Submission on the Draft Energy White Paper

Beyond Zero Emissions – March 16, 2012

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1. Introduction:

Australia must rapidly decarbonise its economy if it is to play a constructive role in global efforts to address the climate change challenge. Present atmospheric levels of CO_2 are at 390ppm[1] and must be brought down to 350ppm to stay within the 2°C warming "guardrail."

Blessed with vast renewable energy resources, Australia can decarbonise its economy principally through the large-scale rollout of commercially available renewable energy technologies. The *Zero Carbon Australia Stationary Energy* plan, a research partnership between Beyond Zero Emissions and the University of Melbourne's Energy Research Institute, demonstrates the technical feasibility of shifting to a 100 percent renewable energy system in ten years. It identifies Concentrating Solar Thermal and wind power as the primary technologies for a zero-carbon stationary energy sector.

Transitioning the stationary energy sector to 100 percent renewable energy sources is achievable, and now needs investment. The scenario modelled in the *Zero Carbon Australia Stationary Energy* plan would require $370 billion investment over a decade.[2]

The Energy White Paper is intended to "define a comprehensive strategic policy framework to guide the further development of Australia's energy sector". However, the White Paper only serves to further the development of the *existing* energy sector: namely the incumbent fossil fuel powered 19th Century energy system. It not only fails to provide development guidance commensurate to the challenge of addressing climate change, but actively discredits and ignores the strategic benefits of renewables and their role in developing a zero carbon economy.

The key issues concerns include:

- Failure to acknowledge the threat of climate change and provide an appropriate vision for a zero emissions future
- Over reliance on Fossil Fuels
- Misrepresentation of renewable technologies and cost

and are addressed in the following.

2. General Strategic Issues: Relying on Fossil Fuels

2.1. Lack of Vision: Enshrining the Status Quo

The Energy White Paper only serves to further develop the existing incumbent fossil fuel based 19th century energy supply system: the paper suggests that gas should triple to account for 44 per cent of power supplies by 2050. No effort is made to create the vision for the renewable powered, zero carbon economy required to address the problem.

The Paper even goes so far as to bend the definition of 'clean energy' to allow dirty fossil fuels to be considered as clean and sustainable. The Energy White Paper defines "Clean and Sustainable Energy" as:

> *"Sources of energy, technologies or processes that produce lower or zero greenhouse gas emissions relative to conventional counterparts and that meet appropriate social, environmental, health and safety standards"*

The definition should be amended to include ***only*** process that produce zero greenhouse gases. Anything that does, by definition, is not clean. Specifically, the definition should exclude gas and coal (with CCS). Coal with CCS and gas is not by any measures "Clean".

Gas is not a 'clean technology'; it is a fossil fuel that would contribute substantially to Australia future emission (see section 3.1). The emissions of gas may be no better (in fact could be worse than) coal, if proper accounting practices were employed, which consider lifecycle and fugitive emissions of gas. If Australia is going to seriously address climate change, there is no place for gas.

Even the conservative International Energy Agency says that no new gas projects should be built after 2017, if world wants to meet its 450 parts per million carbon target: the only option is emissions free technologies[3]. The IEA also suggest that solar energy could become the backbone of a largely renewable energy system worldwide[4,5,6]. The Energy White Paper suggests gas is essential to balance the variability of renewables. This is not required with baseload, and dispatchable technologies such as concentrating solar thermal[6].

2.2. Wasting Time and Money

The Energy White Paper indicates that suggest that over $260 billion will be spent on the domestic electricity and gas sector alone by 2030. A further $140 billion has been committed to LNG projects according to the White Paper. This is a substantial expenditure ($380 billion) on infrastructure that will ultimately have to be replaced to achieve the carbon emission reductions required.

The Zero Carbon Australia plan on the other hand has illustrated that an investment of $370 could deliver a 100% renewable powered economy, with Zero Carbon Energy sources[2].

The question remains: why we should Australia should spend so much money on energy infrastructure, if it only delivers a gas powered system, (with limited greenhouse emission impacts) given that we could invest $370 Billion today to deliver the Zero Carbon Australia alternative. An emissions free, 21st century Renewable powered economy (that will not need replacing in the future) is possible today. Renewable energy alternatives, that save money (by avoiding unnecessary replacements in the future) and allow meaningful action on climate change to be taken today are superior options, that are not recognised in the Paper.

3. Picking Winners - The Governments Winners

The Government claims not to "Pick Winner", however the Energy White Paper refers to "importance of gas", "strategic interests", and suggests that the Government should be "strategic in its investments". The Energy White Paper further contradicts their position by describing "Critical energy sources such as coal seam gas", and "important technologies, including carbon capture and storage". These so called "winner's" are anything but, and are not appropriate to rapidly reduce carbon emissions.

3.1. Gas

There is a substantial importance and focus placed on gas in Australia's energy future, and the future energy mix in the Energy White Paper, and by the Government more generally. Martin Ferguson has gone as far to say that "It is the really only form of alternative clean energy in Australia at the moment...". In fact Greg Combet has indicated that the point of the carbon price was to "drive investment in new cleaner energy sources such as gas", and Ferguson has said "a price on carbon is going to create a huge growth opportunity for gas". The paper suggests that gas should triple to account for 44 per cent of power supplies by 2050.

Gas is currently being pushed as a 'clean', risk free alternative to coal[7]. This however, could not be farther from the truth. Generating electricity from gas exposes the electricity market and price to the volatility and price rises occurring in the gas market, and introduces further energy security issues. Additionally, the continued use of gas has significant environmental and greenhouse gas emission ramifications.

There are significant uncertainties relating to the lifecycle emissions (including fugitive emissions, venting and flaring and other processing emissions) for all gas types, but particularly when considering and unconventional gas, such as Coal Seam Gas. The Energy White Paper glosses over the substantial concerns relating to the emissions and environmental concerns of Coal Seam Gas. That Coal Seam Gas has low emissions intensity, and the associated mining practices are environmentally benign is foregone conclusion.

3.1.1. Fugitive emissions

Fugitive emissions are those relating to leaks or uncontrolled venting throughout the extraction and production process. These emissions are in the form of methane which when released into the atmosphere has 23 times the impact (Global Warming Potential, GWP) of carbon dioxide if its impact is averaged over a 100 year period. Over a 20-year time horizon[8], the GWP for methane is 72, (and recent research published in 2009 by NASA[9] suggests methane it 105). The 20-year time horizon is more relevant, as the global climate tipping points will have been reached far earlier than 100 years from now (if we continue using gas, coal and other fossil fuels). This is not recognised in the Paper.

The rate of fugitive emissions is largely unknown, and will vary project to project and pipeline to pipeline. These fugitive emissions have the potential to be significant, with (for example) leaks in the Adelaide distribution network alone being reported to be as high as 7.8%.[10]

3.1.2. Fugitive Emissions of Coal Seam Gas

Currently the fugitive emissions of CSG are uncertain (and consequently so are the lifecycle emissions of electricity generated from CSG). There has been very little research conducted anywhere in the world to quantify the fugitive emissions associated with "unconventional" gas

production. However, the large number of wells per-unit of gas extracted, (relative to conventional gas), makes it likely that there will be significantly higher fugitive emissions from unconventional coal seam gas than conventional gas.

In Wyoming, in the United States, fugitive emissions from unconventional gas have been found to be up to 30% well yield, and 15% of total field yield[11]. A very recent study by the National Oceanic and Atmospheric Administration (NOAA) in the US based on actual measurements of unconventional gas emissions in Denver, has found rates of fugitive emissions up to 7.7% across the unconventional fields. [12] Major CSG projects being developed in Australia, on the other hand, have assumed extremely optimistic and unverified levels of fugitive emissions of around 0.1%[13]. The Paper does not properly recognise the emissions of CSG, and has seemingly reach a foregone conclusion on its environmental and safety characteristics.

3.2. Carbon Capture and Storage

The Energy White Paper acknowledges that "technology breakthroughs" are required for CCS, yet continues to project significant deployments of CCS from the mid twenties onwards. The Energy White Paper projects that the currently un-commercially available "fossil fuel–based carbon capture and storage could make up [a] market share of 40 per cent", yet the commercially available today Solar Thermal barely even rates a mention, with only 3% of our power need supplied by "large-scale solar" by 2050.

3.3. Geothermal

Similar to Carbon Capture and Storage, the Government seems to have placed irrational faith in the to-date commercial unviable Geothermal power. The Energy White Paper has projected that as much as 23% of our future energy needs will be met with a technology that essentially does not exists today (and yet ignore the commercially available off the shelf CST).

The Government claims not to "pick winners", but the Paper has already picked "strategically important" Gas, Carbon Capture and Storage (and Geothermal), yet dismissed other more strategic important technologies such as CST. These "winners" cannot reduce our emissions to avert dangerous climate change.

3.4. Fossil Fuel Subsidies

The Energy White Paper notes the "impact of non-market interventions" and claims "external subsidies are in effect driving inefficient outcomes". The excessive subsidies given to the Fossil fuel industry, (which far exceed the subsidies given to the Renewable sector) are not acknowledged in the White Paper.

Much is made of the cost and support mechanisms for renewable technologies: we should not forget the fossil subsidies. An important step towards a renewable energy future should include removing the subsidies currently enjoyed by the fossil fuel industries. Australian State and Federal Government budgetary support for fossil fuels was estimated to be US$7.2 billion per annum, whilst the Australian Taxation Office estimated the subsidies at $8 billion per annum and the Australia Institute7, $9.3billion[14]. Subsidies for the dirty emissions intensive industries of yesterday should be completely removed in order to assist the transition to the clean renewable. Their removal is paramount to the development of a zero emissions economy. It makes s little sense to both tax (e.g. carbon tax) and subsidies dirty technologies.

4. Misrepresentation of Renewable Technologies, Cost and Policies

4.1. Technology Cost

The Governments technology costs have been identified and criticized on many occasions, yet the government continues to rely on old and outdated costs. A comparison of cost projections (undertaken by the University of Melbourne Energy Institute) illustrated how outdated the technology costs are[15]. Figure 1 illustrates the discrepancy for solar pholtovoltaics (and other technologies are similar), with the figures typically used by Government in the red. It is disappointing to note that the Governments technology still do not reflect the most recent costs.

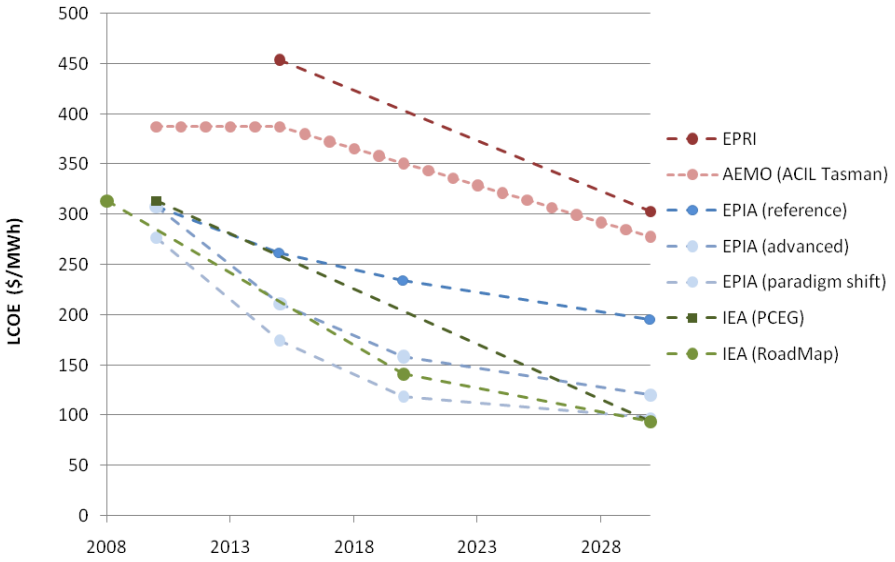

Figure 1: Comparison of Photovolatic Cost Projections [source: Melbourne Energy Institute]

The cost of PV are particularly misrepresented. Not only are the cost inaccurate, but the comparison between bulk power (such as coal) with distributed and local power (such as PV) is misleading and deceptive. Bulk power competes on the wholesale market, where as distributed technologies (such as rooftop PV) compete with the retail price of electricity (which is roughly four times greater than the wholesale price of electricity). PV can almost already compete directly with the retail price of electricity – it is expected to reach this point ('grid parity') through the world in the coming years.

The 2030 technology costs used in the report are greater than the costs achieved today. The 2030 costs of solar PV are out by a factor of 2-3 compared with today's cost. A recent Grattan Report suggest the generation costs prior to 2015 for PV is as low as $190/MWh[14] . This contrast with the projected cost in the Energy White Paper in 2030 of between $380 and $740/Mwh. Similar is true for the cost of solar thermal, with the lowest 2030 projected cost aligning with the current cost today.

The IEA also notes that solar PV is already competitive with wholesaler power in some areas today. The IEA reports that says that solar thermal will be competitive with intermediate and peaking plant by 2020, and by 2030, solar costs will range from $50/MWh in the best solar regions, to $150/MWh in the worst[5]. Again, this is substantially out of line with the costs used in the Energy White Paper.

4.2. Deployment Policies

The White Paper suggests pursuing further "Research and Development" of renewable technologies, rather than effective deployment policies. Too much emphasis is placed on Research and Development.

The report suggests that "In the decades to come we need clean energy technology breakthroughs to allow us to commercially exploit our clean energy resources in the form of wind and solar". This is simply a delay tactic, with commercially available, ready to deploy, off the shelf technologies available today. These include solar technologies (such as baseload CST or PV) and wind power. Deployment policies are now necessary to drive a rollout in these renewable technologies and drive economies of scale, learning effects and cost reductions[15].

4.3. Feed in Tariffs

The Energy White Paper is critical of the "dog's breakfast" of state based Feed-in Tariffs. Feed-in Tariffs are the most effective mechanism deploying renewables around the world, and driving the important cost reductions and economies of scale. Last year, the German Feed-in Tariffs drove investment in over 7.5 GW of PV (roughly 50 times the Federal government's proposed Moree farm). Over 80 countries around the world use Feed-in Tariffs to drive the investment in renewable, and Australia should do so with a National Feed-in Tariff. The Energy White Paper proposes feed in tariff 'harmonization' – this should include a national feed-in tariff, for the various renewable technologies.

4.4. The Merit Order Effect

The Energy White Paper on partially acknowledges the 'Merit order Effect', and does not acknowledge that the effect can completely offset the cost of schemes such as the Renewable Energy Target and Feed-in Tariffs. The Merit Order Effect is a phenomenon that is well recognized around the world. Germany's Federal Ministry for the Environment considers the merit order effect induced by renewables in their analysis of the cost of the various support mechanisms used to deploy them.

Whilst the Energy White Paper correctly notes that "Analysis suggests that this effect does impact pool prices", it incorrectly concludes the "the overall impact of the bipartisan expanded Renewable Energy Target has been to increase prices to consumers". *This is a completely and utterly unqualified and potentially inaccurate claim.* German experience has shown that Merit Order Effect can completely offset the cost of the scheme, and in some case return a net saving to consumers. This occurs when the merit order effect is greater than the scheme (e.g. FiT or LRET), and could certainly be the case in Australia, with the wind industry under the LRET.

Modelling conducted by the Melbourne Energy institute indicates that the Merit Order Effect could substantially offset the cost of feed in tariffs (or other schemes) used to incentivise renewable technologies[16].

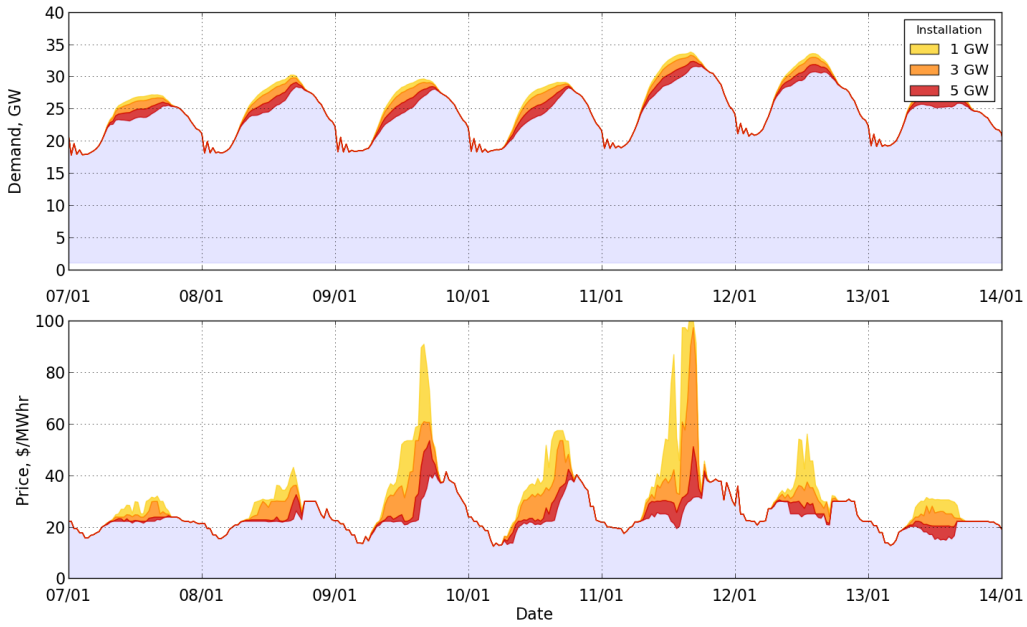

Figure 2: Merit Order Effect [source: Melbourne Energy Institute]

Unequivocally claiming that schemes cost consumers is a gross simplification of the schemes and the impact they have on the energy market. Without further analysis it is deceptive to unreservedly claim that the RET scheme has caused an increase in price to consumers.

5. Conclusion

The Energy White Paper should be completely redrafted to represent the real challenge of climate change. Fossil Fuels, such as gas have no place, in a strategic vision for Australia's energy future, the full externalities (combustion emissions, fugitive emissions and environmental impacts) should be fully accounted for. The White paper should also accurately present renewable energy technology costs and incorporate offsets to cost such as the Merit Order Effect. The Energy White Paper should aim to provide a vision for Australia to reach Zero Emissions as rapidly as possible and not only serve to further the development of the *existing* energy sector.

6. References

[1] Tans, P. (2010). *NOAA ESRL Data*. National Oceanic and Atmospheric Administration. Retrieved December 7, 2011, from ftp://cmdl.noaa.gov/ccg/co2/trends/co2_mm_mlo.txt

[2] Beyond Zero Emissions. (2010). *Zero Carbon Australia Stationary Energy Plan*. Melbourne: University of Melbourne Energy Research Institute

[3] International Energy Agency, (2011). *World Energy Outlook 2011,* available at: ttp://www.iea.org/weo/

[4] International Energy Agency, (2011). *Press Release: IEA sees great potential for solar, providing up to a quarter of world electricity by 2050,* available at: http://www.iea.org/press/pressdetail.asp?PRESS_REL_ID=301

[5] International Energy Agency, (2011). *Roadmap: Solar Photovoltaic Power,* available at: http://www.iea.org/papers/2010/pv_roadmap.pdf

[6] International Energy Agency, (2011). *Roadmap: Concentrating Solar Power,* available at: http://www.iea.org/papers/2010/csp_roadmap.pdf

[7] Department Resource Energy and Tourism, (2011), *Energy White Paper* , available at: http://www.ret.gov.au/energy/Documents/ewp/draft-ewp-2011/Draft-EWP.pdf

[8] As reported by the IPCC (Intergovernmental Panel on Climate Change (2007) IPCC fourth assessment report (AR4), Working Group 1, The Physical Science Basis.)

[9] Shindell, D.T., G. Faluvegi, D.M. Koch, G.A. Schmidt, N. Unger, and S.E. Bauer, 2009: Improved attribution of climate forcing to emissions. Science, 326, 716-718, doi:10.1126/science.1174760.

[10] South Australia Energy Supply Industry 2009/10, *Annual Performance Report,* Available at: http://www.escosa.sa.gov.au/library/101124-AnnualPerformanceReport_2009-10.pdf

[11] HyCap Energy LLC 2010, *CBM Gas Separator,* Available at: http://www.hycapenergy.com/CBM_Separator.pdf

[12] Tollesfson, J 2012, Air sampling reveals high emissions from gas field, *Nature,* Available at: http://www.nature.com/news/air-sampling-reveals-high-emissions-from-gas-field-1.9982

[13] Citigroup, *Coal Seam Gas & Greenhouse Emission*s 17 August, p13.

[14] The Grattan Institute (2012), *No easy choices: which way to Australia's energy future?* Available at: http://www.grattan.edu.au/pub_page/124_report_tech_choices.html

[15] Melbourne Energy Institute, (2011) *Renewable Energy Technology Cost Review*, Available at: http://www.earthsci.unimelb.edu.au/~rogerd/Renew_Energy_Tech_Cost_Review.pdf

[16] Melbourne Energy Institute (2012), *The Merit Order Effect*, available at: http://energy.unimelb.edu.au/index.php?mact=News,cntnt01,detail,0&cntnt01articleid=112&cntnt01origid=158&cntnt01returnid=22