Submission No 17

INQUIRY INTO SKILLS SHORTAGES IN RURAL AND REGIONAL NSW

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Theme:

Summary

The Association of Consulting Engineers Australia

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Submission to

Parliament of NSW Legislative Council Standing Committee on State Development

Inquiry into skills shortages in rural and regional NSW

July 2005

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ACEA represents Australian consulting engineering firms which provide technology-based consulting services to government and private sector clients in Australia and 40 countries worldwide. Services are provided in building, infrastructure, oil and gas, transportation, mining, communications and information technology, agriculture, food processing and manufacturing.

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INTRODUCTION AND EXECUTIVE SUMMARY

The Consulting Engineering Industry in Australia

The Association of Consulting Engineers Australia (ACEA) represents the interests of nearly 300 engineering and technology businesses providing consulting services to government and private sector clients throughout Australia, both metropolitan and regional, and in more than 40 countries overseas.

The value of construction projects designed by ACEA member firms each year is estimated to be $11 billion. The industry is a significant contributor to the Australian economy in terms of both revenue and employment and provides essential services to clients and the community.

ACEA firms offer a large range of design services for major projects in the fields of building, infrastructure, transport, communications and information technology, project management, environmental management, geotechnical and electrical services, mining, oil and gas.

ACEA firms employ more than 10,000 professionals in Australia alone, and many tens of thousands ancillary staff.

Just over a quarter of ACEA firms are based in New South Wales, making it the largest of ACEA's divisions.

A profile of ACEA and the consulting engineering industry is attached. (**ATTACHMENT A**)

The Standing Committee on State Development Inquiry into rural and regional NSW

ACEA is deeply concerned at the critical skills shortages in consulting engineering firms and believe that they will substantially impact on the development of current and proposed infrastructure development in New South Wales and across Australia.

Against this background, ACEA welcomes the skills inquiry because ACEA believes that urgent action is needed to address the skills shortages in consulting engineering firms.

ACEA summary position

ACEA believes that the position is as follows:

- Engineering design skills in consulting engineering firms are in short supply
- A significant number of specialist engineering skills are in critically short supply
- Project work and infrastructure development nationally will suffer from delays and cost blowouts; some projects will be unable to go ahead
- The shortages will extend over 3-5 years at least
- There may be shortages beyond 5 years.

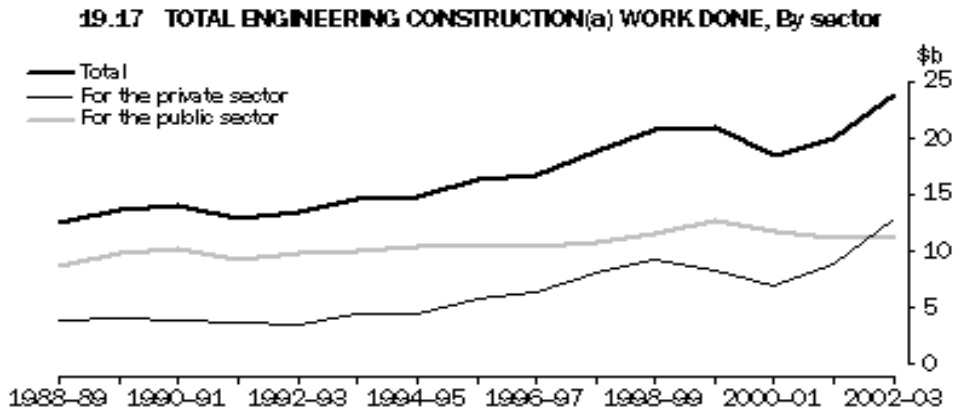
ACEA believes that a two part strategic approach is required to ensure that the demand for consulting engineers is met. That is looking the short terms action needed to assist recruitment and the assessment of longer term demand and supply to resolve ongoing shortages. ACEA has developed a number of recommendations to support this approach and address the ongoing demand for consulting engineers, which are set out in this submission.

THE DEMAND FOR ENGINEERING SKILLS IN CONSULTING ENGINEERING FIRMS

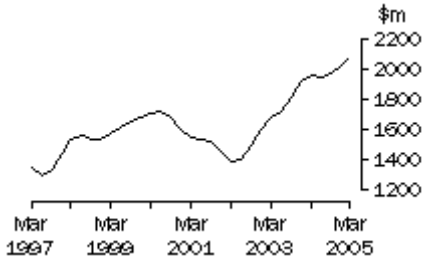
THE WORK DEMAND

Australia is experiencing an unprecedented economic boom. This, and the increasing interest by governments in the development and upgrade of our infrastructure, has led to a dramatic increase in engineering construction project work.

The total value of engineering construction work done across the different sectors during the past 15 years, and the rising trend, is shown below (Graph 19.17 *ABS Year Book Australia).*



The trend estimate for the value engineering construction work done in New South Wales has grown for ten consecutive quarters (Graph: ABS AusStats March 2005):



This trend is set to continue. The NSW Government announced in May 2005 that investment in public infrastructure across New South Wales over the next four years will total $34.7 billion. A significant increase on the $26.6 billion spent in the four years to 2004-05.

Economic statistics and forecasts from ABS, Treasury, Access Economics and our own economist are attached which demonstrate the likely continuation of high demand in the areas driving infrastructure development **(ATTACHMENT B)**.

There is and will continue to be a very high demand for the services of consulting engineering firms.

THE SHORTAGE IN SUPPLY OF ENGINEERS

General Shortages

The engineering design work required to meet this huge demand can only be carried out by highly skilled staff at professional (and also para-professional and trade) levels, applying their high level skills in the design and development of projects.

However experienced professional engineers working on the design of projects in consulting engineering firms are in short supply:

- The numbers of engineering graduates from universities are not sufficient to meet the demand now, and the intakes are falling **(ATTACHMENT C)**
- The number of engineers acquiring specialist skills in many existing and emerging critical areas of engineering design in universities are falling (small numbers and the high cost of training mean that specialist electives and postgraduate courses are closing)
- There is significant and increasing competition for engineers with employer organisations who value the skills of engineers for management and technical support services (as opposed to project design and development):
    - the public sector is recruiting engineers to develop the tenders and to manage the contracts for the growth in government infrastructure programs
    - contractors are recruiting engineers as project managers
    - management, accounting and law firms are acquiring engineers in large numbers to augment their advisory services with high level technical skills
    - banks are recruiting engineers to manage risk and oversee their projects.
- The age profile of the industry has changed; the ABS labour force survey (2003 annual average) showed that 27.8% of mining and materials engineers are between the ages of 45-47 and 14.2% are 55 and over. The same survey showed that the professions with an above average proportion (for a profession) working when 65 years or more included civil engineers and mechanical, production and plant engineers. The Department of Employment and Workplace Relations in their April 2004 report '*Australia's future professional skills need'*

concluded that mining and material engineers where in the top four professions in Australia most at risk from ageing.
- Skills shortages are not confined to rural and regional NSW; ACEA consulting engineering firms report that metropolitan shortages are as significant in NSW as regional shortages.

Specific Shortages

Technological specialisation and niche design demands are increasing, as projects become more complex, but also as areas of work which have been quiet over the last few years become more active e.g. expansion of the power industry needs many more highly skilled power engineers that we have trained to do the work over the last decade.

ACEA undertook a survey of all its member firms in March 2005, which identified a broad range of shortages in specialist areas. Firms that predominately work in NSW identified, civil and structural engineers and construction project managers as the top 3 disciplines in shortage.

A detailed breakdown of specialist areas in shortage as identified by our firms is attached (ATTACHMENT D).

IMPACTS OF THE SHORTAGE IN SUPPLY OF ENGINEERS

In its survey of firms, ACEA also tested the impact that increased demand is having on the capacity of firms to respond to demand. The clear majority of firms stated that the shortage of professional engineers is a critical issue, reducing their ability to meet the needs of clients.

For clients, the primary impacts will be
- major projects not getting the level of skill and experience applied which they require
- time delays and unmet deadlines increasing
- cost blowouts and litigation further slowing projects.

Whilst this is a problem for clients attempting to manage projects, it also slows the streamlining of our national arteries that are vital for us to get our goods and services to local and international markets in as timely and efficient manner as possible. Speeding up investment in the infrastructure required to lift exports of minerals and manufacturers (notably roads, railways and harbours) is especially important for continuing economic development, given potential drops in agriculture revenue from drought.

For the firms themselves, the shortages are restricting their business growth. This is also detrimental to the contribution of such a vigorous and vital industry

sector to Australia's economy through its taxation contribution, and will serve to inhibit the sector's overseas exports (engineering service exports are amongst the highest categories of exports in the building and construction sector).

SUMMARY POSITION

ACEA believes that the position is as follows:

- **Engineering design skills in consulting engineering firms are in short supply**
- **A significant number of specialist engineering skills are in critically short supply**
- **Project work and infrastructure development nationally will suffer from delays and cost blowouts; some projects will be unable to go ahead**
- **The shortages will extend over 3-5 years at least**
- **There may be shortages beyond 5 years.**

WHAT ARE ACEA CONSULTING ENGINEERING FIRMS DOING TO ADDRESS THE SHORTAGES?

ACEA consulting engineering firms are working hard, in an increasingly global market place, to recruit and retain skilled professional engineers:

- Domestically, firms are paying graduate recruits and staff higher salaries that ever before (eg the Graduate Careers Council of Australia, *Gradfiles December 2004* shows that engineering professionals have the highest starting salaries of all professionals). A survey-on-survey analysis of ACEA firms' total fixed remuneration (TFR) compared to other major industries (undertaken by CSi The Recruitment Specialists for 2005) shows that the TFR has increased by 5.1% compared to 2.7% in IT and 4.1% in Banking and Finance.
- Firms are working to encourage an interest in engineering amongst young people. They carry out significant recruitment activity in universities, including participation in careers fairs. ACEA participates in the NSW Indigenous Australian Engineering Summer School (IAESS). ACEA has produced a guide to NSW members of ACEA that contains employment contact details, approximately 1,200 guides have been distributed since March 2005. ACEA has also worked with the NSW Careers Advisers Association to distribute information about careers in consulting engineering. ACEA Firms offer work placements during vacation periods. The NSW Division of ACEA runs competitions in conjunction with members to inspire potential young engineers for example the Water, Energy Challenge Competition as part of Engineering Week in August 2005.
- Increasingly recruitment activity is moving offshore. Firms of all sizes are using professional recruitment agencies, running graduate recruitment programs and participating in careers fairs and forums overseas. Many of the larger firms are recruiting up to 100 engineers per year from overseas, to make up for shortfalls in domestic recruitment. Many more are needed as described.
- To retain staff, firms are offering significant programs around performance bonuses, flexible working hours, staff incentive schemes and international rotation opportunities. Firms also retain recruitment agencies to attract staff.
- Large and small firms are allocating up to 5 per cent of their total budgets on these activities, a significant increase on historical budget allocations in our organisations.

In addition, large firms are outsourcing work overseas, either through joint ventures, or establishment of overseas offices, to tap local design skills (India, the Philippines, and Bangladesh). Basic and routine work is done offshore, then transferred to Australia for final and more complex design onshore.

Even with these measures, there are still not enough engineering skills available to properly do the work required.

ACEA WORK PLAN RECOMMENDATIONS

ACEA believes that both urgent and strategic action is required to relieve the current skills shortages. Skills shortages in consulting engineering firms is a national problem and therefore a number of the recommendations must be pursued by the Federal Government, however we ask that the NSW Government take action through the Council of Australian Governments and other joint Federal and State initiatives to support these proposals.

URGENT ACTION

ACEA asks the NSW Government to consider the following recommendations:

1. ***Expand the National and Regional Skills Shortage Lists and the National and Regional Migration Occupations in Demand Lists (MODL)***

The Federal Government Department of Employment and Workplace Relations (DEWR) Skills Shortage List and the Department of Immigration and Multicultural and Indigenous Affairs (DIMIA) Migration Occupations in Demand List (MODL) needs to be expanded in addition to regional NSW skills shortage lists to better reflect current skill shortages and to be more explicit about the detail of skills required.

'Civil engineering' is recognised on the skills lists, and consulting firms require civil engineers (amongst others). But this definition is a very limited instrument in describing the skills required by consulting firms. Many civil engineers do not have design expertise, and this is the critical skill which consulting engineering firms need. There could be many civil engineers listed as available for work, and there still be skills shortage in consulting engineering firms.

Technical suitability for vacancies is an important consideration in assessing the occupational supply of professional engineers. Vacancy data for such a broad category as 'civil engineers' gives no realistic information on the availability or otherwise of civil engineers with design skills suitable for work in project design firms. A greater differentiation of skill descriptions is required on the lists if accurate assessment of shortages is to be made.

In addition, disciplines of engineering and the skills required by consulting engineering firms other than civil engineering (design) are not identified on the lists. In the past, engineering activity tended to cluster in more narrowly focused and isolated disciplines. This is no longer the case, due to huge technological changes and the speed at which technologies change. The consulting engineering industry now is multidisciplinary and incorporates an array of engineering and technically based management consultancy services such as project management.

While in the long term there needs to be better analysis of supply and demand of both professional and trade engineering services, in order to address the shortage of skills today the lists operated by both Federal and State Governments need to incorporate the shortages that ACEA consulting engineering firms have identified, as below.

The lists need also to be updated, at least annually. ACEA is happy to do annual surveys of firms in conjunction with Federal and NSW Government to identify the relevant information. We are happy also to work in this with Engineers Australia and the Association of Professional Engineers Scientists and Managers of Australia (APESMA).

PROFESSIONAL ENGINEERS IN SHORTAGE	
FUNDAMENTAL DISCIPLINE	**SPECIALISATION**
Civil	Structural Mining Geotechnical Materials Petroleum Traffic and Transport Water Construction project manager Engineering manager
Mechanical	Materials Mining Petroleum Hydraulic and Fire Water Construction project manager Engineering manager
Electrical	Materials Mining Petroleum Water Construction project manager Engineering manager
Chemical/Process	Materials Petroleum Water Construction project manager Engineering manager

ENGINEERING TECHNICIANS IN SHORTAGE	
FUNDAMENTAL DISCIPLINE	**SPECIALISATION**
Engineering Draftspersons	All areas
Construction Supervisory Staff	All areas

OTHER DISCIPLINES:

Environmental Scientists

2. Streamline Entry Processes for Internationally Recruited Staff

Once consulting engineering firms have received applications from prospective employees whom they believe are suitability qualified for the relevant engineering vacancy, the mechanisms for getting that individual into Australia needs to be routinely quick and efficient.

This should particularly be the case where the candidate's engineering discipline appears on the skills shortages lists.

Once the firm has demonstrated that they were unable to find a suitable candidate already in Australia through their normal recruitment processes and the applicant has verified his/her qualifications, in general there need be no further major delay checking qualifications or the numbers of such engineers already in Australia. Other checks on the individual, eg security and health checks need to be streamlined to support the streamlining of professional qualifications.

The target should be routinely to get *prospective employees* to work in Australia within a few weeks of application.

Some case studies where unnecessary delays materially affected an outcome for firms detrimentally are as follows:

CASE STUDY 1

In 2003 a young, highly qualified engineer from Scotland applied to DIMIA for Permanent Residency after travelling to Australia on a Short Term Visa.

The engineer, who was sponsored by one of Australia's most recognised engineering firms, was forced to wait for over 14 months for her application to be approved by the Department of Immigration. Her application was lodged in early February 2003, accompanied by all the requested documentation – including relevant police checks from Scotland Yard, and in late April 2004 the application was finally approved.

During this waiting period the engineer was married, and took on her husbands' surname. All appropriate documentation and transcripts relating her change of both circumstance and name were sent to the Department of Immigration, giving no cause for delay.

Throughout this process the engineering firm found communications with the Department of Immigration to be slow and uninformative. The Department did not acknowledge receipt of any documentation sent to them by the firm, and even after a personal visit to the officer in charge of their case the firm still found themselves frustrated by the Departments seeming inability to communicate effectively.

The engineering firm who sponsored the engineer, believes that there are blockages in the department which are responsible for the enormous and

unnecessary delays associated with gaining permanent residency in Australia, the reasons for which are difficult to assess from outside. It may be that more resources are required in the relevant areas, and/or that codes of practice in relation to communications with applicants and sponsoring firms, and response rates for processing of applications, should be considered.

CASE STUDY 2

A senior engineer, sponsored by a major Australian engineering firm, was forced to wait in excess of 15 months before receiving Permanent Residency in Australia. The engineer, who is considered a world expert in his field, was highly sought after for his knowledge and expertise, and would have been a major asset to the Australian engineering industry.

The application process required both the engineer and his wife (from South Africa) to undergo thorough medical checks, and during these checks the engineer's wife made known that she suffered from what was considered a minor medical condition. Her condition was so mild it did not impact on her way of life in any way, she was not dependant on any medication and doctors did not believe that her condition would deteriorate. Despite these assurances the Department of Immigration, determined that it would be an unnecessary burden on the Australian health care system if she was granted Permanent Residency, and consequentially their application was denied.

After many discussions with the Department of Immigration, and the threat of legal action, the engineering firm was able to intervene. After a lengthy period from when their application was first submitted the engineer and his wife were granted permanent residency in Australia.

Unfortunately, after all the unnecessary and needless delays in getting the young couple approved for permanent residency, they were so disheartened with Australia's bureaucratic systems they decided to return permanently to South Africa.

The engineering firm believes that due to bureaucratic process and poor decision-making in the Department of Immigration they have lost an extremely valuable employee, but more importantly they are also disappointed that the Australian engineering industry has lost the opportunity to learn and gain expertise from an acknowledged world expert.

June 2005

3. Relieve the cost of large scale recruitment on firms

With international sponsorship, firms have significant costs, both before the prospective employee arrives, and afterwards. The costs are particularly onerous where large numbers are sponsored.

- ***Relief on FBT related to the Living Away From Home Allowance (LAFHA) through ATO***

Under the Living Away From Home Allowance (LAFHA) Scheme, international staff recruited to their first job can be paid that part of their salary that is above award rates as an allowance, which has the effect of reducing the amount of tax paid by the individual.

However firms are responsible for payment of FBT on the allowance (or that part above accommodation and living costs), particularly where single professionals (without families) are being sponsored.

ACEA believes that the Australian Tax Office might consider the waiving of FBT in these cases, particularly where large numbers of employees are sponsored (a cut-off point might be selected - over 20, or perhaps 5% of new employment numbers in any one year, is suggested for consideration), as a gesture of relief to the costs of firms.

- ***Relief on costs of health care benefits and more reciprocal health care agreements***

Employers who bring skilled workers to Australia on temporary business entry visas have a number of responsibilities one of which is to pay medical or hospital expenses by making suitable health insurance arrangements. Australia has a reciprocal Medicare arrangement with a limited number of countries, for example the United Kingdom. This affords both the employer and employee reassurance that the costs of immediately necessarily healthcare will be met. However it is not the case with all countries, many of which have highly skilled engineers that Australian consulting engineers would wish to and do recruit, including Germany and European countries, and the United States of America.

Where reciprocal health care arrangements are not in place, employers must then interpret what is meant by '*suitable*' health insurance arrangements, and given the uncertainty, and the disincentive of asking the employee to pay, in most cases firms take out insurance for basic cover on behalf of their sponsored employees. For employers looking to recruit large numbers from overseas this obligation can become very costly, running into thousands of dollars. Some consulting engineering firms may be recruiting more than 100 people from overseas annually. The cost of health cover adds to the firm's other outlay costs, which include employee relocation and visa application fees etc.

Even where firms take out insurance on behalf of their sponsored employees, some employees may wish to have private medical insurance on top of what is offered by their employer or offered through the reciprocal health care arrangements. They will have to budget for this extra cost. Such employees do not have access to Australian social welfare benefits either. In some

circumstances this cost, on top of others, will be enough to deter the employee for choosing Australia as a place to work.

ACEA believes that reciprocal health care agreements could be signed with those countries where consulting engineering firms would look to recruit. A particular mechanism for this could be under the Free Trade Agreements that Australia has signed or is considering with a number of countries around the world.

4. Make approval of sponsorship for permanent residency concessional on guarantees of employment with the sponsoring firm for a minimum of 2 years

ACEA recommends that the rules be amended so that when a consulting engineering firm sponsors an individual's permanent residency, that individual must remain an employee of the firm for a minimum of 2 years.

There is a major disincentive where firms might wish to sponsor prospective employees for permanent residency, in that once permanent residency is approved, the individual has no obligation to remain an employee of the firm that provided sponsorship, regardless of the investment of time and money by the firm.

The problem applies most acutely where prospective employees, for example from South Africa, will refuse an offer of employment from a consulting engineering firm unless the firm is prepared to offer sponsorship of permanent residency from the very beginning. If the firm chooses to sponsor the individual for permanent residency, the firm is taking a risk that the individual, once in the country, can decide not to work for the consulting engineering firm that provided the sponsorship.

The same issue arises where employees are recruited from overseas under a temporary visa (457), then the employee indicates that they would like to remain in Australia under permanent residency. Under the temporary visa, the employee must stay with the sponsoring firm for up to 4 years as a condition of that temporary visa. If the individual has been a successful employee by applying their skills within the consulting engineering firm, and shortages still exist, it is reasonable that the firm might wish to encourage the individual to stay in Australia on a long term basis, by sponsoring for permanent residency. However, again, once permanent residency is approved, the individual has no obligation to remain an employee of the firm that invested in permanent sponsorship.

ACEA believes that these arrangements are inequitable for the consulting engineering firm, they do not reflect the resources which firms must expend to sponsor for permanent residency, and a two year commitment from the employee is reasonable in the circumstances.

Of course, all employees tied to employers in this way should be afforded the normal protections of Australian employment law for the duration of their contracted period.

5. Allow Firms Access to Government Information Portals

A number of ACEA firms have already developed or are developing ways in which to internationally advertise job opportunities.

Federal and State Governments could work together more effectively in order to develop ways to communicate areas of skills shortages to overseas job seekers and to provide simple straightforward immigration and employment advice and information as a coherent package. This should complement the proposed development of a national web portal on Australia's skills assessment and recognition process.

As part of the portal there should be processes in place for qualified job seekers to be quickly matched with potential employers. Federal and State Governments should work with industry so that employers can post applications and job seekers can come straight to potential employers for assessment. If approved, the portal can be then used to fast-track the visa applications through DIMIA.

LONG TERM ACTION

ACEA recognises that shortages in our industry are affected by cyclical influences. Given that, and what is known now of current and proposed demand, ACEA believes that the current cycle will mean shortages for some 3-5 years.

However ACEA is concerned that the fall in engineering graduate numbers, and the dispersal of design engineers across a broader range of commercial organisations not actually delivering engineering design and development services, may constitute structural changes in the education and business environment rather than cyclical ones. If this is the case, and if the current or even similar level of demand to the current continues, consulting engineering firms may have a problem which extends out beyond 5 years, and longer term assessment and development of strategies is required.

Long Term Shortages

6. Establish a strategic review process which assesses the potential for longer term shortages in consulting engineering, three, five and seven years out, with the objective of establishing the means of addressing them.

The following is needed.

- To review the supply of consulting engineers and engineering technicians through the NSW education system and through immigration into the region.
- To assess the demand for consulting engineering services in NSW, whether this has increased/decreased and what factors have influenced the demand.
- To quantify the success of the short term recommendations that have been implemented.
- To forecast future supply and demand needs for consulting engineers in NSW, through ongoing comprehensive and ongoing strategic skills mapping against demand.
- To maintain and develop strategies to ensure that maths and science subjects are promoted a supported in schools, and that maths and/or science is a compulsory subject in senior secondary certificates.
- To maintain and develop strategies to ensure that consulting engineering career pathways are developed and promoted in schools, in tertiary education and in vocational education and training programmes.
- To maintain and develop strategies to ensure that Australia and NSW remains an attractive destination for skilled job seekers and encourages the return of expatriates.

7. ***Involve ACEA directly in all the above to represent the circumstances of our firms and industry.***

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ATTACHMENT A

ASSOCIATION OF CONSULTING ENGINEERS AUSTRALIA

The Voice of the Consulting Engineering Industry

- The Association of Consulting Engineers Australia (ACEA) represents Australian consulting engineering firms which provide technology based consulting services to government and private sector clients in Australia and 40 countries. Services are provided in the fields of building, infrastructure, transport, communications and information technology, project management, environmental management, geotechnical, electrical, mining, oil and gas.

- The ACEA is the voice of engineering firms in Australia. ACEA members number nearly 250 firms in all states and territories. These members constitute some three-quarters of the consulting engineering firms employing twenty or more people in Australia. Most large and medium-sized firms in the industry (over 90%) are ACEA members.

- Engineering consulting revenues of $10.4 billion in 2003/04 were equal to 1.3 per cent of Australia's GDP of $798 billion. Industry revenue has tripled since 1995/96 and share of GDP risen from 0.6 per cent to 1.3 per cent.

- Engineering firms employed 92,000 people in 2003/04, including 50,000 engineering and technical professionals. Employment in the industry has risen by 130 per cent since 1995/96, a much more rapid increase than the 15 per cent rise in national employment.

- The total value of projects designed by ACEA firms in 2002/03 was $25 billion.

- Engineering services accounted for the major share of all service exports related to building and construction – 67 per cent of total building and construction services exports in 2002/03. Engineering consulting exports accounted for 1.4 per cent of Australia's total service exports of $32.5 billion in 2002/03. Exports of engineering services have grown strongly and fairly steadily from $141 million in 1992/93 to $447 million in 2002/03, an average growth rate of more than 12 per cent a year.

- ACEA is represented on major government and private-sector industry bodies concerned with consulting engineering and building and construction. It is also a member of a number of bodies concerned with general business and industry issues.

- There are ACEA offices in all capital cities in Australia.

- ACEA is one of the largest members of FIDIC, the international association of engineering, technology and management firms related to the built and natural environment. FIDIC includes some 67 member associations worldwide.

- ACEA Firms supply the engineering design for the iconic infrastructure projects that define Australia. Projects inlude all of the major facilities for the 2000 Olympic Games, including Stadium Australia, the Superdome, the Olympic Village, the Olympic Flame Lighting Event and Aerial Effects; Sydney Crosscity Tunnel; Alice Springs to Darwin Rail Link; Sydney Opera House; Darling Harbour; Star City Casino; Colonial Stadium Melbourne; Federation Square Melbourne; National Museum of Australia; Sydney Domestic Terminals; the M1 Motorway in Sydney, Citilink in Melbourne and the Inner City Bypass in Brisbane; the WA Maritime Museum; and the Adelaide Convention Centre. Major international projects designed by ACEA firms include Hong Kong Airport, the Singapore Exhibition and Convention Centre, the My Thuan Bridge linking Vietnam and Laos, Shenzen Aquatic Centre, and new Wembley Stadium. ACEA firms were also significantly involved in the stabilisation and remediation of the Ground Zero site in New York City, and have offered volunteer aid and resources to the regions affected by the Indian Ocean Tsunami.

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The Association of Consulting Engineers Australia

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CONSULTING ENGINEERING DEMAND

DRIVERS OF CONSULTING ENGINEERING DEMAND

To demonstrate that total engineering consulting activity is rising and likely to continue to rise, we need to consider engineering construction, non-residential building, and investment in plant and equipment by both the public and private sectors.

TREASURY indicates its views in the Budget Papers, about what is likely to happen to various drivers of consulting engineering demand.

Treasury is bullish about private sector investment:

- 'Business investment is expected to again grow solidly in 2005/06. The growth of business investment in recent years has been broadly based, with the mining sector a particularly important contributor. The investment environment remains favourable, with high capacity utilisation, a relatively low cost of capital and very strong corporate balance sheets.'

Private sector investment consists of two main parts: investment in buildings and structures (non-dwelling construction) and investment in plant and equipment. Treasury is positive about both:

- Private investment in non-dwelling construction (which is the sum of spending on engineering construction for the private sector and non-residential building for the private sector, as reported in the national accounts) is forecast to increase, in real terms, by 2 per cent this financial year and by a further 2 per cent in 2005/06.

- Private investment in machinery and equipment is forecast to grow, in real terms, by 11 per cent this financial year and by 7 per cent in 2005/06.

Treasury also thinks public investment will grow strongly:

- 'Public final demand should grow at a solid rate of 3¾ per cent in 2005/06, with strong growth in public investment and slowing growth in public consumption.'

The demand for consulting engineering services should continue to grow, at least in the year ahead. All of the main drivers of consulting demand – private and public investment in buildings and structures and in machinery and equipment – are forecast to rise.

Treasury is clearly of the view that mining investment will peak in 2005/06, but perhaps at higher levels than forecast:

- 'Higher export prices are not expected to result in a significant increase in investment by mining companies in 2005-06 over that which has already been announced. While it is possible that companies might invest more quickly than anticipated in response to high commodity prices, this upside risk is offset somewhat by the likelihood that commodity prices will fall beyond the present forecast period. As a substantial increase in supply is forthcoming from more recent investment in many countries, it is likely that commodity prices will retract significantly in the medium term.'

DON STAMMER, former Reserve Bank Chief Economist and a good judge of markets, disagrees with Treasury about the likelihood of falling commodity prices:

- 'There is little appreciation, I believe, of how tight the supplies of many commodities will be for several years, given the effect of China's demand and the global underinvestment in minerals and energy over the past decade'. (*BRW*, April 28-May 4, p. 26)

ACCESS ECONOMICS agrees that commodity prices are likely to weaken in 2006, but it still sees mining investment rising. Its forecast of private non-dwelling construction (which includes the construction of mines), is much stronger than Treasury's. Access forecasts an increase of 6.5 per cent this year and 8.7 per cent in 2005/06, compared with Treasury's 2 per cent in both years.

Access Economics outlines in more detail forecasts of areas of engineering construction demand as follows:

Access Economics Forecasts - Planned Building and Construction Projects, Australia

Engineering construction
Delta Electricity and Access Economics publish a quarterly *Investment Monitor* which lists around 2,000 Australian investment projects, each valued at $20 million or more. Table 1, below, draws on December quarter data for engineering construction projects from that publication.

Table 1
Planned Engineering Construction Projects, Australia, at December 2004

	Definite $m	% change on Dec '03	**In planning $m**	% change on Dec '03	**Total $m**	% change on Dec '03
Manufacturing	10,031	11.0%	36,043	-11.5%	46,074	-7.4%
Transport	36,808	13.9%	47,894	14.5%	84,702	14.2%
Communcation	7,829	2.6%	550	-51.3%	8,379	-4.4%
Mining	13,010	-4.3%	61,262	12.2%	74,272	8.9%
Power & water	9,480	16.1%	29,847	6.0%	39,327	8.3%
Rural & forestry	623	21.2%	2,356	17.1%	2,979	17.9%
Total	77,781	9.1%	177,952	9.1%	255,733	9.1%

Source: Access Economics, *Business Outlook March 2005,* p.15.

Access Economics comments:

'Responding to the sharp lift in infrastructure concerns, power and water and transport projects underway are up strongly in the past year, but planned manufacturing projects are easing alongside domestic demand and the strong $A. Overall planned investment remains healthy.

'Australia's commodity exports are set to boom in the next two years, with demand high and global shortages of coal and iron ore pushing prices up still further. As a result, many large-scale **mining and metals** investments are being developed, including BHP Billiton's $1.4 billion Ravensthorpe nickel project and the $730 million Rapid growth iron ore project in WA, as well as Barrack Gold's Cowal Gold project ($355 million) and Xstrata's Rolleston open cut thermal coal mine in Queensland. And there are several other major projects expected to start soon, including Fortescue Metal's iron ore project in the Pilbara, which should help to support a further increase in mining investment over the next two years. Overall mining investment may therefore soon be back to late 1990s peaks.

'In **energy** investment the major projects underway include the huge $3 billion Bayu-Undan gas field (stage 2) and the $1.1 billion Thylacine and Geographe gas field in the Otway Basin. Woodside is also preparing to begin construction at the Enfield development in the Carnarvon Basin.

'Looking further ahead there are a number of major projects in active planning, including the massive $14.6 billion Gorgon LNG joint venture. Preliminary design and engineering will commence shortly at Gorgon. Other big projects in active planning which could support investment over the next couple of years include the $4 billion Olympic Dam expansion (WMC spent $70 million on planning and feasibility studies for the proposal for a potential 2006 start, so BHP may be keen), and the $2 billion plan for the fifth LNG 'train' at the North West Shelf. Western Australia continues to account for a large share of mining investment in Australia, of late led by iron ore, nickel, gold and LNG projects. The latter still has massive further potential – backed by the record $25 billion export deal with China, led by the North West Shelf and Gorgon projects.

'Downstream **chemical manufacturers** have the best chance of good growth during 2005. In Queensland, Stanwell Corp recently announced plans to build a coke manufacturing plant at Rockhampton. The $1 billion investment is still in the early stages of development, with a feasibility study underway and a planned 2006 start to construction. In the west, Alcoa is undertaking an environmental approval process for the giant $1.8 billion Wagerup alumina refinery. The development, Stage 3b, is hoped to be finished by end-2007. Alcoa is also undertaking several other large scale metals manufacturing projects, including the $440 million expansion of the alumina refinery at Pinjarra and the $722 million upgrade to the Portland aluminium smelter.

'Surging steel and energy prices mean Australian **auto manufacturers** are bracing for a cost squeeze. The sector is under further pressure from imports given newly-lowered tariffs. Indeed, the collapse of parts manufacturer Iopn shows the tough times are here. Investments in new vehicles are underway at Holden, Mitsubishi, Toyota, and there isa planned investment mooted for Ford. And **paper, printing and publishing** should see solid growth. Gunns are going ahead in Tassie and UPM Kymmene have plans to build a $1 billion pulp mill at Mt Gambier in South Australia.

'Energy generation investment continues, with Queensland in need of extra base-load power. CS Energy's $1.1 billion coal-fired power plant at Kogan Creek began late last year, and will add 750 MW to the Queensland grid. In Victoria, Origin Energy is seeking approvals for a $1 billion base-load gas power plant in the state's west – though it is no certainty. Renewable energy continues to be popular, with Green Pacific Energy's $27 million power station using 'green waste' for fuel in Victoria and Queensland, and Peabody's $30 million environmentally friendly power plant to provide energy to nearby North Goonyella mine, while EnviroMission plan to build a $1 billion, 1 km high chimney stack as part of a green power station, and Stanwell corp and Griffith energy are jointly investing in a $160 million wind farm at Emu Downs, north of Perth.

'**Infrastructure** investment covers roads, rail air and ports. **Aircraft** and associated airport infrastructure investment is strong, with the new Airbus A380 requiring upgrades in Sydney and Melbourne. At Kingsford Smith, an upgrade incorporating new runways, parking and terminal space valued at $586 million is due to begin mid-year. And Tullamarine is undergoing a $220 expansion to make the runways and terminals 'A380 ready'. Elsewhere, Brisbane, Adelaide, Perth and Darwin airports all have developments at various stages of construction and planning. Airlines continue to build their fleets, with Virgin Blue to take delivery of the first of its new 40-strong fleet of aircraft mid-year. Total investment in the new Virgin fleet is $4 billion. Qantas is also committed to fleet expansion, with an order for $200 million worth of new Bombardier planes for QantasLink. The first of these is to be delivered early next year.

'Investment in ports, rail and road has strengthened to cope with surging commodity demand. In **ports**, the Victorian Channels Authority wants expressions of interest for a proposed $545 million dredging of Port Phillip Bay and heads to allow larger vessels to enter. However, Dalrymple Bay and Newcastle remain the focus of particular current attention. **Road** and **rail** infrastructure continues to be dominated by government spending. In addition to several large-scale roadways (Westlink, Lane Cove, Scorseby) in Sydney and Melbourne, the Geelong Bypass is progressing through planning to begin construction mid-year with a price-tag of $380 million.

And in rail, NSW Railcorp is soon to begin taking delivery of its 498 air-conditioned rail carriages, valued at $1.5 billion, while final planning continues on the third railway and port facility at Port Hedland in the Pilbara ($1.4 billion). This latter project should ease transport constraints in the area.

'In **communications**, the NSW Department of Public works is outlaying $300 million on a state broadband network. The roll out is scheduled to begin ASAP and take six months to complete. Elsewhere, Telstra has plans to spend $100 million enhancing its mobile network to allow for 3G technology as well as building extra infrastructure for the network. This comes atop a $1.5 billion spend to upgrade the residential and voice data network, 'Broadband Multi-Services'.

'**Agriculture and forestry** investment in Australia tends to be difficult to track and often of a smaller scale than other engineering construction investment. Currently on the books is a proposal by Sunny Queen Farms to build a poultry and egg farm at Euroa ($30 million) while in Tasmania, Gunns Ltd has announced plans to develop a plantation timber property at Evercreech.'

Commercial construction

Table 2 presents data similar data from the Delta Electricity/Access Economics *Investment Monitor* on commercial construction projects.

Table 2
Planned Commercial Construction Projects, Australia, at December 2004

	Definite $m	% change on Dec '03	**In planning $m**	% change on Dec '03	**Total $m**	% change on Dec '03
Trade	4,658	18%	3,650	-1%	8,308	9%
Business parks	4,366	1%	4,105	26%	8,471	11%
Hotels and resorts	1,824	-24%	8,734	-11%	10,558	-13%
Offices	5,053	-25%	3,044	-4%	8,097	-19%
Education	1,944	-15%	1,535	-5%	3,479	-11%
Health & community services	3,155	-14%	2,519	51%	5,674	6%
Culture, recreation and other	3,110	24%	3,839	-4%	6,949	7%
Business services	928	28%	2,757	-1%	3,685	-9%
Government	5,808	-17%	524	38%	6,332	-14%
Mixed use	4,590	20%	5,403	-23%	9,993	-8%
Total	35,436	-7%	36,110	-3%	71,546	-5%

Source: Access Economics, *Business Outlook March 2005,* p.18.

The earlier strength seen in domestic demand and in recent job growth should maintain momentum in the **commercial construction** sector.

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The Association of Consulting Engineers Australia

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ENGINEERING STUDENTS

Student Enrolments

	All Student Enrolments (No.)							
	1996	1997	1998	1999	2000	2001	2002	2003
Age Group								
<=19	27.1%	27.1%	27.0%	27.0%	27.2%	26.8%	23.7%	22.6%
20-24	32.2%	32.4%	32.8%	33.1%	33.5%	33.8%	34.1%	35.5%
25-29	12.8%	13.2%	13.5%	13.5%	13.5%	13.6%	14.6%	14.6%
30+	27.9%	27.3%	26.7%	26.3%	25.7%	25.8%	27.7%	27.3%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Gender								
Females	54.3%	54.4%	54.7%	55.0%	55.2%	55.0%	54.4%	54.4%
Males	45.7%	45.6%	45.3%	45.0%	44.8%	45.0%	45.6%	45.6%
Mode of Attendance								
Internal								
Full-time	58.7%	57.7%	57.1%	57.2%	56.4%	63.0%	58.6%	58.9%
Part-time	27.9%	26.2%	26.4%	26.0%	26.6%	19.4%	22.3%	21.4%
External	13.4%	13.3%	13.4%	13.7%	13.7%	14.1%	15.5%	15.1%
Multi-Modal	n/a	2.8%	3.1%	3.1%	3.3%	3.4%	3.6%	4.6%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Broad Level of Course								
Doctorate by Research (a)	3.6%	3.7%	3.7%	3.9%	4.0%	4.0%	3.8%	3.9%
Doctorate by Coursework	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%
Master's by Research	1.7%	1.7%	1.5%	1.5%	1.4%	1.3%	1.1%	1.1%
Master's by Coursework	7.1%	7.5%	7.7%	8.0%	8.5%	9.4%	12.5%	13.9%
Other postgraduate (b)	8.4%	8.0%	7.2%	6.8%	6.5%	6.5%	7.7%	7.6%
Bachelor	74.9%	75.3%	76.0%	76.1%	75.7%	74.8%	69.6%	68.4%
Other undergraduate (c)	2.7%	2.3%	2.1%	2.0%	2.0%	1.9%	1.9%	1.7%
Enabling and non-award courses	1.6%	1.5%	1.5%	1.6%	1.8%	1.9%	3.3%	3.3%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Broad Field of Education								
Natural and Physical Sciences	7.5%	8.0%	8.0%	8.2%	8.4%	8.5%	7.6%	7.6%
Information Technology	6.7%	7.2%	7.3%	7.4%	7.6%	8.5%	8.8%	8.3%
Engineering and Related Technologies	7.9%	7.9%	7.7%	7.7%	7.6%	7.3%	6.8%	7.0%
Architecture and Building	2.3%	2.3%	2.3%	2.2%	2.2%	2.1%	2.0%	2.0%
Agriculture, Environmental and Related Studie	2.7%	2.7%	2.6%	2.6%	2.6%	2.3%	2.1%	2.0%
Health	11.8%	11.7%	11.8%	11.7%	11.8%	11.6%	10.9%	10.8%
Education	11.1%	11.2%	11.0%	10.6%	10.7%	10.2%	10.0%	9.7%
Management and Commerce	21.3%	23.0%	23.9%	24.5%	24.4%	24.9%	26.9%	27.5%
Society and Culture	21.5%	23.6%	23.5%	23.7%	23.9%	23.2%	21.9%	21.8%
Creative Arts	6.2%	6.7%	6.6%	6.5%	6.5%	6.2%	6.1%	6.2%
Food, Hospitality and Personal Services	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mixed Field Programmes	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.2%	0.2%
Non-award	1.0%	0.9%	0.9%	1.1%	1.3%	1.4%	2.5%	2.7%
All Students	634,094	658,849	671,853	686,267	695,485	726,418	896,621	929,952

Sources: DEST Selected Higher Education Student Statistics.
Notes:
(a) Higher Doctorate is included with Doctorate by research prior to 2001
(b) Other postgraduate is made up of: Postgraduate qualifying or preliminary, Postgraduate diploma - new area, Postgraduate diploma - ext area and Graduate certificates
(c) Other Undergraduate is made up of: Associate degree, Advanced diploma (AQF), Diploma (AQF) and Other award courses.

ATTACHMENT D

Association of Consulting Engineers Australia

CONSULTING ENGINEERING SKILLS SHORTAGE LIST

PROFESSIONAL ENGINEERS IN SHORTAGE	
FUNDAMENTAL DISCIPLINE	**SPECIALISATION**
Civil	Structural Mining Geotechnical Materials Petroleum Traffic and Transport Water Construction project manager Construction supervisory staff Engineering manager
Mechanical	Materials Mining Petroleum Hydraulic and Fire Water Construction project manager Construction supervisory staff Engineering manager
Electrical	Materials Mining Petroleum Water Construction project manager Construction supervisory staff Engineering manager
Chemical/Process	Materials Petroleum Water Construction project manager Construction supervisory staff Engineering manager

OTHER DISCIPLINES	
Environmental Scientists	All areas
Engineering Draftspersons	All areas