Engineering Industry Insights-
Current Trends and Outlook

A Manpower Market Insights Paper

June 2009
Australia

What do you do?

Manpower

"Engineering is the art and science of production. It is a pragmatic activity that draws on imagination, judgement, integrity, and intellectual discipline to apply science, mathematics and practical experience to design and operate useful objects and/or processes that meet the needs and expectations of people." *(Source: Engineers Australia, 2006)*

The global economic and financial crisis has brought an end to a period of sustained strong expansion in the engineering construction sector…… *(Source: Australian Industry Group, State of Play Report 2008)*

Engineering construction is forecasted to fall despite the Federal Government's funding boost, with the global downturn to heavily impact other sources of activity. According to economic forecaster BIS Shrapnel, the best Government efforts to counter the global financial crisis and associated economic downturn via an infrastructure-led economic stimulus will not be enough to prevent a significant decline in total engineering construction. As a result of the global economic and financial crisis, the industry is facing a range of pressure points which pose a risk to the medium term outlook. This includes continued slowing in the domestic economy, volatile financial conditions, and the increased difficulty in raising funds, which are the potential source of increasing delays in project commencements, or the cancellation of work planned.

The impact of the global credit crunch is reflected in a deceleration of growth to 6.7% in 2009/10[1]. However, some market segments in the engineering construction sector are expected to grow. For example, the latest Australian Industry Group/Australian Constructors Association Construction Outlook Survey reveals that the infrastructure market is expected to record further growth of 8.4%, supported by Federal and State Government funding commitments. A high volume of work is expected to continue in the utilities segment, with revenue sewerage and water supply and electricity generation projects forecast to rise by 19.6% and 14.5% respectively. This is consistent with the $70 billion of projects currently earmarked for both sectors. Other key growth areas include road and rail projects, and pipelines with projects in this sector to be boosted by work associated with the oil and gas sector and water infrastructure[2].

Aside from the global economic and financial crisis, securing future workloads is the most significant challenge but however the skill shortages remain as the sector's biggest concern. Engineers Australia estimated that Australia would need another 20,000 to 30,000 engineers[3], particularly in the electrical power, civil, resources and petroleum areas. While there is a lot of work being done to increase the number of skilled migrants coming into the engineering sector, the shortfall shows no sign of decreasing.

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[1] *Australian Industry Group, Australian Constructors Association, "Construction Outlook, October 2008".*
[2] *Australian Industry Group, Australian Constructors Association, "Construction Outlook, October 2008".*
[3] *Engineers Australia*

While the global economic downturn is expected to drive a sharp slump in private sector funded work, private funded work is still exceeding its public sector counterpart for the foreseeable future.

(Source: BIS Shrapnel Report, Engineering Construction in Australia, 2008/09- 2022/23)

In this report, the Engineering Industry is categorized into two sectors:

Engineering Construction- This sector includes construction normally identified as infrastructure projects such as roads and bridges, railways, airports, dams, electricity transmission and generation, water and sewerage, the construction of oil, gas and coal production, oil platform, mineral processing facilities and other heavy industrial facilities, the construction of mines and other utilities.

Engineering Consultancy Services- Major services in this sector includes: undertaking project feasibility and environmental impact studies; project design and management including the coordination of documentation, asset management, construction process and quality control. Consulting engineering services account for a significant large portion of Australia's building services export[4].

Structure of Engineering Industry*

Engineering construction activity in Australia was historically predominantly funded by the public sector. However, a strong, consistent increase in the private sector funded share since the mid-1990s, and especially in the last six years, has seen work funded by the private sector surpass work funded by the public sector since 2002/03. This has been accelerated by the effective privatisation of Telstra. While the global economic downturn is expected to drive a sharp slump in private sector funded work, private funded work is still exceeding its public sector counterpart for the foreseeable future.

In 2007/08, work done for the public sector (by its own labour force or on a private contract basis) accounted for 36 per cent of the value of engineering construction work done. Private sector expenditure contributed the other 64 per cent. The proportion funded by the private sector has risen steadily since the early 1990s, but has surged since 2000/01 (37 per cent).

It should be noted that the largest segment of private sector activity is *heavy industry* (which includes mines, oil platforms, minerals processing facilities and other heavy industrial facilities). When heavy industry is excluded, leaving the 'infrastructure' categories, work funded by the public sector accounts for 53 per cent of work, and private sector funded work 47 per cent.

In terms of who performs the work, the split is widening in favour of outsourced work versus 'inhouse' labour forces. This is being driven by the strong growth in work funded by the private sector, rather than by increased outsourcing in the public sector. The public sector mainly uses its own labour force, with 49 per cent of its work going to private contractors in 2007/08. Work done by the private sector was valued at nearly $50 billion in 2007/08 (in current prices), 82 per cent of the total value of engineering construction.

**Information in this section was obtained from BIS Shrapnel Report- Engineering Construction in Australia, 2008/09-2022/23*

[4] *Australian Trade Commission*

Engineering is a key driver of Australian economic growth, with expertise across infrastructure projects including railways, dams, roads and bridges, major pipelines and electricity and other utilities…

Market Size

Australian has a highly advanced engineering construction sector. The engineering construction sector accounts for around 6%[5] of Australia's GDP, adding approximately $60 billion to the Australian economy and employing around 3%[6] of the workforce.

Currently, the engineering consultancy services sector generated $23 billion[7] in revenue which equal to 2.1% to national GDP and there are about 18,000 firms in the industry[8].

Key Industry Facts and Figures:

- Recent solid activity and strong investment has resulted in further jobs creation with total employment rising by 9.2% in the year to July 2008. This follows growth of 7.2% during the previous 12 months period and maintains the upward trend of the past seven years[9].
- Over the last five years, exports of engineering consultancy services have averaged $400 million per year[10].
- Over two-thirds of employees in the engineering industry are employed in firms with over 300 staff and the total income generated by engineering firms in 2006 was $9.3 billion[11].
- The seasonally adjusted estimate for the value of total engineering construction work done rose 5.1%, to $17,591 million, in the December quarter 2009[12].
- In the engineering sector, coal, oil and mineral projects dominate, with $25.4 billion of work to be done. Roads and highways account for $11.5 billion of work to be completed (up 45 per cent on a year ago). Other work is spread over a number of sectors led by water storage with $3.6 billion[13].
- A shortage of engineers is anticipated to impact Australia's shift to environmentally friendly energy generation[14].

[5] *Manpower estimate, May 2009*
[6] *Manpower estimate, May 2009*
[7] *IBIS Report, Engineering Consultancy Services, Dec 2008*
[8] *Australian Consulting Engineering Association, Industry Fact Sheet*
[9] *Australian Industry Group, Australian Constructors Association, "Construction Outlook, October 2008"*
[10] *Australian Consulting Engineering Association, Industry Fact Sheet*
[11] *Australian Consulting Engineering Association, Industry Fact Sheet*
[12] *ABS, Engineering Construction Activity Australia, Dec 2008, category no. 8762.0*
[13] *CommSec, Economic Insights Report, January 2009*
[14] *IBIS Report, Construction Industry, Oct 2008*

Key Drivers:

Underlying global and domestic drivers of higher levels of investment in engineering construction and engineering consultancy services include:

- Continued strong economic growth in China and India;
- Level of private and public fixed capital expenditure;
- Growth in GDP;
- Rising commodity prices, including iron ore, coal, aluminium and nickel;
- Ageing infrastructure and past underinvestment by governments in economic infrastructure, particularly in utilities, road and rail infrastructure, and ports and harbour related construction;
- And population growth from an increase in the birth rate and higher levels of immigration and interstate migration.

Industry Trends, Forecast and Outlook

Engineering construction

Engineering construction work done has now peaked, with the onset of the global financial crisis and the moderation in commodity prices meaning that the flow of large mining related engineering projects is over for the time being. However, long project lags in the sector mean that work done will hold up in the short term as the pipeline of existing projects is slowly completed over the next 12-18 months despite the slowdown in project commencements. Growth in engineering construction work is expected to be limited to government backed road, electricity and water infrastructure spending.

Five Year Forecast*

- The engineering construction sector is forecast to experience more stable conditions over the five years to June 2014, with sales growth of 3.1% per annum.

- Over the five years to 2013-14, this sector will experience average annualised growth in enterprise numbers of 2.7% per annum.

- Employment levels for this sector will increase at an average annualised rate of 2.7% per annum over the five years to 2013-14.

- The overall slow-down across the construction division during this period will reduce demand for qualified trades-people and apprentices. In addition, a number of people employed by this sector are expected to exit their jobs due to retirement.

- This sector is forecast to pay $62.8 billion in wages by 2013-14, representing an average annualised increase in the wage bill of 2.5% per annum over the five years period. As a share of total revenue for this sector, wages are forecast to decline from 32.8% in 2009-10 to 31.9% by 2013-14.

** Forecast data in these sections were obtained from IBIS World Industry Report*

Engineering Consultancy Services

During the current year, demand for consulting services is expected to remain strong in the road and bridge construction market driven by several large scale private and publicly funded projects which are less susceptible to short term fluctuations in the economy. Demand conditions are also estimated to strengthen moderately in the engineering infrastructure market driven by committed investment into pipeline, electric power and oil and gas developments. Demand for engineering design, procurement and construction management services is expected to stall in the non-residential building during 2008-09 reflecting the impact of the weaker economic outlook on demand for commercial and industrial building construction (notably offices, retail stores and factories).

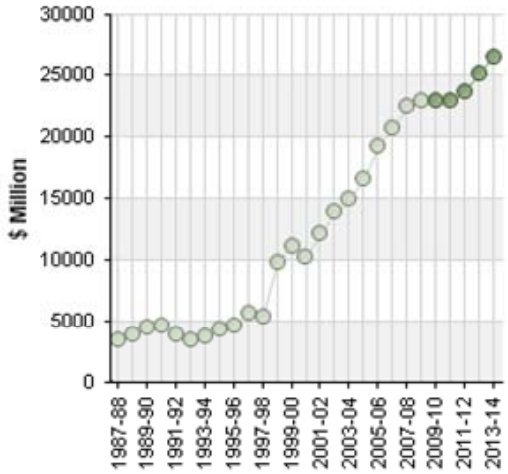
Five Year Forecast*

- The pace of industry revenue growth is forecast to strengthen midway through the outlook period to 2014, reflecting the return to synchronised cyclical growth in the building markets and improved demand conditions in the infrastructure markets.

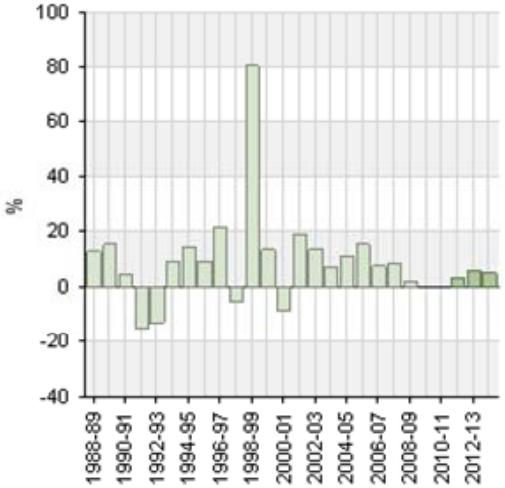
- Industry revenue is forecast to strengthen moderately and grow by around 3.3% to $24.65 billion in 2011-12, and by around 6.0% per annum over the next two years to total $26.60 billion in the year ending June 2014, to around 15.6% above the estimated current level, and more than twice the level recorded in the 2001-02 industry survey.

- Industry employment is forecast to average 2% to 4% per annum late in the outlook period to total 105,000 persons in 15,500 establishments by 2013-14.

Revenue



Revenue Growth Rate



Source: IBIS World, Engineering Consultancy Services Report, December 2008

** Forecast data in these sections were obtained from IBIS World Industry Report*

The slowdown in global economic conditions during 2008-09 and particularly the meltdown on international financial markets has filtered through to demand conditions for engineering infrastructure. *(Source: IBIS World, Construction Industry Report, Dec 2008)*

Market Segment Outlook

Engineering Construction-
Heavy Industry and non-building construction segment*

The major products and services in this segment include:

- Mine construction
- Electricity generation and distribution facilities
- Gas, oil refineries and chemical plant construction
- Telecommunication facilities - cable laying, switching stations etc.
- Water supply & storage infrastructure including treatment plants
- Sewerage and drainage
- Railway infrastructure - track laying, embarkation facilities
- Recreation infrastructure - sporting arenas, theme parks etc.
- Harbour, airport and port facilities

The slowdown in global economic conditions during 2008-09 and particularly the meltdown on international financial markets has filtered through to demand conditions for engineering infrastructure. The concerns about the weaker demand for commodity exports to China point to a reappraisal of developments in the mining and energy sector, which has coincided with the completion phase of several large scale developments.

- The total heavy industry and non-building construction segment revenue is forecast to climb in line with downstream demand to reach a record $45.25 billion in the year to June 2014, to approximately 5% above the current level and around twice the level of early 2000s.

- Employment is forecast to climb to around 125,000 persons by the end of the outlook period (2014), reflecting a decline by 1.5% per annum over the five years, reflecting the greater use of subcontracted labour on the more geographically dispersed large scale railway, pipeline, water, and mining infrastructure projects.

** Forecast data in this section was obtained from IBIS World Industry report and the Construction Forecasting Council*

Oil and Mineral infrastructure

Engineering construction in the total heavy industrial infrastructure market (including mainly the construction of oil and mineral infrastructure along with refineries, chemical plants, paper mills, and other industrial processing plants), is forecast to contract by an average 3.2% per annum over the five years to June 2014, associated with the completion of several large scale energy development projects and the impact on future investment by the downturn in world demand conditions.

Telecommunications infrastructure

Activity has risen strongly over the past few years with the roll-out of Telstra's Next G network. However, with this project now completed, the passing of this, telecommunications construction activity is forecast to slow to a more normal level until work begins on the installation of the infrastructure for the Government's national broadband network (expected to be some time in 2009/10 or 2010/11).

Investment into the engineering construction of telecommunications facilities has been forecast to have an average growth of 5% per annum over the outlook period to 2014.

Railway Infrastructure

The value of work done in this segment has more than doubled between 2003-04 over the past four years, driven by mining related infrastructure projects needed to get minerals to port. The existing pipeline of mining-related transport infrastructure projects is expected to keep this type of construction at a high level for the next 18 months, and the latest information from the Construction Forecasting Council indicates that the $2 billion Oakajee rail and port project is still going ahead for commencement in 2010, which will further support the level of construction.

The railway infrastructure segment is projected to provide some stimulus to industry expansion and averaging moderate growth of 2.8% per annum over the outlook period to 2014, despite further cyclical contraction over the short term.

Electricity and Pipeline Infrastructure

Activity has been rising strongly over the last two years as shortage in generation capacity is being addressed. As demand for "green" energy increases (especially if the government introduces a carbon tax or emissions trading scheme, increasing the cost of generating non-green electricity), this will in turn drive a need for large scale investment in electricity infrastructure. Thus the Construction Forecasting Council forecast that investment levels in this type of construction to remain strong over the forecast period.

The value of electricity infrastructure construction is forecast to average solid cyclical growth of 4.0% per annum over the outlook period to 2013-14.

Water & Sewerage Infrastructure

Strong demand for engineering construction services in the water treatment, storage and distribution market is forecast to prevail over the outlook period to 2014, despite some downward correction in total investment. Activity has surged as governments have finally moved to address the inadequacies in Australia's water infrastructure highlighted by the ongoing drought. Ongoing infrastructure development aimed at securing Australia's water supply, such as the Desalination Plant in Wonthaggi, Victoria (valued at $3.1 billion) will maintain activity in this type of construction at a high level.

** Forecast data in this section was obtained from IBIS World Industry report and the Construction Forecasting Council*

The threat of recession does not fully affect the road and bridge construction market, since it performs an integral role in the Australian economy.

(Source: IBIS World, Road and Bridge Construction Report, Dec 2008)

Road and Bridge Construction Segment*

The threat of recession does not fully affect this segment, since it performs an integral role in the Australian economy. Underlying demand for the construction of new roads and bridges is determined by trends in population growth and geographic dispersal, economic growth and structural change involving the geographic dispersal of economic activity.

The Road and Bridge Construction segment is forecast to record moderate revenue growth averaging 2.7% per annum over the outlook period to June 2014, roughly matching the pace of Australia's GDP growth. The value of work done in the road and bridge construction market is forecast to climb by an average 3.0% per annum over the outlook period, while investment trends in most other non-building infrastructure markets will ease back from the current record levels. Demand for road construction services will continue to be supported by high levels of private sector investment committed to highway infrastructure projects, the increased demand for roadworks on new housing subdivisions, and the buoyant levels of public sector infrastructure funding under multi-year appropriations.

The trend for State and Local Governments to outsource engineering construction activity to private contractors will continue over the forecast period and the value of work done by private sector contractors will grow by 3.4% per annum through to 2013-14, while engineering construction activity by public sector authorities is forecast to average subdued growth of 1.2% per annum.

Industry employment is forecast to grow to approximately 43,000 persons in 2013-14, with approximately 45,000 full-time equivalent persons working in the industry's subcontractor labour force.

** Forecast data in this section was obtained from IBIS World Industry Report and the Construction Forecasting Council*

While some major minerals and energy projects continue, the much weaker commodities outlook will hit Western Australia hardest of all……..

(Source: BIS Shrapnel Report- Engineering Construction in Australia, 2008/09- 2022/23)

Forecast by state*

New South Wales - A very strong year in 2008/09 will give way to a 15 per cent fall in activity in New South Wales in the three years to 2011/12. Mining will be a major driver in across the state, as well as the end of this round of electricity and water investments.

Victoria - Activity in Victoria is expected to increase steadily due to a strong need for work. Road and rail works are being fast-tracked, while there is an acute need for the next water, sewerage and electricity projects.

Queensland- A 30 per cent fall in engineering construction activity in Queensland is expected in the period to 2011/12. Weaker minerals demand will be pivotal on mine projects, but also for civil investment. The end of several 'once every 20 years' projects will also be significant.

South Australia - Activity in South Australia will be supported by vital projects in water, sewerage, electricity and the Northern Expressway, before the Olympic Dam expansion from 2011. Overall, it is a positive outlook for the state.

Western Australia - While some major minerals and energy projects continue, the much weaker commodities outlook will hit Western Australia hardest of all. BIS Shrapnel is forecasting a 35 per cent fall in activity over the next three years.

Tasmania - Activity in Tasmania is expected to fall back 20 per cent by 2011/12, led by the end of this round of electricity projects, but BIS Shrapnel's outlook does not include the $2 billion Gunns Pulp Mill, so there may be some upside here.

Northern Territory - Activity in the Northern Territory is dominated by major resources projects. The end of the Gove alumina refinery expansion will send activity backwards, before the Ichthys LNG plant will boost activity from 2011/12.

Australian Capital Territory - the outlook for the Australian Capital Territory is quite positive, led initially by much-needed water supply and electricity investments, before the next road and telecommunications projects in the early 2010s.

** Forecast data in this section was obtained from IBIS World Industry Report and the Construction Forecasting Council*

"The Australian engineering workforce is ageing, with up to a third of the existing workforce reaching retirement age in the next 5 years." *John Vines OAM, CEO of APESMA*

Key Trends in Engineering Labour Market

In recent years, Australia has experienced severe engineering skills shortages. An industry expert indicated that Australia is facing an ever increasing shortage of qualified engineers with the country already falling 28,000 short and if governments continue to ignore the evidence, the current shortage of 28,000 engineers will more than double in the next 10 years or so[15].

Recent Trends*:

- In Australia the supply of engineering graduates over the past 5 years has been static and at some universities engineering courses and school have been closed. At the postgraduate level, the availability of course work based programs has declined significantly at most universities.
- Within OECD countries, Australia produces the lowest percentage of engineering graduates.
- Impact on the supply side- increasing proportion of engineering graduates who intend to work overseas early in their careers and it is possible that an increasing proportion of engineering graduates will pursue careers in fields other than engineering.
- In addition to the general high rate of attrition, APESMA research shows that female engineers are leaving the profession at an even higher rate than males. While females now make up around 20% of all engineering graduates they represent only 9% of the overall engineering profession- a figure which has changed little over the past decade.
- Impact on remuneration- The demand/supply relationship for engineers has, over recent years, resulted in upward pressure on engineer remuneration, particularly in Western Australia, Queensland and the Northern Territory, where the private sector resource based companies have been active in ensuring that they have appropriate engineering capability.
- In 2006, the supply of new engineers was 11,134 (5044 new domestic graduates and 6090 new migrant engineers).
- The engineering workforce is aging, with up to a third of the existing workforce reaching retirement age in the next 5 years.

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[15] http://www.myfen.com.au/Article/Engineer-shortage-could-double-in-10-years/202027.aspx

** Information in this section was mostly obtained from John Vines OAM, CEO of APESMA, Background Paper- Key Trends in the Professional Engineer Labour Market*

Conclusion

Engineering is a major driver of Australia's economic growth. In 2009, the outlook for the engineering industry has weakened with the turmoil in the world economy. However, no economic recession will last forever and general growth is still continuing in the infrastructure market.

Aside from the global economic and financial crisis, securing future workloads is the most significant challenge however, the continuing skill shortage remains as the sector's biggest concern.
This ongoing shortage means that firms need to develop innovative and effective strategies, to ensure that they can both attract and retain these qualified professionals. Especially when Australia has passed the current economic crisis, the skill shortage problem will become more serious. Government and industry should provide support for the development of training programs in engineering specialties so as to ensure that Australia has advanced technical capabilities which ensures high levels of engineering skills in Australia.

About Manpower Inc.

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