# Energy White Paper 2014 – Issues Paper submission template

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## Confidentiality

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| ☐ | **Submissions may be published on the Department of Industry website. If you do not wish to have your submission made public, please tick the box.** |

**Issues for comment are listed against each of the Chapter Headings. In making your submission, you are welcome to make comment against some or all of issues in the fields provided. A field for general comments is provided at the end of the template.**

## 1. The Security of Energy Supplies

The Government seeks comment on:

- ways community expectations can be better understood and reflected in reliability standards;
- the value of developing fuel reserves to meet Australia's international oil security obligations, and augment domestic security;
- ways to increase new gas sources to meet demand and measures to enhance transparency in market conditions; and
- issues relating to the regulation of energy infrastructure.

**Please provide any comments on The Security of Energy Supplies below:**

**Please note that this submission has the following co-authors, also from the Centre for Energy and Environmental Markets (CEEM):**

**- Dr Jenny Riesz (Research Associate, CEEM)**
**- Associate Professor Iain MacGill (Joint Director, CEEM)**
**- Neil Raffan (Masters Candidate, CEEM)**

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**Energy security is a vital energy policy objective yet often a relatively poorly defined one. It is relevant over all time frames from electricity industry operation to long-term planning and investment. Some aspects of energy security that could usefully receive greater attention in the White paper process include:**

**- the rather unique perspective of Australia on energy security in comparison with most other OECD countries by virtue of being a major energy exporter. It needs to be appreciated that many of the countries that currently buy energy resources from us see some risks associated with this dependence on imports to meet their energy needs. Some emerging technologies, notably renewables, provide a means to reduce reliance on externally sourced fuels and it should not be surprising if major energy importers see considerable advantages in greater deployment of these. Thus, the growing prevalence and availability of renewable technologies creates risks associated with making energy exports a central plank of future economic development.**

**- Given that local availability of energy resources can improve energy security, there are some potential advantages in carefully managing energy exports rather than seeking to maximise them. Local oil and gas reserves have energy security value even if not immediately tapped.**

**- An emissions intensive energy sector by comparison with many other countries has potentially adverse energy security implications. It is possible that future international agreement on the need to rapidly reduce global emissions might see considerable pressure bought to bear on wealthy, developed countries with high per-capita emissions, such as Australia.**

**REFLECTING COMMUNITY EXPECTATIONS IN RELIABILITY STANDARDS**

**One of the fundamental issues that has plagued electricity market design since its inception is the dominance of the supply side of the market, due to the lack of demand side participation. For this reason, market regulators and operators have always needed to externally define the desired reliability standard that the system should achieve. The process of elucidating customer preferences is itself complex, and it is even more challenging to attempt to standardise the vagaries of customer desires into a single reliability standard to apply across the whole market. For example, previous studies have identified that small business customers place an extremely high value on electricity reliability (far in excess of that currently applied in the market), while residential customers place a much lower value on customer reliability (Oakely Greenwood, "NSW Value of Customer Reliability", Australian Energy Market Commission, 2012). The system regulator is then faced with the dilemma of**

**which customer to satisfy; should residential customers pay for more than they want? Or should small businesses accept a lower level of reliability? Furthermore, every individual customer is likely to have unique preferences, sometimes widely different.**

**The emergence of new technologies, such as advanced metering infrastructure, opens the door to a new degree of customer participation in this process. Rather than needing to rely upon a regulator to define your desires, and be aggregated across the whole market, individual customers could, in theory, have the freedom to define the level of reliability that they individually are prepared to pay for. Some have gone to the degree of proposing new market models based upon this principle, such as the capacity subscription model proposed by Doorman (G. Doorman, 2005, "Capacity Subscription: Solving the Peak Demand Challenge in Electricity Markets", IEEE Transactions on Power Systems, 20(1)). However, the energy-only market design in the National Electricity Market (NEM) is naturally designed to facilitate this response.**

**Thus, the solution may be intimately connected to other measures designed to encourage greater demand side response. Engagement with consumers on the management of their electricity bills and mechanisms such as time of use pricing could be combined with increasing understanding around the costs of reliability. Customers could then be offered choices about the level of reliability they are prepared to pay for. Advanced metering infrastructure could facilitate selective customer load shedding when required, based upon the level of reliability they have individually chosen.**

**REGULATION OF ENERGY INFRASTRUCTURE**

**The regulation of energy infrastructure, and particularly networks, has been the topic of extensive analysis in the past several years. The AEMC's Power of Choice report and Transmission Frameworks Review are important documents that summarise years of analysis and stakeholder engagement. The Electricity Network Regulatory Frameworks review by the Productivity Commission extends and complements this body of work and raises many important issues. It is important that any policy intervention is founded upon the extensive work conducted by these organisations, and others.**

**On the topic of privatisation of electricity infrastructure, there is an extensive yet currently neglected, body of research by researchers such as Professor John Quiggin of the University of Queensland regarding the potential challenges and pitfalls of privatisation. Where there are concerns about efficient government ownership and operation of assets, there are likely to be similarly challenging concerns about that government's ability to effectively conduct the privatisation process. Consumers may be better served by an approach that aims to simply increase the efficiency with which government organisations operate. Especially in a time of rapid market transition, it may be extremely beneficial for the government to retain control of electricity infrastructure so that challenging policy choices can be implemented more easily in future to respond to changing market conditions.**

**ENSURING RELIABILITY AND LONG-TERM ENERGY SECURITY**

**Modelling by researchers at CEEM and others suggests that renewable generation can play a significant role in contributing to improved long term energy security. Renewable technologies achieve this in two ways. Firstly, they alleviate electricity price risks by removing dependency upon fossil fuel resources that are internationally price exposed, and removing exposure to the dynamics of international action on climate change and the associated carbon prices. Secondly, renewable technologies improve the security of electricity systems by increasing fuel diversity, thereby alleviating physical supply risks. More detail on this analysis is available in the following publications:**

**- The role of Wind and PV in mitigating the impact of uncertainty in the Australian National Electricity Market, Vithayasrichareon, P., Riesz, J. , MacGill I. (2013), available at: http://ceem.unsw.edu.au/sites/default/files/documents/Paper_WIW13-1207.pdf**

**- Assessing Long-term Security of Electricity Supply and the Role of Renewable Energy: A Probabilistic Generation Portfolio Analysis Approach, Vithayasrichareon, P., Riesz, J. , MacGill I. (2014), available upon request.**

**Importantly, climate change poses a threat to the long term security and reliability of the electricity system in Australia. Extreme temperatures already pose a significant challenge to the power system. High temperatures de-rate generation capacities, reduce the transport capacity of transmission network lines, make forced generation outages more likely, and reduce the reliability of network components. These conditions coincide with record peak demands caused by high loads on very hot days. Unabated climate change will dramatically increase the incidence of extremely hot days in Australia.**

**Furthermore, the electricity system in Australia is highly dependent upon fresh water supplies. Hydro generation is directly affected by long droughts. Most thermal coal-fired generators in Australia also rely upon fresh water supplies for cooling. During 2007 the extended drought led to several units at Tarong power station being removed from the market due to lack of cooling water supplies. This had far reaching and significant effects on electricity prices around the market. These effects are elaborated upon more in the following book chapter: J. Riesz, J. Gilmore, Adaptation to climate change – Impacts on infrastructure: case studies (2010) in "Climate Adaptation Futures".**

**For these reasons, ongoing climate change will put unprecedented stress on the electricity system. Significant investment is likely to be required to address these issues. Thus, mitigating climate change is an important strategy to minimise the threat to the security of Australia's power system.**

**INCREASING TRANSPARENCY IN MARKET CONDITIONS**

**The Australian National Electricity Market (NEM) is relatively transparent, compared with many international markets. This has facilitated a higher degree of rigour in industry and academic analysis on the electricity system than is available in many other jurisdictions. This is of significant benefit to Australia, through better understanding of the impacts of policy interventions, better insight into market dynamics for market participants and investors, and so on. There are, however, almost inevitably incumbent pressures to reduce the availability and transparency of market operation. These need to be resisted.**

**One aspect of the NEM that remains opaque is the electricity derivatives market. The NEM design is grounded in a liquid and well-functioning contracts market; without it the market could not function. A proportion of futures and options is traded via the ASX 24 Futures Market which provides some degree of transparency around trading dynamics. However, a large proportion remains traded off-exchange either bilaterally or through brokers in the over the counter (OTC) market, with very little information made publicly available.**

**While it is important to allow confidentiality over sensitive business decisions, and to reduce regulatory burdens, this area of the market is one that could benefit from increased transparency, as recognised by the proposed G20 OTC reforms. This would facilitate more sophisticated monitoring of the health of the market, highlighting any potential issues earlier. It may also reduce barriers to entry for foreign investors, making the market more transparent and accessible.**

**These issues are discussed further in:**
**- 100% renewables in Australia – Will a capacity market be required? J. Riesz, I. MacGill (2013), available at: http://ceem.unsw.edu.au/sites/default/files/documents/SIW13_Riesz-CapacityMarkets-2013-09-02a.pdf**

## 2. Regulatory Reform and Role of Government

The Government seeks comment on:

- priority issues, barriers or gaps within the COAG energy market reform agenda;
- possible approaches and impacts of review of tariff structures including fixed network costs, further time-of-use based electricity tariffs and the use of smart meters;
- possible measures to promote greater price transparency in gas markets; and

- areas where further privatisation of government-owned assets would contribute to more effective regulatory frameworks and better outcomes for consumers.

**Please provide any comments on Regulatory Reform and Role of Government below:**

**THE ROLE OF GOVERNMENT**

**The stated intention to develop an "integrated national energy policy" is welcome because this is vital for the effective development of Australia's energy sector. The EWP should outline how this will be achieved. This should include consideration of why this has been so hard to achieve in the past (eg. due to having a restructured industry with mix of public and private ownership, market and non-market elements; short federal and state electoral cycles) and what will be done differently in future. The points below offer a means to developing an integrated national energy policy.**

**The role of government and the role of the EWP itself should be clarified. The Australian energy industry has undergone significant restructuring since the 1990s such that the clear, centralised planning roles performed by government have been variously spread to government agencies and market participants, or in some instances are no longer performed at all. The Energy White Paper process has the potential to make clear that the peak energy-focused governance body is COAG's Standing Committee on Energy & Resources (SCER), with administration and implementation support provided by the Commonwealth Department of Industry and the equivalent state and territory government departments. Further, the role of the EWP should be clarified. There is the opportunity for it to be the means by which the Government, via SCER, articulates its high-level plan for Australia's energy industry, including identifying where sub-planning is undertaken by other agencies (eg. AEMO's role with transmission infrastructure) or by markets (eg. NEM participants' decisions relating to the commissioning or decommissioning of generation plant).**

**For the EWP to fulfil its potential as an effective plan, it should clearly state prioritised objectives, an assessment of the status quo, a vision for the target state, and a description of the steps, resourcing, time and risks to implement. Further, it should identify how progress will be measured, and how the plan itself will evolve based on feedback loops. The Issues Paper contains a number of these elements however improvement is recommended in the next stages of the process of developing the EWP, in the following areas:**

**a. Structure: The Issues Paper is structured according to themes/issues (as opposed to the above elements of a plan) which are a mixture of objectives (eg. security of energy supply) and methods (eg. productivity). Within these themes there is discussion of objectives, status quo, target state, implementation options, measurement and feedback, however by not documenting these in a uniform manner risks making gathering stakeholder input more difficult, and the ultimate EWP unclear to its audience.**

**b. Objectives: There are a number of objectives proposed within the Issues Paper however it is not clear what the "draft" order of priority is for stakeholders to comment on. Furthermore the trade-offs between priorities are discussed however this could be improved. For example, the statement that the carbon price and green schemes have contributed to recent electricity price increases is made without stating the benefits of those policies.**
**The environment is not clearly identified as either an objective or a constraint, in contrast to typical energy sector policy development internationally. Sustainability is mentioned as an objective but this is not defined.**

**c. Status quo: The Issues Paper makes a number of statements which are important to set the context for the planning process. References are provided for many of these (eg. the observation of recent upward movements in electricity prices) but are missing for some (eg. suggested causes of electricity price increases; proposed causes of oversupply in electricity markets). The EWP process could make it clearer what the most important indicators of the status quo are and identify the sources of that information (and where improvement is needed because estimates are uncertain beyond an acceptable level). These indicators should be clearly set aside in the EWP process from those matters for which stakeholder consultation is more relevant to, particularly priorities, target state and implementation options. Without a clear baseline to plan from it is unlikely that an effective consultation process can be run.**

**d. Implementation: For an implementation plan to be selected the alternative courses of action, including their costs, benefits and risks need to be presented in a comparable manner.**
**Decision-making should consider work in progress and accordingly the Issues Paper makes valuable references to current initiatives underway. During the development of the EWP the status of work in progress should be made clear to stakeholders (for example via a SCER status report), how it compares to other options, and what the implications are for halting work in progress.**

**e. Measurement: To monitor progress in the development of Australia's energy industry requires taking relevant measurements regularly. The statement of the status quo and the EWP's priorities determine which are the most relevant measures.**
**Proposed criteria for determining the merit of policies to promote low emissions generation are put forward, for example. Such criteria are an important part of the planning process however it is suggested that it should be made clearer that stakeholder consultation is invited and indeed critical to determining these.**

**f. Feedback and improvement: The Issues Paper does not draw attention to the important question of how the EWP and the numerous sub-plans that flow from it will be maintained once it is developed. The SCER could hold the central governance role to ensure the EWP is a living document - a plan that remains up to date and as effective as possible.**

**The identification of current initiatives that relate to the EWP (including RET review and carbon tax repeal) on the one hand is welcome given how important they are to the development of Australia's energy industry, yet on the other hand highlights some of the present deficiencies in governance arrangements relating to energy planning. For example, the Coalition Government has proposed repeal of the current Australian carbon price, but has not yet clearly identified the impact of such a decision on overall energy policy. Ideally, a broad and strategic plan would be developed before making decisions that relate to a subset of that plan. In practice, the timing of policy development is driven and constrained by a range of factors. However, the key importance of assessing proposed changes within a broader planning framework remains.**

## 3. Growth and Investment

The Government seeks comment on:

- commercial or market initiatives that could enhance growth and investment in the energy and resources sectors;
- areas where approvals processes could be further streamlined while maintaining proper environmental and social safeguards;
- further ways that regulatory burdens could be reduced while maintaining appropriate levels of disclosure and transparency in energy markets; and
- the impacts of variable land access policy and ways the community could be better informed and engaged on development in the energy sector.

**Please provide any comments on Growth and Investment below:**

**INITIATIVES TO ENHANCE GROWTH AND INVESTMENT IN THE ENERGY SECTOR**

**As discussed below, the single largest barrier to investment in the energy sector in Australia at present is regulatory uncertainty. Ongoing uncertainty about schemes such as the Renewable Energy Target undermine investor confidence. This is particularly pertinent for renewable technologies. The majority of investment in power systems around the world in future is likely to be in renewable technologies, so in order to encourage growth in investment in Australia it is important to provide an environment that is supportive of the entry of renewables.**

## 4. Trade and International Relations

The Government seeks comment on:

- how to grow the export of value-added energy products and services;
- ways to remove unnecessary barriers to continued foreign investment in Australia's energy sector;
- ways to strengthen support for access to export markets; and
- ways to support business to maximise export opportunities for Australia's energy commodities, products, technologies and services, including the value of Australia's participation in the variety of international forums.

**Please provide any comments on Trade and International Relations below:**

**HOW TO GROW THE EXPORT OF VALUE-ADDED ENERGY PRODUCTS AND SERVICES**

**Australia has of course seen considerable growth in the export of energy over the past decade. Indeed, some observers have noted the potential risks of such an approach including the IEA, which in its 2012 review of Australian energy policy, noted:**

**"One concern of policy makers is the manner in which energy production has begun to dominate the Australian economy. The commodity boom is also having a negative impact on the economy by driving the Australian dollar upward, squeezing trade-exposed industries such as manufacturing and tourism and boosting inflation. The Australian Treasury expects that conditions in other parts of the economy will continue to be weighed down by the high exchange rate, cautious household spending behaviour and tightened macroeconomic policy settings."**

**These concerns might be better reflected in the Issues Paper.**

**REMOVING UNNECESSARY BARRIERS TO CONTINUED FOREIGN INVESTMENT IN AUSTRALIA'S ENERGY SECTOR**

**As discussed below, the single most significant barrier to investment in Australia's energy sector at present would seem to be regulatory uncertainty. In order to invest in long-lived electricity infrastructure, developers need confidence of a stable, future focussed, environment that will produce positive returns over the long term. To support this, Government needs to demonstrate a commitment to thoughtful and well considered regulatory reform that provide an environment conducive to stable and sustainable growth.**

**Climate change is now nearly globally accepted, and it is well understood by the great majority of investors that the energy sector in Australia will need to experience dramatic change over the coming decades. For example, large energy players are already shadow pricing carbon in their investment decision making, at prices considerably higher than the current fixed Australian carbon price. As The Economist noted in its 14/12/2013 edition:**

**"The markets for CO2 have had about as good a year as Obamacare. Europe's emissions trading system (ETS), the world's largest carbon market, collapsed in April (2013). Australia's new government is killing off that country's fledgling market. Yet companies are blithe. "Internal carbon prices", the price of a tonne of CO2 used for planning purposes within firms, are becoming an increasingly common business tool. Perhaps firms know something that markets and politicians do not."**

**Investors will draw confidence from a clearly elaborated and credible strategy for achieving societally appropriate carbon pricing and associated policies, in a gradual, supported and stable manner. Clarity around the mechanisms that will be applied is an essential prerequisite for investing in any kind of long-lived capital intensive infrastructure.**

**Providing greater certainty can also reduce costs to consumers. Minimising uncertainty allows investors to access lower cost capital, and savings can be passed on to consumers. This is particularly important in the coming decades, given that uncertainty is high in many ways that cannot be easily alleviated. Regulatory uncertainty is one aspect that the Government has control over, and can influence significantly. It could be argued to be extremely perverse to continue to exacerbate regulatory uncertainty by ongoing opposition to credible climate mitigation mechanisms, if the goal is to increase appropriate investment in Australia's energy sector.**

**AUSTRALIA'S PARTICIPATION IN INTERNATIONAL FORUMS**

**Constructive and positive participation in a wide range of international forums is vitally important for maintaining Australia's enviable position of relatively good favour among other nations in the energy space, and achieving effective global action on our growing global energy challenges. The United Nations Framework Convention on Climate Change (UNFCCC) is one of the most important of these forums, and therefore occupies a position of particular importance. Australia would be well served by a constructive presence at these negotiations. Avoiding an obstructionist approach is likely essential for maintaining positive relations with the developing nations who have played a very limited role in contributing to climate change, but who will feel the effects of it most severely.**

## 5. Workforce Productivity

The Government seeks comment on:

- the nature of any current skills shortages being experienced and how these could be addressed by and with industry;
- the capacity of industry and education sector-led programs to meet long-term training and skills development needs of the energy and resources sectors; and
- specific long-term training and skills development needs for alternative transport fuel, renewable energy, energy management and other clean energy industries.

**Please provide any comments on Workforce Productivity below:**

**LONG-TERM TRAINING AND SKILLS DEVELOPMENT NEEDS OF THE ENERGY SECTOR**

**As outlined below, there are a range of interdependent mechanisms supporting renewable development in Australia at present. The Renewable Energy Target (RET) is the most important of these for driving commercial investment in the market deployment of renewable technologies. Thus, the RET underpins a significant amount of employment in the renewable energy sector in Australia at present.**

**Substantial long term training and skills development has occurred over the past decade, supported by the RET scheme, and associated policy programs and efforts. This is ongoing, as businesses in the renewable energy industry expand their capabilities. However, if the RET is removed or reduced this threatens ongoing renewable development in Australia. Regulatory uncertainty creates an**

**unfavourable environment for investment. Furthermore, the repeal of the carbon price means that important adjustments will need to be made to the RET scheme to make it viable (as described below).**

**If renewable investment stalls in Australia it is entirely possible that the skills and expertise already developed in this field will be lost. Aside from the loss of employment opportunities (especially in rural and remote areas, such as indigenous communities), it would then take years to re-establish these essential capabilities in the workforce.**

**Therefore, the most important measure to maintain and expand the training and skills development in the energy sector is likely to be the support of the ongoing growth of the renewable energy industry.**

## 6. Driving Energy Productivity

The Government seeks comment on:

- the current suite of energy efficiency measures, ways these could be enhanced to provide greater energy efficiency or possible new measures that would enhance energy productivity;
- the use of demand-side participation measures to encourage energy productivity and reduce peak energy use; and
- measures to increase energy use efficiency in the transport sector.

**Please provide any comments on Driving Energy Productivity below:**

**ENCOURAGING DEMAND-SIDE PARTICIPATION AND ENERGY EFFICIENCY**

**The focus in the Issues Paper on energy efficiency and demand side participation is commendable. These mechanisms have excellent potential to reduce electricity bills for consumers, while simultaneously reducing greenhouse emissions. An increasing focus on unlocking the potential for energy efficiency in households, commercial businesses and industry is likely to enhance the productivity of Australia's economy. It is important, however, that a focus on energy productivity improvements not neglect the broader societal value of improved energy efficiency and demand reduction including greater energy security, affordability and environmental outcomes. Despite some excellent programs and measures, this area has also been neglected by Australian and State governments to date.**

**There is a significant and growing body of analysis and research on methods for encouraging greater demand side participation and energy efficiency, but much remains unknown. The best approach is likely to involve building upon previous analysis, such as the AEMC's extensive Power of Choice Review, previous energy efficiency task group work and pilots and programs such as those seen in the Ausgrid Smart Grid, Smart City trials. Researchers at UNSW are also conducting extensive analysis on this topic through the CRC for Low Carbon Living. A key focus of this initiative is to understand the actual responses of real people when faced with a range of interventions and options. This has been a significant challenge facing previous modelling and analysis of demand response.**

**Given that many energy efficiency projects are cost negative (in that they save the customer money) it is clear that the barriers to energy efficiency are often not financial. Thus, any successful mechanism will need to be designed with a strong understanding of the human interaction component, and the barriers that have inhibited past action. It also highlights the potential role of regulatory measures to drive societally beneficial energy efficiency and demand reduction.**

**The significant discussion of demand-side issues in the Paper is important for developing an effective, integrated plan for Australia's energy sector. Integrated resource planning (IRP) is a planning approach that has the potential to take a society-wide perspective and that has a strong track record in industry planning internationally and in other sectors. A key principle of IRP is that planning should**

**consider both supply and demand-side options. The EWP has the opportunity to set out how such an integrated approach would be achieved.**

**The steps in IRP are: setting objectives, demand forecasting, investigation of demand-side measures, investigation of supply-side technologies, preparation and evaluation of alternative integrated resource plans, selection of preferred planning, implementation and monitoring and evaluation. Public review and participation is vital throughout the process. In Australia's restructured energy industry there may be reasons for not enabling a single organisation to conduct such a planning process across both supply and demand, in which case clear interfaces between the various organisations involved in planning need to be in place.**

**INCREASING ENERGY EFFICIENCY WITHIN THE TRANSPORT SECTOR**

**As outlined in the following section, the transport sector offers many emerging innovative alternatives. A wide consideration of the possibilities is likely to be fruitful, including consideration of expanding public transport alternatives, investing in improved cycling infrastructure, and emerging technologies such as autonomous shared vehicles. The most effective approach will avoid being locked into the limited mindset of simply continuing the present personal car-based culture, shifted to alternative fuels and electric vehicles**
**.**

## 7. Alternative and Emerging Energy Sources and Technology

The Government seeks comment on:

- ways to encourage a lower emissions energy supply that avoids market distortion or causes increased energy prices;
- the need to review existing network tariff structures in the face of rapidly growing deployment of grid-backed-up distributed energy systems, to ensure proper distribution of costs;
- additional cost-effective means, beyond current mandatory targets and grants, to encourage further development of renewable and other alternative energy sources and their effective integration within the wider energy market;
- how the uptake of high efficiency low emissions intensity electricity generation can be progressed;
- any barriers to increased uptake of LPG in private and commercial vehicles and CNG and LNG in the heavy vehicle fleet; and
- any barriers to the increased uptake of electric vehicles and advanced biofuels.

**Please provide any comments on Alternative and Emerging Energy Sources and Technology below:**

**WAYS TO ENCOURAGE A LOWER EMISSIONS ENERGY SUPPLY THAT AVOIDS MARKET DISTORTION OR CAUSES INCREASED ENERGY PRICES**

**Australia's current energy infrastructure is, in many respects, the outcome of long standing market distortions that haven't yet been addressed by Australian governments. Likely the most important of these are unpriced environmental externalities. The greenhouse emissions arising from Australia's fossil-fuel consumption have a societal cost arising from the damage global warming is already causing to societal welfare. The existence of these potential costs are near universally acknowledged – as just one example the US government estimates a social cost of carbon as an input into the climate benefits and costs of government decision making. Their most recent estimate has a social carbon price of over A$75/tCO2e in 2020 given a 2.5% societal discount rate (US EPA, 2013, Social Cost of Carbon, www.epa.gov.) The current Australian carbon price goes some way to removing this market distortion although even the current fixed price is well below the likely social cost of emissions. The current Government's proposal to remove this carbon price will, therefore, increase market distortions. The present inadequate regulation of regional air pollutants and water usage within the energy sector are other major market distortions, as are existing fossil fuel subsidies. Other market distortions include the present asymmetry in decision making regarding supply versus demand-side options that means energy efficiency and demand management opportunities are being neglected. Present renewable energy subsidies, hence distortions, are modest by comparison and socially beneficial compared against these existing distortions. Thus, it is likely that efforts to reduce market distortions would do better to begin with unpriced environmental externalities, fossil fuel subsidies and current supply/demand-side asymmetries in our energy markets.**

**Affordability should certainly be a key energy policy objective given energy's vital role as an essential public good. However, policy and regulatory arrangements that distort electricity prices by keeping them below their economically efficient price (a price that should include environmental externalities) will adversely impact overall societal welfare. There are other means to ensure affordability that don't require such distortions, such as direct payments. Another key opportunity here is assisting households and businesses to improve their energy efficiency such that increasing energy prices need not increase their overall expenditure on energy.**

**In terms of encouraging a lower emissions energy supply there would seem to be four key technology options – gas-fired generation, Carbon Capture and Storage, Nuclear and renewable energy.**

**Modelling conducted by CEEM and other research groups suggests that caution should be applied before embarking on wide-scale support of the development of additional gas-fired generation. There**

**is very large uncertainty over future gas prices that could apply on the east-coast of Australia in the coming decades; investment in long-lived gas-fired generation infrastructure commits Australians to paying the potentially very high pass-through of those costs in electricity prices. The environmental benefits of gas-fired generation have also been questioned by some recent science on methane leakage and water impacts associated with coal seam gas operations. These questions require urgent attention before the role of CSG fuelled generation in a sustainable Australian energy future can be ascertained.**

**Renewable technologies, by contrast, have the potential to remove this potential for volatile and uncertain prices. Since renewable generation has no external fuel dependence, they provide electricity at a certain price throughout their lifetime. Thus, the small additional premium to install renewable technologies at present can be better seen as a kind of "insurance" against the possibility of future extreme prices.**

**For further reading on this issue, we refer you to the following papers which summarise our recent modelling and analysis:**

**- The role of Wind and PV in mitigating the impact of uncertainty in the Australian National Electricity Market, Vithayasrichareon, P., Riesz, J. , MacGill I. (2013), available at http://ceem.unsw.edu.au/sites/default/files/documents/Paper_WIW13-1207.pdf**

**- Delivering energy price security in an age of uncertainty, J. Riesz, E. Tourneboeuf (2012), available at: http://www.aecom.com/deployedfiles/Internet/Geographies/Australia-New%20Zealand/DeliveringEnergyPriceSecurity_DrJennyRiesz.pdf**

**Furthermore, gas-fired generation does not have the potential to reduce greenhouse gas emissions to the levels required. The most efficient combined cycle gas-fired power stations have an emissions intensity around half that of coal-fired generation. Thus, even a complete replacement of the power system can, at best, halve greenhouse gas emissions from the electricity sector. This is insufficient to achieve the targets that are likely to be required, as outlined by the Climate Change Authority in their recent Targets and Progress Report. Given that gas-fired power stations would typically need to be operated for a period of twenty to thirty years to make a suitable return, scenarios involving an intermediate shift to gas, before an ultimate move to renewable energy cannot cost effectively achieve the rates of change required. Further insights on this issue are provided in recent work of the University of Queensland:**

**- Australian Power: Can renewable technologies change the dominant industry view? L. Molyneaux, C. Froome, L. Wagner, J. Foster (2013), Renewable Energy 60, 215-221. Available at: http://www.sciencedirect.com/science/article/pii/S0960148113002541**

**For these reasons, it would be misguided to embark on a strategy of attempting to decarbonise Australia's electricity fleet by a widespread shift to gas-fired technology for base-load power. By contrast, renewable technologies offer a low risk, mature and reasonably cost effective way to reduce the emissions intensity of the electricity supply in Australia.**

**Nuclear is raised in the Issues Paper as a potential source of power. This is a welcome advance on the failure to appropriately consider nuclear power in the previous White Paper. Nuclear power provides over 10% of global electricity and, as such, is a proven low-emission generation option. However, international experience has also highlighted the complexities, risks and potentially very high costs of the technology. To provide a concrete example, the recent decision by the Government of the United Kingdom to support the development of a nuclear power plant necessitated agreement to a power purchase agreement of £92.50/MWh for a period of 35 years. This equates to approximately AU$154/MWh, which is significantly higher than the cost of wind generation in Australia (available at approximately $80-100/MWh). Furthermore, the UK already has an established nuclear industry, and is in close proximity to France (which has an extensive nuclear industry). Thus, the cost of establishing nuclear power in Australia could be expected to be significantly higher. First of kind nuclear power is likely to also have many hidden costs associated with establishing a new and unfamiliar industry, decommissioning, insurance, alleviating public concern, and so on.**

**Expanding nuclear power may be a sensible option in Europe and some Asian countries, where the technology is already prevalent, and renewable alternatives are limited and more expensive due to the lower quality resources. By comparison, Australia has abundant high quality renewable resources available at competitive prices. As for gas-fired power, an attempt to decarbonise**

**Australia's electricity supply by widespread investment in nuclear power will need very careful consideration, and a highly transparent, rigorous formal process for its consideration.**

**Finally, progress in Carbon Capture and Storage options in Australia and internationally over the past decade has been far slower than many industry experts and policy makers had hoped, and despite considerable efforts by some Governments (although it would seem less enthusiasm by some key industry stakeholders). As noted by the IEA in their 2012 review of Australian energy policy:**

**"The IEA commends Australia's commitment to the development of CCS but notes a risk that delivery of integrated commercial large-scale CCS by 2030 is not guaranteed at this stage. A number of challenges lie ahead; among them improving the efficiency and reducing the cost of large-scale $CO_2$ capture technologies, provision of suitable commercially viable $CO_2$ storage sites and building integrated transport networks to agreed pipeline standards."**

**It seems increasingly unlikely that CCS will be able to contribute major emission reductions in the electricity sector over the next one to two decades.**

**For these reasons, renewable energy would seem to provide the most assured, low risk opportunity to reduce energy supply emissions over the next few decades, of the present options available to Australia.**

**THE NEED TO REVIEW EXISTING NETWORK TARIFF STRUCTURES IN THE FACE OF RAPIDLY GROWING DEPLOYMENT OF GRID-BACKED-UP DISTRIBUTED ENERGY SYSTEMS, TO ENSURE PROPER DISTRIBUTION OF COSTS**

**There is certainly a need to review existing network tariffs. However, this has been the case for at least the past decade, certainly since the uptake of residential and commercial air-conditioning rapidly expanded in Australia. The growing deployment of distributed generation including PV and Combined Heat and Power (CHP) has only highlighted an existing problem that successive Australian Federal and State governments have failed to address. Note also that the previously existing problems also appear far more significant than those related to distributed energy. For example, estimates from the Energy Supply Association of Australia suggest that the cross-subsidy from households that don't have air-conditioning to those that do is currently around ten times greater than the subsidy between houses that don't have PV systems and those that do (Parkinson, www.reneweconomy.com.au, 20 May 2013).**

**There are potentially significant economic efficiency and equity gains to be made from improving the economic efficiency of network tariffs. It is becoming widely acknowledged that the present system of charging small energy users for network usage primarily through a flat c/kWh charge is no longer suitable. While relatively simple to implement, this approach fails to provide customers with appropriate price signals that are needed in an environment of growing customer choice. Distributed energy sources break the long-held "monopoly" of network companies; this means that network companies must evolve to manage a more competitive environment, and regulatory structures must be sufficiently flexible to allow and encourage suitable innovation.**

**However, developing better network tariff structures will not be straightforward. A particular challenge is between tariff changes to provide more assured revenue recovery versus tariff changes to provide more efficient signals for investment. Unfortunately some recent tariff developments such as seen in Queensland have been to greatly increase fixed (daily) charges to increase certainty of revenue recovery rather than simultaneously striving for more efficient price signals by a move towards Time of Use and peak demand charges. In general, it is preferable to apply a "causer pays" principle, such that customers receive suitable market price signals to incentivise the desired behaviour, particularly given the evident misallocation of investment over the past decade by both network service providers and end-users.**

**It is also essential that tariff changes be applied in a manner that is consistent across all technologies and consumers. For example, it is not appropriate to apply penalties or cost structures that disproportionately affect customers that install photovoltaic panels. From the perspective of the grid, the main impact of net-metered solar generators is simply reduce a customer's consumption. A consumer could achieve an identical effect with a combination of energy efficiency and demand response, and yet it would be obviously inappropriate to charge a "penalty" to the diligent customer**

**who managed to reduce their consumption. Similarly, and as noted previously, air conditioners can create significantly greater network issues and costs than solar photovoltaics, but have not yet been "penalised" in any way, aside from paying the same c/kWh charges that all consumers pay.**

**Ideally, the methodology for setting network tariffs will focus on getting future investment right, will be technology independent and, as far as possible, economically efficient. Such tariffs will likely require fixed, time-based consumption and peak demand components given the underlying cost structures of network service provision.**

**Calculating these individual components of cost is highly non-trivial. For example, the need for network augmentation (and the cost associated with that augmentation) will be very location specific, and time specific. Calculating individual network tariffs for customers on each individual network feeder may be prohibitively complex for network companies to implement. Furthermore, at present electricity prices are generally cross-subsidised across large geographic areas to facilitate greater equity, and it may not be politically achievable to change this mentality.**

**Thus, a cautious and carefully considered approach appears wise, building upon the extensive work already conducted by bodies such as the AEMC in the Power of Choice Review. It would be ideal to avoid a knee-jerk reaction to solar photovoltaics, and consider the opportunity to introduce a robust methodology that can flexibly respond to many kinds of new entrant technologies that are likely to become available over the coming decades.**

**ADDITIONAL COST-EFFECTIVE MEANS, BEYOND CURRENT MANDATORY TARGETS AND GRANTS, TO ENCOURAGE FURTHER DEVELOPMENT OF RENEWABLE AND OTHER ALTERNATIVE ENERGY SOURCES AND THEIR EFFECTIVE INTEGRATION WITHIN THE WIDER ENERGY MARKET**

**As noted above, renewable energy should be the focus of low emission generation deployment policy. Experience to date, market modelling and analysis suggests that the present suite of mechanisms designed to support the entry of renewable generation into the market are reasonably coherent and comprehensive, and likely to be successful if supported by the Government. These measures include:**

**- The Renewable Energy Target (RET)**
**- The fixed Carbon Price**
**- The Clean Energy Finance Corporation (CEFC)**
**- The Australian Renewable Energy Agency (ARENA)**

**These schemes are designed to work cooperatively, and cover all parts of the renewable development chain. The RET supports deployment of mature renewable technologies in the market, complemented by the carbon price. The CEFC supports the entry of emerging technologies by de-risking capital. ARENA provides funding for early stage research and development, integration studies, and other "gaps" identified across the entire renewable development pathway. Removal of any one of these schemes weakens the ability of the others to deliver efficiently and cost effectively.**

**If the carbon price is removed, the RET will need to be adjusted in order to work effectively. In the absence of the carbon price the shortfall charge is likely to be too low, encouraging companies to pay the penalty rather than investing in renewable generation. This could be amended by increasing the shortfall charge.**

**Similarly, if the carbon price is removed the duration of the RET will need to be extended. At present, the target stops growing at 2020, and the scheme ends entirely in 2030. This is well within the lifetime of renewable generators installed today. Despite discounting effects, the revenue earned in the last periods of a generators life remain important for demonstrating the overall profitability of the project. In the absence of a credible carbon pricing scheme, investors are unlikely to have confidence that a sufficient electricity market price will prevail beyond the end of the RET. Thus, the RET period will need to be extended.**

**Although analysis suggests that the present schemes have the ability to deliver strong renewable deployment, they are threatened by regulatory uncertainty. The threat of removal or reduction of a scheme such as the RET deters investors, and increases the perception of risk. This then increases the cost of capital, which is ultimately passed on as an increased cost to consumers. Ongoing review of the RET exacerbates uncertainty and is detrimental to investment.**

**The Government could create a much more stable and low cost investment environment by committing to strong, bipartisan, unequivocal support for the RET and the other renewable support schemes discussed above. This would be the single most effective step the Government could take to support the growth of the renewables industry in Australia at present.**

**Thus, rather than introducing new schemes to support renewable technologies, the best option at present appears to be committing to and supporting the schemes already present. There will of course opportunities to improve their effectiveness whilst retaining a clear commitment for potential investors.**

**Integration of renewable power sources into the wider electricity market is a key focus of research at CEEM. All generation technologies can pose integration challenges. For example, the relative inflexibility of large coal plant in terms of start-up times, minimum operating levels and ramp rates can pose operational challenges at high penetrations. Nevertheless, highly variable and somewhat unpredictable wind and solar generation does pose new challenges for electricity industry arrangements. Our group is keenly interested in finding strategies to streamline market processes and internalise costs so that renewable integration can proceed as smoothly and cost effectively as possible.**

**CEEM's research, together with that of other key stakeholders including the Australian Energy Market Operator, has highlighted that the design of Australia's National Electricity Market (NEM) appears well suited to renewable integration. Unlikely many other electricity industries, the NEM was designed with a relatively technology neutral approach and without many of the problematic features facing other systems. For example, the very fast five minute market in the NEM allows real time correction of forecast errors in wind and solar generation (and in demand). The single platform market (without a day-ahead and longer term platform) also encourages and rewards greater flexibility response from conventional generators. The NEM's sophisticated frequency control ancillary service (FCAS) markets also have many special features that make frequency control reserves cheaper to procure and manage. All of these features serve to significantly reduce the costs of integrating variable renewable technologies such as wind and solar into Australia's NEM. Further information on this can be found within our papers, such as:**

**- Frequency Control Ancillary Services – Is Australia a model market for renewable integration? J. Riesz, I. MacGill (2013), available at: http://ceem.unsw.edu.au/sites/default/files/documents/WIW13_Riesz-FCAS-2013-09-02a.pdf**
**CEEM staff are available to discuss this research and related topics on renewable integration.**

**Future work at CEEM continues to explore the design of the electricity market, in collaboration with international researchers dealing with similar questions in other markets. A particular focus has been around exploring the operation of the NEM's energy-only market design under conditions of very high renewable penetration, and understanding whether an alternative market design (such as a capacity market) may be required to support ongoing investment in firm capacity. Preliminary results suggest that the energy-only market may continue to operate well, although constant monitoring is wise. Further details are available at:**

**- 100% renewables in Australia – Will a capacity market be required? J. Riesz, I. MacGill (2013), available at: http://ceem.unsw.edu.au/sites/default/files/documents/SIW13_Riesz-CapacityMarkets-2013-09-02a.pdf**

**International experiences have highlighted that a very rapid ramp-up in renewable generation can cause market integration issues, because problems are not recognised until they will be costly to rectify. For example, the European "50.2Hz Problem" was caused by inadequate grid codes defining frequency response characteristics for rooftop photovoltaics. This has created a high risk for system security, and has therefore necessitated a costly retrofit of existing panels with more appropriate frequency response characteristics. This issue could have been easily avoided with the proper definition of appropriate grid codes to begin with. However, issues of this nature can be challenging to foresee. A consistent increase in renewable generation over time avoids the challenge, allowing issues to be identified and dealt with as they arise.**

**For this reason, Australia should strive to maintain a consistent pace of renewable development. Boom and bust cycles are detrimental and should be avoided in policy design if possible. Removal of the RET and other renewable support schemes already in place is likely to create a "bust" effect,**

**dramatically halting renewable investment, which will need to be re-established at a more rapid pace at a later time. Thus, integration of renewable technologies in the grid will be facilitated by maintaining and supporting the present renewable support schemes.**

**Supporting ongoing research and development for emerging technologies is important to ensure that costs continue to reduce over time, and innovative ideas can be brought to market. ARENA and the CEFC are designed to fill these roles; increasing funding and support for these agencies would appear to be a sensible way to support this ongoing research. Bureaucratic upheaval related to the establishment of new agencies intended to fulfil the same role is unlikely to be a cost effective way of providing the support required.**

**HOW THE UPTAKE OF HIGH EFFICIENCY LOW EMISSIONS INTENSITY ELECTRICITY GENERATION CAN BE PROGRESSED**

**The terminology of "high efficiency" should be used with care when referring to electricity generating technologies. Efficiency, in the engineering sense of MWh of electricity produced per GJ of fuel consumed, is not generally a useful metric for distinguishing between technologies to support from a policy perspective. Nuclear power and CCS plants (certainly coal-fired plants) will have significantly lower efficiency than current black coal fired generation in the NEM. The most efficient generation in the NEM is CCGT plant. The next most efficient generation is likely wind generation as the modern wind turbine can exhibit efficiencies of greater than 50% in favourable wind conditions. For renewable energy, however, efficiency is not a key factor because their 'fuel' is free and has no associated environmental emissions. Similarly the other concerning issues related to both gas generation and nuclear generation are considered above. Thus, decisions to support some technologies above others are not likely to be usefully based in the concept of "efficiency", and would be better couched in terms of the holistic properties and impacts of each technology.**

**ENCOURAGING USE OF COMPETITIVE ALTERNATIVE TRANSPORT FUELS AND ELECTRIC AND BIOFUEL VEHICLES**

**Reducing dependence upon foreign oil in transport fuels is a sensible goal for Australia. There are a wide range of competitive alternatives available at present to achieve this, which are worthy of immediate consideration. For example, investment in more extensive, more regular and more convenient public transport networks would provide increased mobility and community accessibility for a wide range of demographics, while decreasing traffic congestion and oil dependence. Investment in cycling infrastructure would similarly reduce traffic congestion and make more accessible this low cost, low carbon transport mode. This simultaneously provides Australians with increased opportunities for healthy, low impact exercise, helping to combat heart disease and depression, two of the most significant health problems of the modern world. Work in these areas is being undertaken by groups including the Cooperative Research Centre for Low Carbon Living involving the Universities of NSW, Melbourne, South Australia, Victoria and Curtain.**

**Electric vehicles and alternative fuels may be one part of the solution. However, they retain many of the unfortunate properties of the present congested transport system. They may prove more useful when combined with emerging innovative technologies, such as autonomous vehicles. These may offer the opportunity for using existing transport infrastructure to support driverless taxi systems at an affordable cost, allowing more households to forgo the large capital expense of a personal vehicle while maintaining convenience.**

**It is appreciated that transport networks are usually the responsibility of state government. However, national direction on this critical issue is appropriate in this forum, given the significant national expenditure of primary energy on transport fuels. A wider examination of innovative alternatives is likely to be fruitful, avoiding limiting consideration to only alternative fuels and electric vehicles. It is, of course, also important that policy frameworks appropriately reflect the social value that such vehicles can potentially provide including reduced greenhouse emissions and regional air pollutants to facilitate their socially valuable deployment.**

## General Comments

**Any further comments?**

**Energy policy has a vital societal role and will invariably require ongoing efforts given changing priorities and other drivers. Proper integration of policies is also essential – within the inevitably large number of policy measures and instruments that will be required to drive appropriate development of the energy sector, and also the broader policy context of related areas including climate change, transport and regional development policy.**

**Unfortunately, the Issues paper doesn't provide clear guidance on how such integration will be achieved. It will require prioritisation of objectives and detailed analysis of the potential interactions – synergistic and adverse – that may occur between policies. Such analysis should also focus on policy framework robustness so that essential objectives are achieved regardless of the potential failure of particular, novel and hence unproven, policy measures.**

**Another area requiring integration is that of policy coherence and consistency over time. The current Issues paper has emerged within the context of a decade long series of efforts to respond to emerging economic development, energy security and climate change concerns. However, the issues paper makes very little effort to integrate the learnings of these efforts, or explain why changes to them are required.**

**Recent energy policy developments include the 2011 Securing a Clean Energy Future package of clean energy proposals, which included the introduction of a carbon price, the provision of significant financial support for clean energy technology innovation through the Australian Renewable Energy Agency and Clean Energy Finance Corporation, a strengthened renewable energy target and a range of measures to improve energy efficiency. These efforts were highly regarded by the International Energy Agency's 'in-depth' review of Australian Energy Policy which noted:**

**"The IEA welcomes the broad sweep of measures proposed by the Australian government in relation to clean energy, notably its strong financial commitment and the establishment of the commercially oriented Clean Energy Finance Corporation, which will invest in renewable energy, low-emission and energy-efficient technologies….. The IEA views carbon pricing as a critical component of climate policy and welcomes the introduction of a carbon price and hopes the move will put an end to uncertainty in the energy sector."**

**The IEA argues, however, that, even with a carbon price, supplementary policies are still needed, including energy efficiency policies to unlock low-cost abatement and technology policies to help lower the cost of renewable energy, carbon capture and storage, and other technologies for the long term. They suggest that Australia has developed a relatively balanced package with strong elements of each policy.**

**The previous energy white paper process was particularly drawn out but did, in 2012, deliver a comprehensive energy policy framework. Again, the IEA commended the work noting that:**

**"The IEA welcomes the publication of the Draft EWP and commends the open, inclusive manner of its preparation."**

**While some elements remain in the current issues paper, others do not; notably the prioritisation of clean energy transformation in the earlier document. The reasons for this have not been made clear in the current paper. The risk, of course, is that we continue to see policy making undertaken without a clear understanding of where and why some previous policy plans and efforts are no longer considered appropriate. Without such understandings, our ability to develop effective, efficient, equitable and robust energy policy is severely hampered.**