region.
- To compete internationally Australia must close its innovation gap with competing nations. That means bring more R&D projects to market in this high-tech sector. This will require venture capital and close collaboration between industry and research organisations.
- Delegates to the roundtables were keen to form regional collaborative industry groups.

5.2 Medical technologies and pharmaceuticals (and the health system)

The Medical technologies and pharmaceuticals priority sector in Victoria is being developed around medical services such as clinical trials and the manufacturing supply chain, rather than directly targeting the research base and health systems itself. That means the priority industry sector workforce strengths will be around medical technology, supply chain management and pharmaceuticals.

In Victoria the sector is mainly SME size firms, with only five large companies employing over 200 people in Melbourne. Med-tech companies tend to cluster in the south east of Melbourne and are often export orientated. Research for this study suggests that it is unlikely that closure of automotive manufacturing in Melbourne will damage med-tech supply chains.

The Victorian Government is planning to introduce a \$60 million fund to assist start-ups. Firms in Melbourne's North may have opportunities to assist public hospitals to improve supply chain management efficiency by helping to introduce lean techniques and just-in-time supply chain management.

Opportunities may exist in warehousing and logistics, holding and distributing stock, cross-servicing and consolidated distribution hubs. For education providers, opportunities around quality systems and standards (far more complex in the health sector) will develop further. The health sector also requires ongoing training of its non-clinical workforce across a range of service occupations.

This sector provides a particular opportunity for advanced manufacturing firms, because of the relatively high value of medical devices and the potential to develop R&D relationships within the study region. The growth of markets to the north of Australia due to improved living standards and ageing (particularly in China) suggest there is room for businesses in Melbourne's North to grow over the next decade.

Technology advances continue to make enormous contributions to the health sector, for example monitoring of patients and integrated patient records that assist diagnosis and treatment. ICT developments have an important role in improving outcomes and reducing costs in the health sector. There are also significant opportunities for sector businesses to link with La Trobe University's Institute for Molecular Sciences and with RMIT University's School of Health Sciences in Complementary Medicine, Nursing and Psychology.

The Health and social assistance sector is an important employer in Melbourne's North across a diverse range of occupations and skills. Development of health clusters in the region will foster growth in specialist services. The region has built knowledge, skills and competitive advantage in cancer research, medicine, gerontology and rehabilitation. Clinical research should be at the centre of innovation in the sector.

Key findings

- For the Medical technologies and pharmaceuticals priority sector there are opportunities for Melbourne's North firms in specialist medical manufactures and ICT systems development.
- This is an ideal sector for creating high value projects co-developed between universities, existing and new firms entering the region and venture capital. CSL is an exemplar of what can be achieved with the right mix of investment, research and skills to market.
- The health sector as a whole will remain a strong employer in Melbourne's North, contributing significantly to development of the region's skills base.
- Opportunities in Melbourne's North may include assisting public hospitals to improve supply chain management efficiency by helping to introduce lean techniques in just-in-time supply chain management. Opportunities may exist in warehousing and logistics, holding and distributing stock, cross-servicing and consolidated distribution hubs.
- For education providers opportunities around quality systems and standards, which are far more complex in the health sector (requirements are one step up from the hospitality sector and food standards), will develop further. The health sector requires ongoing training of its non-clinical workforce across a range of service occupations to improve the capabilities of its workforce overall.

5.3 New energy technologies

The New energy technologies sector is important to Melbourne's North because it will improve both efficiency and sustainability if it is embraced by businesses and households in the region. It also has potential to grow and do so quickly and globally. The sector provides R&D organisations, professional services companies and the region's manufacturers with expanding local and international markets for their IP, technologies, manufactures and services. Australia's position in relation to these opportunities is far from clear and it remains to be seen if Victoria can position itself successfully in this market.

As has occurred in the telecommunications sector in emerging nations and in poorer communities, the jump directly to mobile telephony is being mirrored by the jump to new energy systems that are providing safe options for lighting and cooking. There are many similar opportunities; the market for cheap and smart technologies is very large.

As economic development in India and China continues demand for energy will rise substantially, making the development of renewable energy increasingly important as a means of reducing the impact of climate change on all nations. China's five-year plans recognise the significance of changing how things are done and China's leadership in clean energy technologies will significantly enhance its own economic prospects over the next decade.

China's expenditures on renewable energy in 2013 were \$90 billion, the USA spent \$50 billion and Brazil spent \$8 billion in the period. In 2013–2014 China's renewable energy share (clean energy was at 10% but this includes some nuclear) was conservatively around 5%.

Key trends influencing skills demand in the New energy technologies sector are:

- the global trend away from coal to gas and renewables with battery and pumped storage of intermittent renewables
- in transport, the improved energy efficiency of internal combustion engines and the increased penetration of plug-in electric vehicles and hydrogen vehicles, which are higher cost (but battery costs are reducing); in terms of rail, air and marine there will be a focus on energy efficiency indicators and future role of renewable fuels
- the move away from gas for space heating to high efficiency reverse cycle air conditioners and towards high efficiency solar/heat pumps for water heating
- improved efficiency in appliances, equipment and lighting (mostly imported)
- changes to built form, shells, envelopes and equipment.

The opportunities for Melbourne's North in continuing to develop new energy technologies are obvious.

Key findings

- There are significant opportunities for Melbourne's North in this sector for both research and development of new technologies and for local high-tech manufacture of construction materials and technologies.
- There are opportunities in measurement systems and governance standards, particularly in relation to building construction performance.
- There are opportunities for factory construction of passive housing (energy neutral) and opportunities for design and architectural services to this sector. The latter is particularly an export opportunity.
- Battery storage systems will revolutionise functionality of off-grid systems.
- Many new and high-tech skills are required by this industry, just the type of high value adding, high-tech industry development that could absorb the manufacturing skills of Melbourne's North residents.

5.4 Food and fibre

The Food and fibre sector is important for both Melbourne and its regions. Victoria is Australia's largest food and fibre exporting state and the value of these exports increased 12% in 2013-2014 to reach a record \$11.4 billion, accounting for 29% of all farm exports from Australia. However, the amount that can be exported in the future is dependent in part on supply from farms that may be further impacted by climate change.

The Melbourne's North Food and Beverage Growth Plan identifies the future significance of this manufacturing sub-sector to Melbourne's North. This strategic plan identifies the success factors and actions that are required to grow the regional industry from a turnover of \$2.6 billion in 2014 to \$5 billion in 2024, creating an additional 7,000 jobs for the region.

Melbourne's North has the capacity to attract a greater cluster of food process manufacturing companies because it has all the key features required by this industry:

- a sector already regarded as a priority and which has a significant focus in Melbourne's North, where an industry cluster is developing
- a pool of experienced manufacturing workers living locally
- proximity to the Melbourne Wholesale Vegetable, Fruit and Flower Market
- high quality industry training providers that can deliver existing or future training requirements across a range of related disciplines
- proximity to freight hubs and Melbourne Airport.

Exports in this industry are significant and have potential for exceptional growth into a range of international markets including Asia and the Middle East. Barriers to growth are discussed in the *Melbourne's North Food and Beverage Growth Plan*. In 2013-2014, Victoria's food and fibre exports included meat and dairy, with 41% of export revenues (around \$4.6 billion), and prepared foods exports at around \$912 million.

Food security issues in some parts of the world (particularly related to pollution and contaminants) and the growing wealth of households in Asia are both drivers of export opportunities. Understanding market requirements and how to gain access to these markets can be complex issues. However, Australian governments are well placed to provide advice on these matters.

The *Food and Beverage Growth Plan* describes labour issues as 'one of the biggest headaches' for the industry, with the central issue identified as finding workers with the right skill set and attitude. Another issue relates to the many SME manufacturers who rely on smaller consultant engineers and other local manufacturers for engineering services such as custom-built production lines. Stainless steel fabrication skills and other specialist skills are becoming scarcer without government funding and support.

Key findings

- Grow industry connections and capability.
- Drive innovation and product differentiation.
- Address skills development and labour availability.
- Address specialised engineering skills issues.
- Position Melbourne's North as a food manufacturing and processing hub.
- Facilitate improved access to international markets.
- Fibre production needs strong design input.
- Government service delivery focussed on needs of market; a review of government procurement policies would be helpful to industry needs.
- Regional branding is notably important.
- Opportunity to develop a food incubator hub in Melbourne's North.
- Opportunities in fibre, around performance fibres and high-tech fibres, yet viability of essential specialist training for the industry is problematic.

5.5 Transport, defence and construction technologies (and logistics)

The Transport, defence and construction technologies priority sector is a combination of related manufacturing/advanced manufacturing activities. Contributors to this study believed that opportunities for Melbourne's North firms were in two main areas:

- highly customised or bespoke product manufacturing for local markets where there is low level of competition from international suppliers because of scale
- high value products where the IP rights reside with the manufacturer (although these manufactures may still be offshored).

Close links between industry and R&D organisations appear to be crucial in developing this sector further. Ford's automotive engineering expertise will remain in Melbourne's North and this will help to underpin the sector over coming years so that demand for engineering skills will be maintained, at least to a level across the industry that will allow for future developments.

Opportunities in the construction technologies could relate to the CSIRO finding that 60% of new 5-star houses in capital cities do not comply with the 5-star rating, meaning that the householders have higher energy bills than if homes were compliant (see CSIRO case study, Chapter 9 of the full report). A number of European countries, including Sweden, Germany and Austria, have become highly proficient at manufacturing energy efficient and passive housing in a factory setting.

CASE STUDY: Sweden after the oil crisis of 1973

After the oil crisis of 1973 Sweden introduced laws that required highly energy efficient housing. This assisted an industry that had been constructing 'off site' housing since the 1930s to flourish.

"Buildings represent 32% of total final energy consumption. In terms of primary energy consumption, buildings represent around 40% in most IEA countries." *International Energy Agency.*

Manufacturing houses in a factory setting allows for the effective construction of super-insulated draught-proof dwellings in which energy for heating is conserved. This process also reduces waste and even the wood shavings and sawdust are recycled.

The Transport and logistics sector, with a strong cluster of activities and expertise in the region, is an important contributor to employment growth in Melbourne's North. The industry has been transformed by technology that has also improved productivity. These advances require the expertise to run and analyse the data, which allows greater control over the supply chain and far more efficiency in managing capacity. However back office jobs, particularly in international firms, are increasingly vulnerable to offshoring as company systems are run at an international level. The industry roundtable identified that some areas of the industry were seen as an unattractive career choice by young people. Work needs to be done to highlight the emerging opportunities due to the growth of the sector and its ageing workforce.

Up to \$10 billion will be invested in Melbourne Airport infrastructure over the next 20 years and passenger movements are forecast to more than double to 64 million per annum in 2033. Currently there are 15,000 jobs associated with the airport, predicted to increase to around 23,000 over the same period.

Key findings

- The priority industry component of this sector will assist in retaining high-tech skills demand in Melbourne's North, with the potential to offset at least some of the negative impacts of the closure of the automotive manufacturing sector.
- The sector overall represents significant opportunities regarding the employment of young people because of the growth of the industry and its ageing workforce.
- Work needs to be done to address some of the attitudes towards employment in the industry, particularly as emerging occupations seem to favour more knowledge and technology based skills requirements.
- This is a global industry with global opportunities.

5.6 International education

International education exports, despite some difficulties along the way, have become a major success and are very important in diversifying Australian exports to include a greater share of knowledge economy exports. Students remember their education so the sector is forging links for Australia that will assist business relationships around the region and beyond.

In 2013 Victoria's share of educational exports was 28% of the national higher education market, with sub-sector shares as follows: VET 30%; schools 31%; ELICOS (English Language Intensive Courses for Overseas Students) 23% and 27% of the non-award sector. New South Wales has the highest share of educational exports. In 2013 Victoria had the highest share of school education exports and had partially caught up to New South Wales in higher education, narrowing the gap to 4%.

Table 5: Top 10 international student enrolments by nationality (share) – Victoria (March quarter 2008 and 2014)

Top 10 markets 2008	% share of Victorian enrolments	Top 10 markets 2014	% share of Victorian enrolments
China	26.4	China	32.3
India	25.0	India	14.0
Malaysia	6.7	Vietnam	7.7
Indonesia	4.0	Malaysia	6.1
South Korea	3.9	Indonesia	3.5
Sri Lanka	3.8	Pakistan	3.2
Vietnam	3.7	Thailand	2.5
Thailand	2.7	South Korea	2.5
Singapore	2.5	Singapore	2.2
Pakistan	1.8	Sri Lanka	2.2

Source: Department of Business and Innovation.

In the period 2008 to 2014 there was a significant decline in the proportion of Indian students, from 25% to 14%. This decline was partly due to extensive publicity in India regarding serious assaults on Indian students and partly due to greater difficulties in obtaining visas and staying on in Australia when studies have been completed. The strong Australian dollar also had an impact but should no longer be an issue. Indian markets will increasingly become a significant opportunity for many industry sectors so it is important to ensure education ties between Victoria and India remain strong.

The studying patterns of international students vary by country of origin. Nearly 70% of students from Malaysia are engaged in higher education. Students engaged in higher education make up about 60% of Chinese students studying in Australian institutions and nearly 6% of Chinese students in Australia are at school level. There is a strong pathway for international students from school to university, so schools play a role in strengthening market opportunities in the tertiary sector. Nearly 40% of students from South Korea are taking VET subjects.

Key findings

- Educational exports are critical to the ongoing economic development of Melbourne's North as these exports underpin university finances and hence capability to assist the region's high-tech and knowledge development.
- The student economy is important to Melbourne's North and this can be developed further as the number of international students continues to grow.
- Global links created by international education exports should be leveraged to create business and research connections for Melbourne's North.

5.7 Professional services

The Professional services sector provides services to the other sectors that make up the economy. The sector includes business services, accounting and legal services, design services including architecture, engineering and various design fields, tourism, education services, financial services and ICT services for both the public and private sectors.

Exports of business and professional services have grown strongly, particularly in professional services and education. Tourism and education are the largest sector exports. In 2013-2014, the top five export markets for these services were China, USA, UK, New Zealand and Singapore.

This China Australia Free Trade Agreement (ChAFTA) may benefit the sector in the following ways:

- professional services: Victorian law firms are now able to establish commercial associations with Chinese law firms in the Shanghai Free Trade Zone
- health services: China will permit wholly Australian-owned hospitals and aged care institutions to be established in China
- education services: China's Ministry of Education website will list Australian private higher education institutions registered on the Commonwealth Register of Institutions and Courses for Overseas Students within the first 12 months of the agreement.

It should be noted that China has an advanced internet economy and this should provide opportunities for sector firms in coming years.

Table 6: Melbourne's North: Priority industry occupation – Professional services

Clerical and administrative workers	18.9%	Community and personal service workers	0.5%
Labourers	0.8%	Machinery operators and drivers	0.3%
Managers	10.8%	Professionals	57.2%
Sales workers	2.0%	Technicians and trades workers	9.5%

In the preceding table, Professional includes accountants, engineers, architects, lawyers and education specialists. This group also includes ICT specialists, clerical staff and high-level management capability.

There are opportunities for further growth in employment in the Business and professional services sector as these firms are still under-represented in the region. As more office space becomes available and the region's businesses demand more professional services, this will make it possible for sector firms to establish a greater presence. The opportunity for the region's Business and professional services sector firms to grow their international exports is also an exciting one and this will include international education and professional and design related services. The sector provides opportunities for start-ups and new entrants to the region.

Key findings

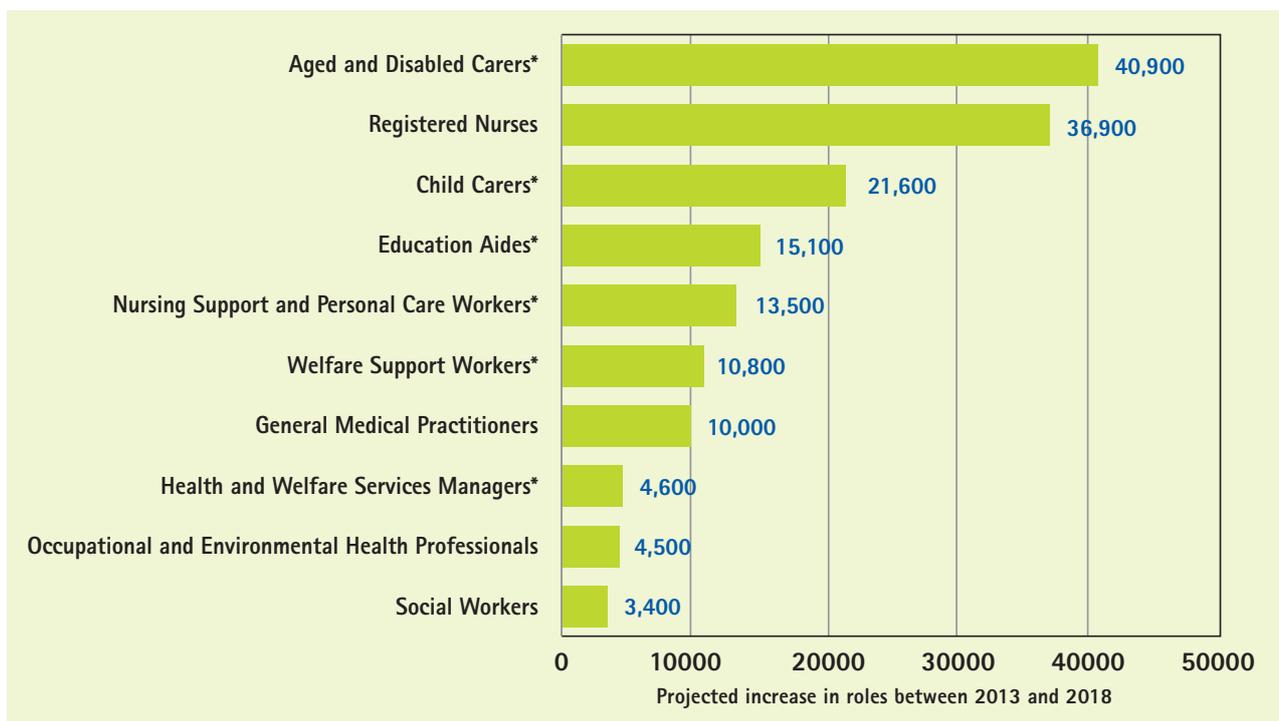
- Demand for Business and professional services sector activities will continue to grow and Melbourne's North has opportunities to grow the sector through domestic regional demand and international exports.
- Fast broadband is essential in enabling the sector to reach its full potential in Melbourne's North.
- There is a particular opportunity for the sector to assist businesses in Melbourne's North to improve operating systems and knowledge about new technologies and markets.
- Continuing to grow educational exports is essential if the region's education and training providers are to flourish.
- Opportunities for food services activities will be enhanced by the relocation of the Melbourne Wholesale Fruit, Vegetable and Flower Market.

5.8 Community services

This sector is engaged in the vital role of assisting some of the most vulnerable and disadvantaged groups in the community, and a highly trained workforce is essential to the wellbeing of the sector's clients. Australian Bureau of Statistics (ABS) figures show that the number of employees in the sector grew 51% in the period 2001-2011, well ahead of employment in all other industries, which increased by 26%. This growth is driven by the demand of changing circumstances, particularly greater demands on provision of child care services as more women enter the workforce, and by an ageing population and the need for more aged care services. The introduction of the National Disability Insurance Scheme (NDIS) will add greater workforce pressures.

Female employees make up the majority of the sector at around 85%; this compares with 45% in other industries. In 2011 part-time workers composed 51% of the workforce and this proportion is increasing. Conditions of employment will become a major barrier to attracting workers to the industry and to developing industry skills. Census earnings of full-time employees were around 75% of those in other industries.

Figure 3: Projected growth in selected health and community service specific occupational groups, 2013-2018



Note: *Indicates groups that include occupations aligned to VET qualifications.

Source: Community Services & Health Industry Skills Council, "Summary – Building a Healthy Future", Environmental Scan 2015.

As the Community services sector is diverse, employee roles vary significantly depending on the sub-sector. The Community Services and Health Skills Council is forecasting the number of jobs in the sector to grow by over 250,000 by 2018 and has identified increased demand for skills that support industry change, which includes increased scope for support worker roles; emerging demand for care coordinator roles; upskilling and new skilling of the existing workforce; and increased demand for business management, administration and technology skills. The VET sector and TAFE have an essential role to play in training the Community services sector workforce.

Key findings

- Increasing levels of part-time and casual employment in the Community services sector are likely to create difficulties in the long term development and training of the workforce.
- Rapid jobs growth in this sector will require an increased commitment to funding the essential training requirement of the industry to ensure quality of service delivery and high levels of productivity. Underinvesting in training for this industry will lead to serious consequences in the longer term.
- Housing affordability may become an issue for some sector workers, particularly in the inner regions of Melbourne's North. This may lead to increased difficulty in attracting a committed workforce to the sector.

5.9 Experience economy

The experience economy can be broadly described as tourism and events. In the case of Melbourne's North, there is scope to develop food, art and culture related events of a smaller scale. Melbourne's North has a growing food processing and manufacturing sector and its outer areas have opportunities to build food tourism. The restaurant and café sector in the inner parts of the region flourish in their diversity.

The priority industry composition table in Appendix B of the full report describes the composition of this sector. Employment in the sector in Melbourne's North increased from 3,850 in 2005 to 5,400 in 2015. The number of residents from the region working in the sector rose from 7,000 in 2005 to 9,000 in 2015.

The following features of the major component of the sector as it exists in Melbourne's North should be noted:

- the industries rely heavily on part-time workers
- these industries also rely heavily on semi-skilled workers.

There is ABS evidence that there are many people available to the industry who would be happy to work at the going rate of pay if there were more jobs available at their levels of skill. NIEIR surveys at major events have confirmed the availability of significant numbers of people who are available to work at short notice and who are not registered as unemployed. It should also be noted that Australian labour force participation rates are below those of many OECD countries and this suggests the potential for the industry to absorb some of this category of workers.

MICE is the term used for the meetings, incentives, conferences and events sector, which is particularly strong in Asia. Melbourne is known as the major events capital of Australia, with events including the Australian International Airshow, the Australian Tennis Open, the Grand Prix and many more. Melbourne's North does not have a major event and does not have the necessary infrastructure of hotels at this time to run a large-scale conference industry. Universities, however, do have conference facilities.

MICE activities typically generate income from:

- event entry fees and other revenue to the event organiser or venue
- meals, food and drinks
- entertainment
- accommodation
- transport
- additional sales by local businesses.

Developing MICE activities in the long term will increase visitors to Melbourne's North, add to the cultural and food events available to local residents, and help to improve the demand and capacity for hotels, cafés and restaurants in the region. Smaller scale events are probably the way forward for the region at this time.

6. MELBOURNE'S NORTH: FUTURE WORKFORCE MODEL SCENARIOS

For this report an extensive modelling exercise has been conducted using NIEIR's new Northern Melbourne model. The modelling provides answers about the benefits of fast tracking investment, particularly in infrastructure, on employment growth over the next 20 years. Two scenarios have been modelled: the base case business as usual (BAU) versus accelerated infrastructure investment as per the *Northern Horizons* report.

Infrastructure investment is a core regional issue. To grow employment and real incomes, regions must grow their capital stock. Lost investment opportunities mean lost employment and productivity growth, and as a consequence lower per capita real income growth. Infrastructure investment is particularly important at the regional level because it is a catalyst, or driver, of private sector investment.

During the 1900s and 2000s the average level of transport infrastructure capital stock installed relative to national GDP was 17% to 18% (NIEIR national modelling). However, Melbourne's North falls below this benchmark. Speeding up the pace of investment is recommended, not only to achieve equity with other regions but because it is required to counter the negative impacts on the region of the former mining investment boom and the subsequent closure of the automotive manufacturing sector. Increased investment will improve the region's competitive position and also increase amenity, making Melbourne's North an increasingly desirable place to live and work.

Table 7: Benefits of transport infrastructure investment

<p>A. Households</p> <ul style="list-style-type: none"> • Increased travel range • Lower transport costs – increased consumption in other areas • Increased workforce commitment/higher real incomes • Improved workforce opportunities/higher real incomes • Reduced accident costs (repair/injury/loss of life)
<p>B. Industry</p> <ul style="list-style-type: none"> • Reduced costs per vehicle – km • Better access to markets – improved competitive position • Reduced freight costs – increased investment potential • Increased workforce commitment and productivity from employees • Increased profitability and/or reduced prices • Increased investment and output from both existing and new firms attracted to the region • Industry cluster consolidation
<p>C. Regional outcomes</p> <ul style="list-style-type: none"> • Emission enhancement/reduction • Structural consolidation and improved competitiveness (more efficient land use outcomes) • Workforce integration and efficient skill matching • Improved equality of opportunity from better labour market access

The *Northern Horizons* report details the types of infrastructure and modelling shows the projects must be delivered at an accelerated rollout rate. The infrastructure includes a program of grade separations; development of a coordinated bus network; an accelerated National Broadband Network rollout; strengthening the La Trobe, Austin and RMIT knowledge cluster; new aged care facilities; improved tram operations; strengthening health precincts; 1,500 new hospital beds in existing health facilities; Metropolitan Rail Stage 2; improving local routes in the north-east; improving the Tullamarine Freeway and Sunbury Road corridor; improving Yarra River crossings; improving local routes in the north-west region; new child care and kindergarten facilities; and new primary schools.

It is important to understand the consequences of the mining investment boom on Melbourne's North and how this reinforces the need for fast track infrastructure investment. For developed countries like Australia, the factors that produce poor economic outcomes from periods of mining expansion can include high commodity prices, which are essential catalysts for elevated mining investment and production expansion. Unfortunately, high commodity prices generate high exchange rates and discourage investment, capacity augmentation and eventually production outside the mining sector. Skilled labour shortages and cost pressures during the construction phase also impact negatively, as does high foreign ownership of the mining industry.

NIEIR modelling shows that the economically diverse states or those with lower levels of resource activity have been impacted by the mining investment boom. Modelling for the 2014 *State of the Regions* report showed that the accumulated net loss to 2012–2013 to these mainland states, as a percentage of gross state product, has been: New South Wales 2.35%; Victoria 3.4%; and South Australia 6.4%. Regions that have clearly lost regional competitiveness from 2005 to 2013 compared to the 1998–2005 average are the metropolitan and non-resource based non-metropolitan regions of New South Wales and Victoria, and this includes Melbourne's North. These losses have reduced growth in resident income from work per capita of working age population as the number of jobs (or working hours) has declined and trade-exposed industries have shrunk.

While catch-up infrastructure investment is important, it is not necessarily strategic. Strategic infrastructure investment occurs when a region aims to strengthen its advantages vis-à-vis other regions, not only in Australia but globally. Local governments, operating at the regional level and together within Melbourne's North, are strongly placed to contribute to strategic decisions and to ensure local coherence of strategic decision making.

To maximise growth in regional employment, strategic investments in infrastructure should generate the following outcomes:

- revenue where this is appropriate
- exports
- business opportunities to multiply impact.

Dr Peter Brain and Professor John Stanley in the report *Sustainable urban mobility: economic perspectives* (ACOLA) found that the development of a high technology zone (node) to the north of the current cluster of high-tech activity emerging around La Trobe University (perhaps in Whittlesea) would have strategic benefits for the region. An increase in high-tech employment opportunities in the outer employment catchments will improve housing affordability as the wages available in the employment catchment will be higher when high productivity employment is available to local residents. Modelling shows that a 10% increase in the share of high-tech employment in such a node for local residents would increase real per capita incomes from this work by 35% to 40%.

Another key strategic node in Melbourne's North is Melbourne Airport, which operates 24 hours, meaning there are no curfews on flights departing or arriving at Melbourne Airport. Developments of all kinds and the planning that drives them needs to take into account the significance of the airport to the Melbourne and Victorian economies and to employment and skills development.

Melbourne Airport has a safeguarding strategy to ensure the long term benefits of the airport are maintained with the following objectives:

- strengthen Melbourne Airport's role within the state's economic and transport infrastructure and protect its ongoing 24-hour operation
- enable the airport to effectively and competitively operate at national and international levels
- ensure any new land use or development around the airport does not prejudice its safe and long term operations, and avoids or minimises incompatible land uses
- protect the airport's curfew-free status
- manage and, where possible, minimise the impact of airport and aircraft operations on surrounding areas and communities
- ensure that strategic planning for metropolitan Melbourne recognises and protects Melbourne Airport, and that land use decisions are integrated, appropriate land use buffers are in place and provision is made for future growth and development
- continue to respect the safeguarding role of the Green Wedges and restrict incompatible land uses in these areas.

High quality broadband, that means world best practice, is essential to industry, research and education and is critical to the future of Australia's knowledge based industries. To remain competitive the region's traditional industries will need to become knowledge based industries. Investment in knowledge infrastructure should be accompanied by the reciprocal obligation that research and education sectors improve commercial outcomes and networks with industry to retain benefits of local investment within Melbourne's North.

The reasons that Melbourne's North would benefit from fast track investment in infrastructure are evident and include:

- to help offset the significant impact of the closure of the automotive manufacturing sector on the region
- to accommodate more effectively and more productively a rapidly growing population
- to help offset the impact of a decline in employment because of a contraction in manufacturing employment and the impacts of automation and technology led economic and industry restructuring
- to help offset the considerable and negative economic impact, and hence impact on employment growth, of Australia's mining investment boom on Melbourne's North
- to help offset the growing gap between the scale of the resident workforce and the number of jobs available in Melbourne's North (a consequence of the points above); NIEIR modelling for this report indicates the gap between resident employment and industry employment will grow from 75,600 in 2015 to more than 188,000 by 2035
- to ease the growing pressure on transport systems as the population grows and more and more people travel outside the region to employment; the danger here is also the possibility that transport issues, already a problem in Melbourne's North, will mean greater difficulties for the industry in the region
- facilitate the growth of clusters such as a high-tech cluster in the outer north, the Melbourne Airport cluster, medical precincts, high-tech cluster around La Trobe University and RMIT University, and a food and logistics cluster around the Melbourne wholesale markets.

When infrastructure investment is not increased or accelerated, that is, BAU, Table 8 gives the key indicator shares of the Melbourne's North economy compared to Melbourne metro. The trends for Melbourne's North for the BAU case are a declining share of GRP and industry employment but a growing share of population and residents in employment.

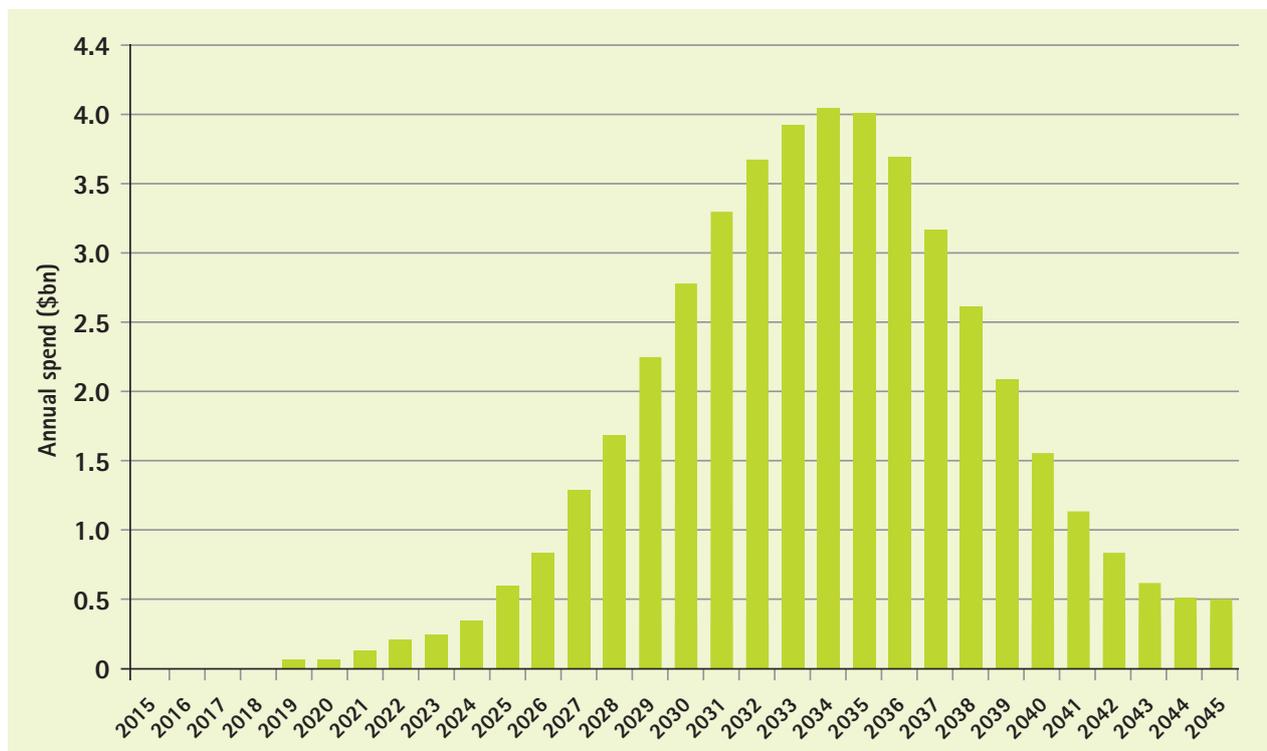
Table 8: Melbourne's North share compared to Melbourne metro – summary table (BAU case)

Industry	2005	2010	2015	2020	2025	2030	2035	Change (2015–2035)
Share of metro GRP	16.7%	16.6%	16.8%	16.9%	16.6%	16.4%	16.2%	-0.6%
Share of metro population	22.4%	22.4%	22.7%	22.9%	23.1%	23.4%	23.6%	0.9%
Share of metro resident employment	21.8%	22.2%	22.6%	22.7%	22.9%	23.1%	23.3%	0.7%
Share of metro industry employment	18.2%	18.2%	18.4%	18.2%	17.8%	17.4%	17.0%	-1.4%

Source: NIEIR modelling.

The *Northern Horizons* report identified 37 infrastructure projects that would benefit the northern economy as well as the broader Melbourne metropolitan region. Projects were listed as short (20), medium (14) and long term (3) with a total average expenditure in the order of \$50 billion. For the purposes of the modelling exercise, a start year was assigned based on whether the project was short, medium or long term. In addition each project was attributed to either Melbourne's North Inner or Melbourne's North Outer. Figure 4 provides an expenditure chart for these infrastructure developments; the sooner the investment in the proposed infrastructure developments occurs, the sooner the benefits to GRP and employment growth.

Figure 4: Melbourne's North – annual infrastructure spend



The modelling uses the methodology and infrastructure multipliers published in the *State of the Regions* report, and a profile of an annual 'shock' to NIEIR's regional model was applied. The results from the model are presented in this report in terms of additional GRP and additional industry employment.

Figure 5: Melbourne's North – gross regional product

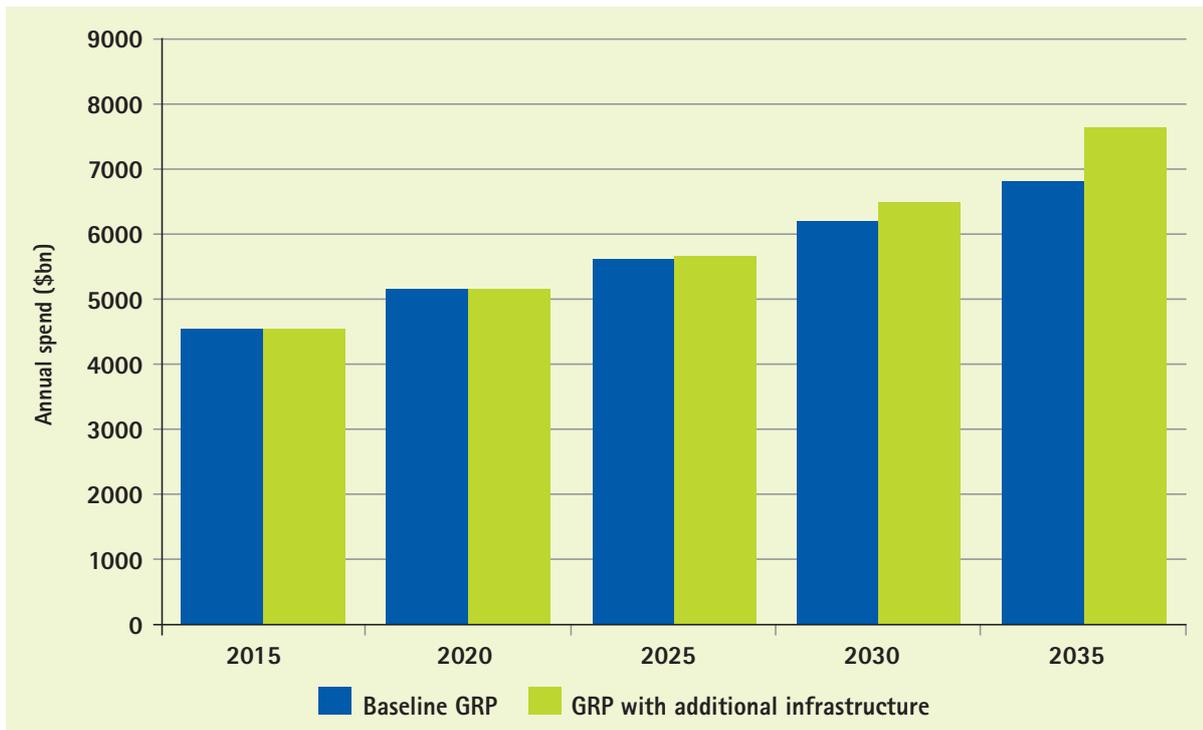
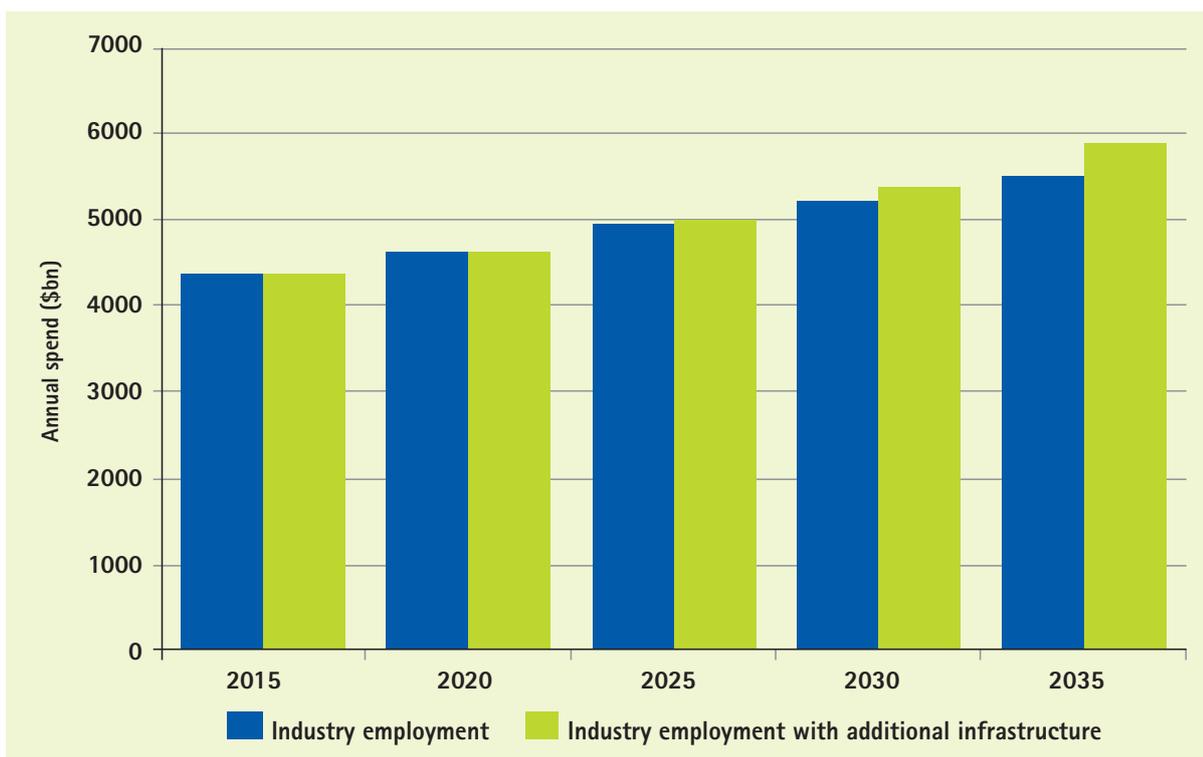


Figure 6: Melbourne's North – industry employment



The modelling demonstrates that the benefits to the region's economy from this investment by 2035 will be an additional 12% added to GRP (\$8.13 billion), resulting in an additional 7% rise in industry employment (39,000 extra jobs in Melbourne's North). Benefits to the economy start to have an impact in 2030, with 5% added to GRP and 3% to employment. For more detail, refer to Chapter 16 of the full report.

7. MELBOURNE'S NORTH: INDUSTRY AND OCCUPATION STRUCTURE – 2015 TO 2035

Chapter 17 of the full report provides industry and employment forecasts for Melbourne's North to 2035. Table 9 gives industry GRP for the region, assuming a business as usual scenario. Industry sector growth will be further accelerated by investment in infrastructure as described in the previous chapter. For the larger scale industries the fastest growth in industry GRP and largest sector overall when measured by GRP by 2035 will be Construction, at an average of 5.2% per annum to \$7.4 billion. If infrastructure investment is strong, this sector will grow faster than forecast here.

The Health care and social services sector, the second largest industry sector in Melbourne's North when measured by GRP, is forecast to have an annual average growth rate at 1.9% to 2035. The Education and training sector is forecast to grow at a per annum average of 3.1% to 2035. The Transport and logistics sector is forecast to grow at an average annual rate of 1.3%, with its value of GRP rising to \$6.3 billion. For the Manufacturing sector, assuming the predicted growth of food process manufacturing partly offsets the closures in the automotive manufacturing sector, the annual average industry growth rate to 2035 is forecast at 0.5%. This figure assumes a decline in the manufacturing industry's GRP over the next 10 years.

Table 9: Melbourne's North – industry sector growth forecasts for gross regional product (\$ million)

Industry	2015	2020	2025	2030	2035	Average annual growth (2015–2035)
Agriculture, forestry and fishing	324.2	351.7	386.0	442.5	500.7	2.2%
Mining	182.1	213.6	223.1	253.3	291.8	2.4%
Manufacturing	5052.4	4904.2	4972.4	5160.3	5540.2	0.5%
Electricity, gas, water and waste services	1505.1	1528.2	1685.4	1853.2	2018.6	1.5%
Construction	2710.7	3733.1	4713.5	5925.6	7412.7	5.2%
Wholesale trade	3333.8	3662.4	4058.0	4423.4	4773.0	1.8%
Retail trade	3866.7	4295.0	4692.3	4858.7	5154.5	1.4%
Accommodation and food services	1366.5	1512.3	1560.1	1600.9	1532.9	0.6%
Transport, postal and warehousing	4819.0	4892.8	5354.2	5820.4	6275.0	1.3%
Information media and telecommunications	1248.4	1365.3	1436.1	1521.2	1654.3	1.4%
Financial and insurance services	3268.8	4003.6	4619.7	5361.3	6305.9	3.3%
Rental, hiring and real estate services	1577.3	1789.4	2196.8	2689.5	3261.6	3.7%
Professional, scientific and technical services	3248.1	3925.4	4332.8	4742.0	5184.5	2.4%
Administrative and support services	1292.7	1422.7	1402.8	1435.6	1453.5	0.6%
Public administration and safety	2214.1	2502.4	2461.9	2459.6	2394.6	0.4%
Education and training	3221.3	3931.0	4525.3	5213.2	5876.1	3.1%
Health care and social assistance	4935.9	5809.4	6219.7	6657.2	7254.7	1.9%
Arts and recreation services	330.2	400.3	386.1	384.8	411.9	1.1%
Other services	1030.6	1108.1	1147.2	1232.7	1328.8	1.3%
TOTAL	45528	51351	56374	62035	68625	2.1%

Note: Table 9 gives industry gross regional product (GRP) at market prices with indirect taxes.

Source: NIEIR modelling.

Table 10 gives the likely change in qualification demand by industry sector comparing 2015 and 2025. Findings are from the from the Melbourne's North NIEIR industry survey 2015.

Table 10: Differences in level of qualifications from 2015 to 2025 by industry sector (%)

Business sector	Bachelor or higher			Certificate III, IV and Advanced Diploma		
	2015	2025	Difference	2015	2025	Difference
Agriculture, forestry and fishing	35.1	36.6	1.4	24.3	29.4	5.1
Mining	45.0	55.0	10.0	0.0	0.0	0.0
Manufacturing	21.8	31.1	9.2	36.9	42.4	5.5
Electricity, gas, water and waste services	0.0	0.0	0.0	0.0	0.0	0.0
Construction	20.0	27.6	7.6	41.8	50.9	9.1
Wholesale trade	27.0	35.4	8.4	27.5	34.4	6.9
Retail trade	12.5	21.3	8.8	44.5	48.5	4.0
Accommodation and food services	0.0	0.0	0.0	43.3	43.3	0.0
Transport, postal and warehousing	18.8	41.7	22.9	40.0	53.8	13.8
Information media and telecommunications	62.5	80.0	17.5	68.8	57.5	-11.3
Financial and insurance services	66.7	75.0	8.3	70.0	62.5	-7.5
Rental, hiring and real estate services	50.0	50.0	0.0	80.0	100.0	20.0
Professional, scientific and technical services	66.0	68.0	2.0	28.4	30.3	1.9
Administrative and support services	27.5	30.0	2.5	30.0	45.0	15.0
Public administration and safety	25.0	32.5	7.5	35.0	40.0	5.0
Education and training	52.6	65.1	12.5	69.2	62.8	-6.4
Health care and social assistance	72.2	81.1	8.9	38.6	39.5	0.9
Arts and recreation services	47.0	51.0	4.0	73.8	75.0	1.3
Other services	39.1	54.9	15.8	58.8	54.2	-4.6

Source: NIEIR Online Survey.

Table 11 shows the change in the number of workers in the 2-digit level ANZSCO occupations by industry located in Melbourne's North. By 2035 the largest number of any 2-digit occupation type employed in Melbourne's North is Sales assistants and sales persons. For a detailed industry and employment forecasts, refer to Chapter 17 of the full report.

Table 11: Occupations by Melbourne's North industry: number of employees per occupation and average annual growth – 2-digit level ANZSCO

Industry	2015	2020	2025	2030	2035	Average annual growth (2015–2035)
Farmers and farm managers	872	1,067	1,183	1,340	1,497	3.6%
Education professionals	18,271	21,313	23,043	24,637	26,903	2.4%
Food trades workers	6,686	8,612	9,341	9,746	9,819	2.3%
Sales support workers	9,993	13,133	14,266	14,146	14,341	2.2%
Sales representatives and agents	7,793	8,694	9,373	10,087	10,991	2.1%
Storepersons	7,494	8,376	9,144	9,729	10,490	2.0%
Protective service workers	5,820	6,173	6,722	7,330	8,011	1.9%
General clerical workers	8,842	10,026	10,678	11,281	11,976	1.8%
Personal assistants and secretaries	3,226	3,555	3,799	4,039	4,318	1.7%
Clerical and office support workers	3,637	4,178	4,440	4,624	4,854	1.7%
Other labourers	7,369	9,065	9,683	9,724	9,789	1.6%
Engineering, ICT and science technicians	7,300	7,942	8,477	8,989	9,616	1.6%
Road and rail drivers	14,038	14,882	16,267	17,404	18,458	1.6%
Carers and aides	17,804	19,449	20,585	21,834	23,394	1.6%
Food preparation assistants	7,544	8,349	9,066	9,801	9,827	1.5%
Machine and stationary plant operators	4,680	4,902	5,278	5,623	6,060	1.5%
Numerical clerks	12,784	13,307	14,327	15,305	16,512	1.5%
Hospitality workers	8,315	9,356	10,100	10,868	10,729	1.5%
Business, human resource and marketing professionals	17,556	18,792	20,071	21,288	22,618	1.4%
Hospitality, retail and service managers	17,639	19,446	20,933	21,754	22,516	1.4%
Specialist managers	26,504	27,375	29,456	31,434	33,821	1.4%
ICT professionals	5,708	6,021	6,459	6,832	7,272	1.4%
Factory process workers	10,672	10,981	11,965	12,678	13,499	1.3%
Office managers and program administrators	8,233	8,845	9,399	9,850	10,389	1.3%
Design, engineering, science and transport professionals	16,354	17,356	18,530	19,544	20,550	1.3%
Mobile plant operators	6,020	5,884	6,440	6,940	7,512	1.2%
Chief executives, general managers and legislators	4,233	4,349	4,654	4,934	5,238	1.2%
Health and welfare support workers	4,386	4,901	5,105	5,209	5,427	1.2%
Other clerical and administrative workers	9,733	10,183	10,685	11,319	11,978	1.2%
Legal, social and welfare professionals	7,030	7,572	8,017	8,356	8,617	1.1%
Arts and media professionals	4,746	5,140	5,355	5,487	5,717	1.0%
Cleaners and laundry workers	7,170	7,629	7,945	8,299	8,568	1.0%
Electrotechnology and telecommunications trades workers	8,974	8,510	9,178	9,856	10,708	1.0%

Table continued

