Submission. Senate Select Committee on Electricity Prices

The Association of Professional Engineers, Scientists and Managers, Australia (APESMA).

This submission is made by the Association of Professional Engineers, Scientists and Managers, Australia (APESMA). We represent more than 23,000 technical professionals employed in all sectors of the economy, including electricity generation, transmission, distribution and regulation.

APESMA is also a founding partner of the Australian National Engineering Taskforce (ANET). ANET was formed in 2009 to address Australia's chronic engineering skills shortage. Other ANET partners are Engineers Australia, Consult Australia, the Australian Council of Engineering Deans and the Academy of Technological Sciences and Engineering.

This submission specifically addresses parts (a), (c) and (e) of the Terms of reference:

1. (a) identification of the key causes of electricity price increases over recent years and those likely in the future;

   ...

   (c) options to reduce peak demand and improve the productivity of the national electricity system;

   …

   (e) investigation of opportunities and barriers to the wider deployment of new and innovative technologies, including:

   i. direct load control and pricing incentives,
   ii. storage technology,
   iii. energy efficiency, and
   iv. distributed clean and renewable energy generation

The scale of engineering skills shortages

Electricity prices are a function of regulatory and market forces including the supply and deployment of skills. Engineering expertise is essential to all aspects of electricity supply, from generation to transmission and distribution. In Australia we suffer from a shortage of engineering skills which affects all sectors of the economy and in particular publicly funded infrastructure, including electricity networks. As a recent Senate Inquiry into engineering skills shortages found[1], the shortage of skilled engineers has been a feature of our economy for some time and will only be exacerbated by increasing demand, including demand associated with transitioning to a low carbon economy. Precise figures for the shortage in the electricity sector are not available although APESMA agrees with the views of the Energy Network Association[2], that the engineering skills base in the sector has been eroded due to a range of factors including the unintended consequences of outsourcing, the ageing workforce and competition from other sectors, including resources. This same Senate inquiry found that demand for engineering occupations will increase by 43,000 by 2016[3].

Some illumination of the scale of the engineering skills shortage is provided by the recent Skills Shortage List and the most recent statistical overview of the profession. National skills shortages are recorded across the following engineering disciplines of note to this inquiry:

- Civil engineering professionals;
- Electrical engineer;
- Mechanical engineer;
- Civil engineering draftspersons and technicians;
- Electrical engineering draftspersons and technicians.[4]

Despite growth in the commencement of engineering studies and improvements in retention in engineering, demand continues to outstrip supplied, as previous outlined. As a response, we have

[1] Senate References Committee. Education, Employment and Workplace Relations. *The Shortage of engineering and related employment skills*. Canberra 2012.
[1] DEEWR (2012) pp 1-3. *Skills Shortages List.* DEEWR, Canberra ACT.
[2] Energy Networks Association. *Submission pg 2.* The Shortage of engineering and related employment skills. Senate References Committee. Education, Employment and Workplace Relations.
[3] Senate References Committee. Education, Employment and Workplace Relations, p12.
[4] Department of Education, Employment and Workplace Relations, (2012) pp 1-3. *Skills Shortage List Australia.* Australian Government.

relied on migrant engineers to provide a solution to the shortage and have imported nearly half of our engineering needs in recent years[5].

The consequences of engineering skills shortages

The acute shortage of engineers in government agencies is causing poor design and scope of projects coming to market. This is leading to infrastructure having to be replaced before normal lifetime and increasing in-built costs in energy pricing. This was extensively demonstrated in research conducted by ANET an referred to in the subsequent Senate Inquiry report referred to earlier, with reductions of workforce in some agencies up to 80 per cent, with this being seen as seriously affecting the ability to exercise "judgement calls regarding the expenditure of public money"[6]

In the electricity sector this problem will be compounded by the range of new skills that will be required for setup, operation and maintenance of smart grids.

The consequences of this situation are very significant. Generally, a shortage of engineering capability within government and asset owner organisations, such as transmission businesses, is known to result in wasted investment of up to 20 per cent of project capital costs[7]. Equally waste due to disputation in the construction sector is estimated "at approximately $7 billion per annum"[8]. Just as importantly it also results in delays in project delivery, cuts to maintenance programs and ultimately failed infrastructure[9]. This is because projects proposals are developed and scoped by asset owners (in this case transmission businesses) without sufficient engineering expertise, leading to reworking, disputes and increased costs. Given up to 5 billion dollars[10] is spent annually on our electricity network this means that up to 1 billion dollars of wasted investment could be saved by addressing this basic skills shortage.

It is fair to conclude that engineering skills shortages are a key and reversible component of price inflation in the electricity sector. By addressing the shortage of engineering expertise Asset owners will restore their capacity to be informed purchasers of goods and services and save money;

---

[5] ANET in Senate References Committee. Education, Employment and Workplace Relations, p17.
[6] Ibid., p57.
[7] Blake Dawson on behalf of the Australian Constructors Association, quoted in *Realising an Innovation economy*, (2012) p21. ANET, Sydney.
[8] Cooperative Research Centre for Construction Innovation (2009), p7. *Guide to Leading Practice for Dispute Resolution*. Cooperative Research Centre for Construction, Brisbane Qld.
[9] Senate References Committee. Education, Employment and Workplace Relations.
[10] Energy Networks Association, estimate, by email 12 September 2012.

network capacity will be enhanced with all the follow on productivity benefits; transitioning to a low carbon economy, including development and operation of smart grid technology, will be enabled cost effectively.

Briefly, the solutions to the skills shortage, and hence also to a large proportion of price inflation in the electricity sector, have been developed by APESMA, ANET and our industry partners in recent years through detailed research and consultation[11]. We encourage the committee to read in detail research that has been conducted on this important issue which is playing a destructive part in the increase in electricity prices in Australia through the inadequate scope and design of infrastructure.

Policy proposals of ANET include three major initiatives:

1. Establishment of an Engineering Workforce Development Council. The council will bring together industry, the profession and government to develop and implement industry specific workforce development strategies for engineers. These strategies will include measures to increase the number, breadth and effectiveness of cadetships and similar work integrated learning initiatives, including for students in the VET and higher education sectors.
2. Procurement solutions. Industry wide investment in engineering workforce development must be driven by governments, asset owners and project proponents. As our evidence shows, modest leveraging of project procurement across industries can not only be cost neutral, but given the savings, more than simply cost effective, with benefits from productivity and innovation flowing through the economy. This would mean mechanisms whereby during a procurement process, governments ensured that they had informed purchaser capacity, thereby benefitting the private sector through reducing disputation. In return, through the provision of incentives, the private sector conducts training which contributes to increased number of engineers, reducing costs over the longer-term.
3. Education sector solutions. In the medium to long term we will need to improve the way our education system prepares and develops our technical workforce. The range of initiatives required in education include improved promotion and take-up of STEM in schools and better alignment of VET and higher education programs to promote articulation between the two

[11] See www.anet.org.au

While the issue of electricity prices is complex and requires understanding of a range of market and regulatory matters, there is no doubt that among the causes of electricity price inflation is the shortage of professional technical and engineering skills in the sector. It is APESMA's submission that one of the simplest and quickest ways to reduce costs and assist moderate prices is to fix this skills shortage. Solutions would come as an engineering workforce development strategy for the electricity industry which will in essence develop and deploy a range of work integrated learning initiatives to lift skills, improve skill retention and ensure a sustainable supply of suitably qualified and experienced engineers in the sector. APESMA is a central player in the development of these solutions and would be happy to provide more detail and assistance as required.