

Subject: Enquiry into “the shortage of engineering and related employment skills”
Individual submission by Colin K Hackney: BSc, BE (Hon – UNSW)

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1) General

The following submission comprises comments against the listed terms of reference based on my experiences and observations in over more than 40 years of Professional Engineering and management practice in the electricity distribution industry. During this time I have also had an active involvement in electricity industry, professional and industrial forums having been awarded distinguished life membership of the Association of Professional Engineers Scientists and Managers Australia and being the current President of the NSW Branch of that organisation.

The comments are summary in nature which I would be pleased to expand upon at interview/discussion if such an opportunity was to be offered as a further stage of the enquiry. More expansive and illustrative comment can be more easily provided through verbal rather than written input.

2) Comments re the Terms of Reference:

References (a) and (h) – these terms seem to have a similarity of thrust in exploring the economic related consequences of a shortage of engineering and related employment skills. Whilst my observation and belief is that significant implications and impacts of such a shortage is a given, it is more the province of others to provide specific information and illustrative comment in this regard.

References (c), (d), (e) and (f) also seem to be related in seeking comment on options to address the skills shortage through development and retention in some predetermined ways being:

- (c) re the effectiveness and efficiency of policies, both past and present (which could therefore also encompass the ensuing points)
- (d) re fostering collaboration through the procurement of infrastructure delivery
- (e) re training and development at enterprise, project and whole-of-sector levels
- (f) re providing incentives through the procurement process (similar to (d))

3) Reference (b) – impact of outsourcing by government on public/private sector skills development and retention

There has been a significant change in the nature and provision of infrastructure and associated services during the period in which I have qualified and practised as a Professional Engineer. Water, sewerage, transport (airlines, railways and roads), communications and electricity supply were once almost the sole province of Government but are now more broadly based in terms of ownership, provision, operation and technology. An active privatisation agenda has resulted in the growth of large private infrastructure companies with Government Departments, which were once the definers, designers, constructors and operators of infrastructure assets, becoming more agencies for allocating funding and outlining procurement needs.

There has also been a replacement of “in house” workforces with contracted construction and service providers.

The shift in responsibility from the public to the private sector has had a significant and ongoing impact on redefining the Professional Engineering employment landscape with larger localised work places of salaried professional technical employees in water boards, electricity commissions and mains roads departments etc having been replaced by more dispersed groups of consultant and construction/operator contractor employees.

This has coincided with other significant trends including:

- a trend to individual contract employment in place of award /agreement based employment
- the “clever country” thrust and actions to substantially increase the availability of and access to tertiary training courses and participation in tertiary training by school leavers and others.
- swinging policies on tertiary education (University) payments with University fees being abolished by the Whitlam government) then charged for again to facilitate the increased provision of course places via the HEX scheme as a time payment option for newly qualified professionals to cushion the impacts of education training courses until they “reap the benefits” of the higher salaries they are expected to earn as a result of their tertiary training.
- the emergence of the credo that competition/privatisation in infrastructure provision was necessary to avoid “gold plating” to ensure cost efficient capital expenditure and the lowest delivery price for infrastructure services.
- governments adopting an approach of realising the accrued value of publicly owned infrastructure assets by debt financing and/or outright sale to balance budgets.

The public/private responsibility balance and other societal changes have changed recruitment, training, skills transfer/development mechanisms with the private sector often recruiting from both the experienced and younger public sector professional employee pool. A potted view of this could be that “it is a public sector role to train ‘em - the private sector role to use ‘em”.

The transfer/outsourcing of the doing part of infrastructure engineering from the public sector was also associated with a thrust to down size Government and acceptance of the view that non engineering qualified managers could handle contract specification, procurement, administration and sign off. This “de-professionalisation” movement has been, and remains, a matter of great concern within the Professional Engineering community. It has resulted in a broader acceptance of the need to add business management training as a supplementary qualification to the demanding professional engineer training and experience requirements and lead directly to a significant expansion of “MBA” and other related options to enable technical professionals to gain formal management qualifications (added to those gained as an inherent part of much professional practice). This facility was pioneered by the APESMA initiatives in establishing its distance education structure as a value added member service.

I believe that it is telling fact that whilst Professional Engineers have acknowledged the needs and benefits of multi skilling by adding formal management training to their

agenda, this has not been reciprocated by having (requiring) finance/administration qualified people gain Professional Engineering qualifications before they takeover engineering functions within the changed and down sized focussed public sector.

The “de-professionalisation” trend has had a real impact on the attraction of engineering employment, the development and retention of engineering skills and the effectiveness of infrastructure delivery, operation and management. An improved understanding of the nature and responsibilities of Professional Engineering work and the “REENGINEERING” of the infrastructure related functions associated with specification, tenders, procurement and outcome delivery is a key required action. Ending the now often touted anti-discrimination policy driven HR practice in the public sector of not allowing “Professional Engineer” qualification requirements in position descriptions (PD’s) which relate to jobs which clearly involve engineering knowledge and skills is an essential action to redress this misguided constraint.

Public sector HR practises re job sizing is also an issue in attracting, developing and retaining engineering skills. Position classification systems almost universally have limitations with giving proper weight to the technical specialist skill against the typical administrative focus on management span of control and budget approval responsibilities. Workplaces should be able to recognise and reward technical expertise and experience rather than drive people to management roles to gain advancement.

Whilst the above points illustrate concerns that have resulted from the substantially increased private sector involvement in the provision of infrastructure, I do not believe that they constitute an argument to say that it should not have happened. More so, I believe that they illustrate the necessity to understand the nature of evolutionary changes and ensure that key aspects are identified and addressed progressively if effective outcomes are to be achieved. Given the scale and nature of the growth in demand for infrastructure services, the level of investment required, the associated growth in the capability of the private engineering consulting, construction and financing sectors and the pressures on governments, the public/private sector balance change was inevitable. What was not right was that this change was seen to remove the need for a large range of professional engineering skills from the public sector rather than change the nature of their focus, basically from “doing” to “defining, monitoring and certifying”, a role that still depends on engineering and technical capability.

I suggest that the public/private partnership needs to go beyond financing and ownership terms for infrastructure to a fuller recognition of the roles and skills required in both arenas, with the public sector needing to understand and accept the need to “re-professionalise/ re-engineer” those positions associated with the defining, monitoring and certifying roles of infrastructure provision. Long term value in infrastructure expenditure (capex) goes well beyond the short term focus on the bottom line (opex).

4) References (c), (d), (e) & (f) - Options to address skills develop and retention

(c) policies past and present

There seems to be little in the way of present policies to develop and retain professional and engineering skills, except to point out the issues relating to the matter and consider “industry” requests to increase the skilled migration quota as an obvious fix, with this accentuated by the mining boom pressures. The current Senate enquiry would seem to be an illustration of this and will hopefully lead to changes for the better.

One aspect of past public sector policy which could offer scope for consideration could be the reintroduction of a widely based “cadetship” scheme where engineering service provider companies would select and employ undergraduates through their academic training period, providing the course requisite work experience for the degree award and the practicing engineer experience training following graduation. Such schemes were common in the 1960’s and 70’s but faded with the increasing numbers of tertiary courses and student enrolments. The concept still seems to be an active part of trade apprenticeship training promotion and could be an element of future professional engineering skills development.

A further point of present policy development could be to parallel the level of government (and industry) support given to the promotion of Science in the promotion of engineering. Whilst these are kindred areas, neither their relationship nor the extremely diverse nature of “engineering” practice and employment is well understood by the public, students or the political arena. The financial and promotional support given to Science Week and science projects should be duplicated for Engineering Week and engineering development projects.

An “Engineering meets Parliament/s (Federal and State)” program is another potential action which could be developed to show what engineering contributes to the community in both basic services (fresh water, sewerage, transport, communications) and sophisticated activities (space exploration, robotics etc).

Getting in to schools and community service structures at all levels to promote mathematics and science and their association with engineering and infrastructure could be another plank of policy development, along with appropriate funding for secondary and tertiary institutions to allow adequate staffing, analytical and laboratory facilities.

(d) and (f) collaboration through procurement

Again, I believe that there would be no evidence of using procurement to support skills development or retention. The focus on competitive tendering and least cost outcomes, now often overseen by non- engineering managers with a financial or legal focus, does not readily lend itself to the inclusion of “extra” considerations in the procurement process. Experience shows that there are enough issues with trying to define and ensure reasonable certainty in the delivery of product and services through the specification and contract process without adding other requirements.

However, this has not always been the case illustrated by what I understand was a key strategy adopted in the early days of the Snowy Mountains scheme to develop Australian project engineering knowledge skills. In general, it seemed that contracts

awarded against overseas tenders included a “skills transfer” provision where the contractor was to provide for Australian engineering and technical staff to work with their contractor counter-parts to learn the game. This initiative apparently resulted in the accelerated development of a substantial Australian engineering capability which contributed to the success of the scheme and subsequently the Snowy Mountains Engineering Corporation as an evolved consulting engineering company. The enquiry may wish to consider the revival of this practice as an element in current infrastructure procurement practices.

(e) industry training and development at enterprise, project and whole-of-industry levels

Engineering and technical skills training is a mix of academic courses to give the theoretical knowledge and work place practice (with more experienced associates) to develop the applied skills. The nature of engineering work covers a very broad spectrum (eg - materials and product research and development, computing and modelling, design, construction, operation, performance assessment, manpower and money management, contracts and legal, environmental management, off-shore/on-shore). Developing and retaining skilled practitioners is by nature also a complex challenge and must involve the public, the student body, schools and tertiary institutions, industry and governments.

A number of the points above illustrate issues and possibilities suggested to improve the skills development and retention in engineering and technical areas. A key part of this could be a closer partnership between tertiary institutions and industry at both an enterprise and whole-of-sector level to provide the work experience needed for individuals to obtain both the initial qualification and professional proficiency. Rather than leave it up to individual students to find work experience employment, tertiary institutions could be required to develop enterprise and whole-of-sector agreements with industry to provide the needed course training and industry required to offer the required places.

Enterprises could also be required/encouraged to engage or sponsor students to undertake academic training courses, either as school leavers, mature age students or education advancement opportunities for existing employees with more basic technical qualifications.

Reference (g) – consequences on public sector capacity to procure and manage infrastructure projects

It is a given that a shortage of engineering and technical skills has an adverse effect on the public sector ability to source and manage infrastructure projects. However, it is not clear that such a consequence is mainly a result of the availability of the needed skills. As indicated above, a key factor in the private sector delivery of infrastructure is effective definition of needs through proper works specification and efficient delivery of outcomes through effective contract oversight. Having an inappropriate staff establishment and unfilled engineering positions as a consequence of a government focus to minimise the budget bottom line has a significantly adverse impact on infrastructure delivery, as does having engineering/technical focused procurement managed by non-engineering/technically qualified people.

A shortage of appropriately qualified and skilled personal can add to infrastructure delivery issues in terms of timing and costs if needs can not be clearly demonstrated and justified within defined procedure lead time constraints and consultant/contractors experience staffing shortages and “poach” from the public sector to fill the needs.

A combination of the above situations can lead to the perverse outcome where not only do projects suffer time delays but also significant cost increases from the public sector agency having to buy both the specification and contract delivery services from a sellers market, with the providers using staff trained by the public sector to back fill a budget focus created gap in staff establishments and appointments.

Reference (i) - other related matters

A number of the above points relating to engineering and technical skills development and retention are matters of general concern to Professional Engineers with summary reports and discussion papers having been produced to outline issues and possible actions for the information of members of the NSW Branch of APESMA and others. Should it be interested, the NSW Branch Committee of Management of APESMA would consider providing copies of relevant reports and discussion papers to the Senate Enquiry to assist its consideration of the terms of reference: eg – de/reprofessionalisation; cadetships; position descriptions

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