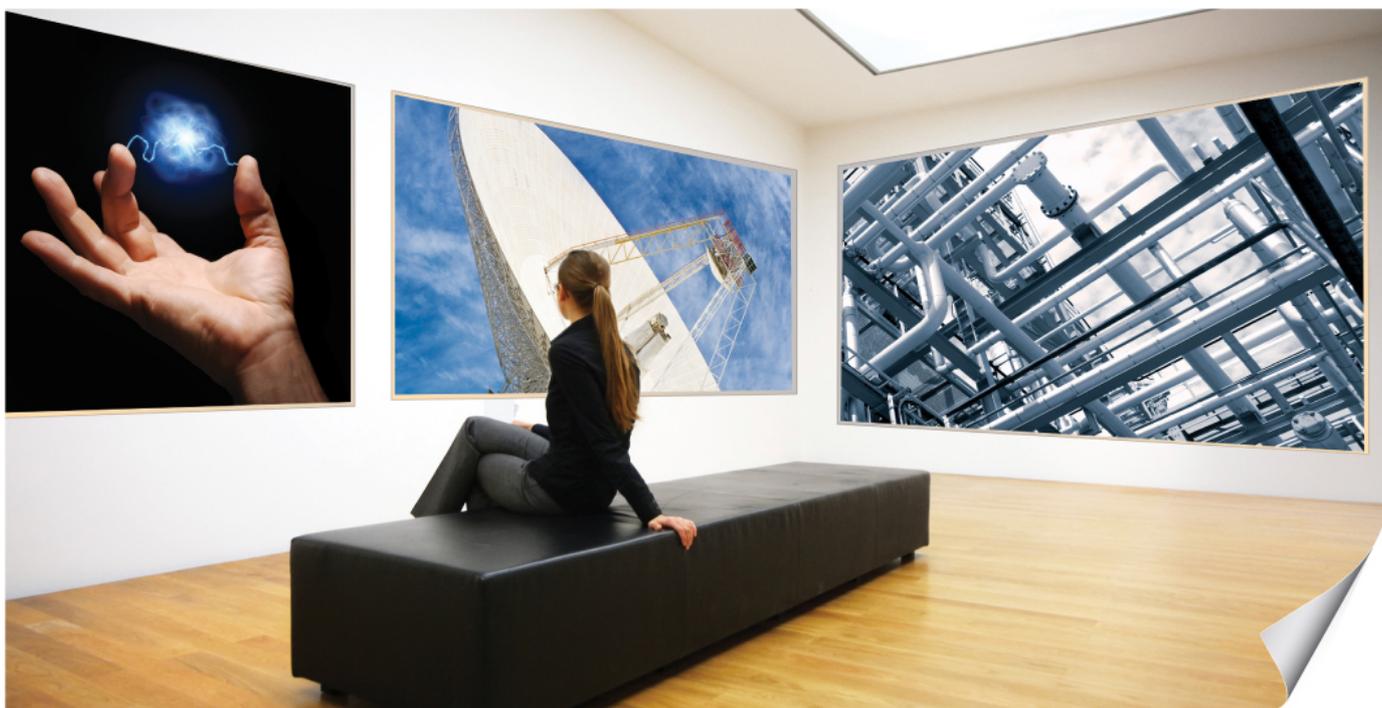


ENERGY WHITE PAPER 2014

Engineers Australia's Response to the Government Issues Paper

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Contact: Andre Kaspura
Policy Analyst, Policy and Marketing Division
Engineers Australia
11 National Circuit, Barton ACT 2600
Tel: 02 6270 6581
Email: akaspura@engineersaustralia.org.au



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Executive Summary

Engineers Australia is the peak body for the engineering profession in Australia. With about 100,000 members across Australia, we represent all disciplines and branches of engineering. Engineers Australia is constituted by Royal Charter to advance the science and practice of engineering for the benefit of the community.

Engineers Australia believes that more progress on energy policy could be achieved through a more coherent separation between domestic energy policy and energy trade policy. Although some issues are common to both categories, there are also important differences. Such separation would facilitate reinvigorated public engagement which is essential to the success of many policies ranging from world parity prices for liquid transport fuels, energy efficiency and demand management to limit growth of electricity market peaks.

Comprehensive energy policy considers all forms of energy demand and all sources of energy supply. Present arrangements are not actively oriented this way. This is why the recent falls in electricity prices attributed to the growth of small scale solar energy and more rapid than expected uptake of energy efficiency options has surprised many. The focus on centralised grid supply treats these issues as residuals rather than substantive targets.

Engineers Australia supports transparent market driven policies. Financial assistance and subsidies should only be used where there is clear cut evidence of market failure, for example, some energy efficiency options and the commercialisation of new technologies. Subsidies to established energy resources simply distort resource allocations and should be reconsidered as urged by leading international authorities and agreed by G20 Leaders. Similarly, this stance supports the completion of energy sector reforms and the extension of the reform process to transport fuels which has largely been ignored.

Market driven policies accept that energy prices are important to effective resource allocation and should not be artificially reduced. Concerns about energy prices should be redirected to reductions in energy bills by demonstrating to the community that energy efficient reductions in consumption can limit or lower energy bills even though energy prices increase. In this regard Engineers Australia advocates the adoption of an energy efficiency target to drive change.

Energy security is important to Australians. More transparent and pragmatic assessments of energy security would go a long way towards alleviating community concerns, especially the glib assessments relating to growing dependence on imported liquid transport fuels. There has been an undue focus on how existing energy supplies contribute to energy security and insufficient consideration of how supply diversity can contribute, including alternatives to petroleum fuels for transport.

As an organisation Engineers Australia exists to further and improve the productivity of the engineering labour force. Full productivity potential requires the employment of fully competent engineers. Completion of appropriate educational qualifications is the entry point to engineering careers. Like other professions, engineering requires a period of professional formation, typically three to four years, to become fully competent. During this period, engineers specialise in the disciplines that define their competence. Within Engineers Australia, fully competent engineers are recognised through the granting of Chartered Status.

Membership of Engineers Australia is voluntary and externally Queensland is the only jurisdiction to recognise the importance of a fully competent engineering labour force and has mandated registration of

professional engineers. Engineers Australia argues that until similar standards become the norm in all jurisdictions and Australia, the full productivity potential of engineers will not be realised.

These remarks are detailed in the sections that follow; section 1 covers energy policy matters; section 2 discusses security of energy supplies; section 3 sets out Engineers Australia's views on regulatory reform and government; section 4 discusses work force productivity and the final section discusses Engineers Australia's views on driving energy productivity.

Energy Policy Issues

Since 2007, Engineers Australia has advocated an energy policy that emphasizes¹:

- As wide a portfolio of energy technology options as possible and includes all sources of energy.
- Market driven in most cases and where market forces are not a complete answer to lowering emissions, government assistance to enable newer options to develop their maturity through regulation and other non-market options.
- Continuation and completion of energy market reforms, recognising that despite considerable progress, there is some way to go before stated policy objectives are realised.
- Actions to address the on-going growth in energy demand to reverse it, or at least minimise it through improved energy efficiency and demand management.

Engineers Australia believes that more headway could be achieved in energy policy generally, and community understanding in particular, through a more coherent separation between domestic energy policy and energy trade policy. Domestic energy policy relates to energy consumed in Australia by industry and households while energy trade policy relates to energy resources exported elsewhere in the world. Although there are elements common to the two areas, there are also important differences that should be reflected in policy decisions and in community consultations and engagement. The policy framework articulated in the 2012 Energy White Paper was an improvement over past arrangements but did not go far enough in separating domestic and international energy policy issues.

The most important factor common to domestic energy policy and international energy trade is the price of energy resources. Engineers Australia believes that synergy between the two sectors is best achieved through market driven prices for energy resources. This has been Australia's policy in respect to oil and petroleum products for over thirty years and maintenance of world parity prices has ensured reliable and continuing domestic fuel supplies while creating the conditions necessary to exploit indigenous crude oil discoveries in more recent decades. For the past twenty five years both world parity pricing of oil and flexible exchange rates have operated simultaneously. The value of this experience should be applied to new present day policy decisions such as on the much discussed possibility of a domestic natural gas reserve.

Domestic energy policy needs to ensure:

- That all sources of energy demands and all forms of energy supply are comprehensively covered and the links between them are fully understood and utilised. This is not the case at present with policy discussions often confined to electricity and even then, despite the extensive work

¹ www.engineersaustralia.org.au/about-us/policy-statements

- undertaken to reform electricity markets and institutions, treating small scale local solar energy generation as a residual reducing grid demand and largely neglecting the role of distributed generation. In recent years, reforms to domestic gas markets have moved ahead, but policy development still lags that in electricity. In the case of transport fuels, there has been little progress and the activity that has occurred has been prompted by community outcries at times of increasing fuel prices.
- That the efficiency and productivity of infrastructure necessary for primary energy conversion and transport of converted energy to consumers is optimised.
- That energy efficiency is vigorously pursued as part of national productivity policy so that Australia realises the maximum benefit from its energy infrastructure and new infrastructure investment is optimised, releasing resources for other activities.
- That domestic energy planning is conducted within an integrated framework that takes into account population growth and its location, industrial development and its location, commercial and private transport needs and long term sustainability of energy use, including minimising and eventually eliminating externalities.

International energy trade policy needs to have a different focus:

- To ensure that Australia maximises potential earnings from export of its energy resources.
- To plan and develop the infrastructure necessary for resource extraction and transport to final destinations consistent with accepted environmental safeguards.
- To ensure that Australia's international energy trade balance is consistent with overall macroeconomic policy.

Engineers Australia believes that community engagement, particularly on domestic energy policy matters, must be significantly enhanced to ensure the success of market driven energy policies, to increase the pace of energy efficiency gains and to enlist community support for policies essential to long term sustainability of energy demand and supply. More emphasis on the distinction between domestic energy policy and international energy trade policy would facilitate this. Similarly, improved transparency in the governance arrangements for energy policy would de-mystify many energy issues and allay community concerns. A case in point is the Ministerial arrangements relating to shared Commonwealth-State responsibilities for energy policies and programs. These arrangements have undergone frequent changes over the past two decades involving mergers and separations of responsibilities and new acronyms that confuse rather than assist. The recent change in Commonwealth Government, for example, saw the COAG Ministerial Council on Energy (MCE) which was responsible for national policy, governance of the Australian energy market and the COAG national energy policy framework replaced by the COAG Standing Council on Energy and Resources. This body will continue the key reforms of the MCE, but as well be responsible for key reforms of the Ministerial Council on Mineral and Petroleum Resources. This change risks a continuation of the present approach of confounding domestic and international energy policy issues.

Security of Energy Supplies

Engineers Australia supports the policy of rolling two year reviews of Australia's energy security and encourages the continuation of this policy in future. The fundamentals revealed in the last assessment, in 2011, for electricity and gas are uncontroversial. Risks identified were in most cases addressed by

elements of the reform program that is underway, albeit, slower than expected. However, in respect to oil and petroleum fuels, policy has relied entirely on market forces.

Energy security assessments can play a vital role in improving engagement with the community by improving the community's understanding of the connections between different elements of energy policy and the risks they give rise to. Instead of unexplained messages about plentiful cheap energy, energy security assessments lend themselves to more appropriate messages about what is plentiful and what is not, and the policies and actions required by governments and energy consumers alike that are necessary to provide energy continuity at prices as cheaply as possible.

Increased use of renewable energy can improve Australia's energy security. Engineers Australia notes that recent falls in the demand for grid provided electricity have been attributed to the widespread installation of solar photovoltaic systems by households and industry, as well as to more rapid than expected uptake of energy efficient appliances and changes in energy efficiency rules for new houses and commercial buildings. Some of the reaction to these developments has considered them as problems. Instead they should be seen as welcome changes in community behaviour that contribute to overall improved productivity and energy security. Indeed, a more complete approach to domestic energy planning and monitoring, as described above, would encourage acceleration of these changes, but more importantly, would have anticipated their scale and impact on centralised grid electricity and may have avoided the apparent surprises that occurred.

In a similar vein, while most consumers are likely to value reliable electricity provision, the technical provisions of electricity reliability standards are entirely meaningless to them. In these circumstances, discussions with the community about trade-offs between system reliability and system costs are unlikely to be productive without significant changes to present arrangements. These changes include more transparent expert discussions of the trade-off and the options arising from them and then community engagement on these options in a form that average individuals can comprehend. This is a major problem that system planners must confront.

Australia's liquid fuel policy has received less policy attention than electricity and gas. Adherence to world parity prices has meant that neither the loss of self sufficiency in crude oil feedstock for Australian oil refineries nor the closure of refineries have been reflected in petrol prices paid by consumers. The result has been an ever increasing reliance on imported refined product that has led some to question the validity of Australia's liquid fuel security assessment². The state of community engagement on key issues can be gauged from the close relationship between community complaints and rising petrol prices every time unusual global oil prices rises occur.

Since the global financial crisis, the price of oil has increased appreciably, but Australian consumers have been insulated by the high value of the Australian dollar. As global economic recovery continues, oil prices are expected to rise further. There is now broad recognition that a lower Australian dollar would be beneficial and indeed is highly likely in the near future. As the Energy Security Assessment says, fuel prices levels are expected to be "manageable within the broad economy", but bureaucratic and community perceptions of what this means are likely to be poles apart. To effectively deal with issues such as this energy policy must become more transparent and community engagement and information must be radically improved.

Higher world oil prices present both difficulties and opportunities. The International Energy Agency³ has noted that as oil prices increase, a range of renewable substitutes become economic, including biofuels

² NRMA, Australia's Liquid Fuel Security, 2013, www.mynrma.com.au/media/Fuel_Security_Report.pdf

³ International Energy Agency, Contributions of Renewables to Energy Security, IEA Information Paper, 2007, www.iea.org

from a range of crops and crop residues. Furthermore, opportunities to substitute between growing dependence on oil and petroleum and renewable electricity for transport should be considered.

Engineers Australia accepts that global structural changes have led to a shift of oil refinery capacity from Europe and the USA to Asia. The same factors underlie changes in Australia's refinery capacity. However, Engineers Australia believes that much more could be done to moderate the growth in demand for liquid fuels, if not reverse it, through a more nuanced approach to market policies. Unlike the USA, Australia does not mandate vehicle fuel efficiency. Although policy in the USA is primarily market driven, the Corporate Average Fuel Efficiency (CAFE) standards have been in place since the late 1970s, a period covering both Democratic and Republican Presidencies. In 2007, the standards were augmented to achieve a 40% improvement in efficiency by 2020, equivalent to 7.6 litres per 100 kilometers. In 2011, the standards were further augmented to reduce greenhouse emissions to achieve better than 5.9 litres per 100 kilometers by 2020⁴. Engineers Australia supports a policy along similar lines for Australia. Engineers Australia further notes that many Australians are ahead of official energy policy by purchasing smaller, fuel efficient vehicles, a trend that has been evident for some time.

Regulatory Reform and Government

There are several gaps in the COAG energy market reform agenda that Engineers Australia believes require attention:

- Domestic and international energy trade items need greater separation and consideration, especially given the remit of the new Standing Council on Energy and Resources (see comments on energy planning above).
- The reform agenda should include all sources of energy demand and sources of energy supply, in particular rooftop solar PV systems and distributed generation require more attention (see comments on energy planning above).
- Energy market reforms should be completed as a matter of urgency. The pace of reform has been exceptionally slow and has negated anticipated benefits for the economy as a whole. Completing reforms will enable the net benefits identified by the Productivity Commission to be realised⁵.
- Ways need to be found to better match prices paid for monopoly provided energy services, notably transmission services, to match the demand for those services. It is entirely unreasonable to expect the entire electricity market to shoulder the burden for poor demand forecasts and "gold plating" of reliability standards by transmission providers. Similarly, a key factor contributing to the recent radical "catch-up" in transmission infrastructure investment was necessary to compensate for historical neglect of renewal activity, an issue that has repeatedly been mentioned in Engineers Australia's Infrastructure Report Cards.
- Time of use charging for electricity should be revisited in the context of lessons learnt from experiences to date⁶. Time of use charging and smart meters have been on the COAG agenda for many years. Only Victoria has mandated installation of smart meters and outside of this States consumers have been confused by mixed messages.

⁴ www.eia.gov/todayinenergy/detail.cfm?id=7390

⁵ Productivity Commission, Electricity Network Regulatory Frameworks, April 2013, www.pc.gov.au

⁶ See the paper by the Productivity Commission The Costs and Benefits of Demand Management for Households, Supplement to inquiry report on Electricity Network Regulatory Frameworks, April 2013, www.pc.gov.au

- Privatisation of electricity assets has been successfully undertaken in several jurisdictions. Providing planning and oversight arrangements are comprehensive and transparent, Engineers Australia encourages this trend.

A joint report⁷ by the International Energy Agency, the OECD and the World Bank for the Seoul G20 Summit in 2010 estimated that the global cost of fossil fuel subsidies in 2015 would be \$600 billion or 0.6% of global GDP. Although G20 leaders agreed to phase out fossil fuel subsidies at the 2009 Summit in Pittsburgh, there has been little progress with many countries choosing to alter definitions rather than proceeding with the elimination of subsidies.

Engineers Australia believes that Australian energy policy should reconsider the country's stance on this issue. A recent report⁸ by the Overseas Development Institute, the UK's leading independent think-tank on international development issues, has highlighted the discrepancy between Australia's self reporting to the G20 process and estimates of Australia's fossil fuel subsidies by other reputable agencies as follows:

- Self reported fossil fuel subsidies: none
- OECD estimate (2012): \$8.5 billion
- IMF pre-tax estimates (2013): \$38.1 billion
- IMF post-tax estimates (2013): \$26.5 billion

Subsidies not only distort the energy market but impose major imposts on the budget including in the form of diesel fuel tax credits, accelerated depreciation, concessional rates of excise on aviation fuel and exploration and prospecting subsidies. In contrast, the report notes that the OECD estimates climate finance provided was \$198 million compared to fossil fuel subsidies of \$8,450 million.

Work Force Productivity

Energy sector work force productivity begins by recognising the importance of the engineering team to the energy sector. The engineering team comprises professional engineers (the equivalent of a four year full time bachelor degree in engineering), engineering technologists (the equivalent of a three year full time bachelor degree in engineering) and engineering associates (the equivalent of a two year full time associate degree or advanced diploma in engineering). Engineers Australia believes that several factors have an important bearing on work force productivity. Engineers construct facilities, maintain them and are a critical input driving energy efficiency.

The full potential of work force productivity is best realised through the employment of fully competent engineers. Completion of educational qualifications is the entry point to an engineering career. Like most other professions, engineering requires a period of professional formation, typically three to four years in duration, to become fully competent. Although the nomenclature of entry level qualifications is suggestive of engineering specialisation, the primary mechanism for specialisation is the area of engineering practice during the period of professional formation. Thus completion of professional formation results in an individual becoming fully competent in their chosen area of specialisation.

⁷ IEA, OECD and the World Bank, the Scope of Fossil Fuel Subsidies and a Roadmap for Phasing Out Fossil Fuel Subsidies, 2010, www.worldenergyoutlook.org

⁸ Shelagh Whitley, Time to Change the Game, Fossil Fuel Subsidies and Climate, Overseas Development Institute, November 2013, www.odi.org

Within the arrangements oversights by Engineers Australia, fully competent engineers are recognised by becoming Chartered Engineers. However, membership of Engineers Australia is voluntary and it is important to consider the arrangements in place to recognise fully competent engineers beyond Engineers Australia. In other disciplines the most common mechanism for recognition is registration with a professional body recognised in law for that purpose.

In Australia, the only jurisdiction to require formal registration of engineers is Queensland. To register as a Professional Engineer in that State, individuals are required to satisfy the educational and professional formation criteria mandated by Queensland legislation. In Queensland, unless an engineer is registered, they are not legally able to determine final engineering decisions and/or to approve final engineering designs. Engineers who are not registered must work under the supervision of an engineer who is registered and who is responsible for their work. The criteria used by Queensland authorities are identical to those used by Engineers Australia for Chartered Engineers and indeed Engineers Australia undertakes assessments for registration purposes for Queensland authorities under contract. The Australian Capital Territory and several other States are currently considering registration systems for engineers similar to the Queensland system.

The fact that formal registration arrangements for engineers are incomplete in Australia, does not change the fundamental proposition that fully competent engineers must hold requisite educational qualifications and must complete the requisite period of professional formation. Both are essential to satisfy the expectations of employers who require independent engineering designs, judgment and decisions. What formal registration does is provide a formal mechanism that enables employers and decision makers to quickly identify engineers who are fully competent.

In the absence of formal registration of engineers, assurance that one is employing a competent engineer involves employers in researching the backgrounds of potential employees to ensure they have the necessary skills and competences, a tedious and costly process for each position filled. As well, employers would need the skills and experience necessary to undertake pertinent assessments.

The past decade has been characterised by persistent shortages of engineers. What is in short supply is the availability of fully competent engineers, not simply the number of individuals with engineering qualifications. In its annual survey of recruitment difficulties experienced in hiring engineers, employers have consistently identified engineers grade 3 as the ones that pose the most problems. Engineers at this level are typically fully competent with several years of additional experience.

The requirement for post-education training, experience and specialisation in practice means that the duration of education and training necessary to become a competent practicing engineer can be seven years for a Professional Engineer, six years for an Engineering Technologist and five years for an Associate Engineer. These durations serve to emphasize the importance of continuity in engineering employment and careers. An environment characterised by stop-start activity is highly damaging to engineering careers and consequently the supply of fully competent engineers. Engineering work, like work in many other professions, is often contractual. When contracts come to an end, individuals typically seek new contracts and change jobs. In a stop-start environment opportunities to do this are constrained and frequently, to meet personal and financial obligations, competent engineers accept opportunities outside of engineering. The longer an individual is away from engineering practice, the more difficult it becomes to rejoin engineering without loss of status. Some engineers simply do not return to engineering and this is a substantial part of the explanation why in 2011, only 62% of

individuals with engineering qualifications were employed in engineering occupations⁹. The result is failure to realise the full benefit of society's investment in engineering education and training.

Driving Energy Productivity

Engineers Australia believes that the cheapest energy is energy that consumers do not need to pay for. Australians use far more energy than is necessary to achieve their production and life-style ambitions and have been encouraged in this direction by institutional arrangements that focus on selling cheap energy. The cost of the unnecessary energy produced and consumed, and the associated infrastructure, is a serious misallocation of resources with national economic implications. This misallocation is present irrespective of whether energy prices are low or not. This is why the McKinsey organization coined the phrase "energy productivity" to describe energy savings from energy efficiency¹⁰.

At national economy level, energy efficiency reduces the demand for energy infrastructure investment, maximizes the returns on existing and proposed new energy infrastructure and increases national income through the redeployment of saved capital. Energy efficiency is to the energy sector what productivity growth is to the national economy. From this perspective alone active energy efficiency policy should be an indispensable component of national policy. An additional benefit, as the International Energy Agency (IEA) has observed, is that over 40% of the emissions reductions required by global climate change mitigation policies can be achieved from energy efficiency¹¹.

For individual consumers, energy efficiency is a means of reducing their exposure to rising energy bills. It is energy bills rather than energy prices that deserve more policy attention. Australians are justly proud of their life-styles and standard of living and expect to be able to maintain them, and if possible, improve on them. Successive Commonwealth Governments have drawn attention to energy efficiency but, so far as policy action is concerned, activity has been low key, bureaucratic and slow with high reliance on the market despite analyses from influential bodies like the IEA, that the take up of many energy efficiency options is impeded by market failures. As well, some energy markets have been established as part of institutional reforms so that success depends on maximising the amount of energy sold, for example, electricity retailers.

Energy prices do influence the take up of some energy efficiency options and the evidence for this is the efficiency gains reflected in the reduced demand for electricity mentioned above. The strength of these gains confirm the importance of energy efficiency and demonstrate the potential available through a more nuanced policy approach to energy efficiency. There is nothing new in these proposals and Engineers Australia argues that it is time to revisit them in a more practical way. As the Prime Minister's Task Group on Energy Efficiency¹² observed four years ago, Australia's record on energy efficiency lags well behind other OECD countries and there are strong arguments supporting a catch up effort that will benefit consumers.

With few exceptions, Engineers Australia believes that Australia has pursued a comparatively passive approach to energy efficiency. The framework for a more active and aggressive approach to energy efficiency has been in place for almost a decade, but there appears to be a reluctance at official and government level to proceed more expeditiously. Identification of energy efficiency by AEMO as one of the reasons for downgrading forecasts of future electricity demand growth demonstrates that electricity

⁹ See Engineers Australia, The Engineering Profession: A Statistical Overview, Tenth Edition, September, 2013, p6, www.engineersaustralia.org.au

¹⁰ McKinsey and Company, The Case for Investing in Energy Productivity, February 2008, www.mckinsey.com

¹¹ See for example, IEA, Energy Technology Perspectives 2008, Scenarios and Strategies to 2050, www.iea.org

¹² Report of the Prime Ministers Task Group on Energy Efficiency, July 2010, www.climatechange.gov.au

consumers are not simply receptive to an increased level of activity, but are moving ahead of official policy.

Engineers Australia has long argued for the establishment of a national energy efficiency target. This proposal was one of the recommendations of the Prime Minister's Task Group on Energy Efficiency but has not been acted upon. An energy efficiency target is the apex of a framework in which the myriad of energy efficiency sources can be defined and allocated to groups that will respond to movements in energy prices, that require regulation to overcome market failure impeding their adoption or that require regulation because although options are economic at macro level, the benefits to individual consumers are too small to encourage action. By combining all options into an integrated framework under a national energy efficiency target, all gains can be consolidated and all options can be assessed in the light of experience to achieve maximum effectiveness. As well an energy efficiency target establishes a mechanism for communicating to the community the overall value of energy efficiency to the nation and how individual options contribute to it.

Demand management is complementary to improved energy efficiency. Engineers Australia supports the directions being followed by the Australian Energy Market Commission (AEMO) review of demand side participation (DSP) in electricity markets. In particular, Engineers Australia notes the point made by AEMO in its issues paper that a key requirement for effective DSP is the availability, investment in and deployment of enabling technologies. AEMO makes the further point that electricity prices have a role to play. Engineers Australia agrees and argues that it is in this context that smart meters and time of use charging are critical. But further steps are also necessary.

In its submission to the AEMO review, the former Department of Climate Change and Energy Efficiency (DCCEE) drew attention to the contribution of household air conditioners to the growth of peak electricity consumption. As well as pricing and smart meters, an effective way to reduce peak consumption is direct management of electricity consumption during the peak through the application of demand management enabling technologies integrated into air conditioners. The DCCEE submission also drew attention to the work that has been undertaken on the development of appropriate national standards for these technologies and made recommendations on the establishment of common standards for the interface between the grid and smart technologies and requiring manufacturers to include the interfacing technology in new equipment. Engineers Australia supports these approaches and argues that a renewed emphasis on de-regulation in Australia should not lose sight of the consequences of a technical free-for-all if common standards are not mandated.

The reviews and supporting work described above have been proceeding largely in an environment that the vast majority of consumers are unaware of. This has been a continuing feature of efforts to reform energy markets in Australia. Unless consumers understand and appreciate what the issues are and the nature of solutions proposed, progress will continue to be glacial. Engineers Australia believes that a key priority should be to address this problem and to engage meaningfully with energy consumers in a manner relevant to their daily lives.



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