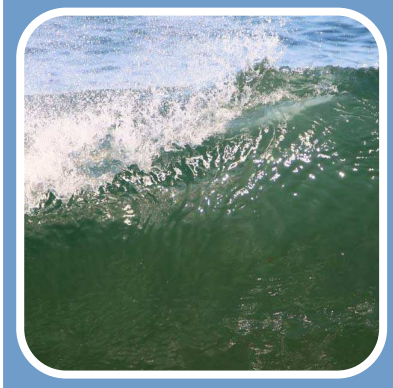
Bloomberg
NEW ENERGY FINANCE

Renewable energy investment opportunities and abatement in Australia



Commissioned by The Climate Institute and Westpac

May 2010

Contents

Table of Figures

Preface

Global low-carbon investments and industries are growing rapidly and Australia's innovative and forward thinking businesses are tapping into these opportunities.

The Climate Institute and its Climate Partner companies have come together because we share a resolve that Australia shouldn't be left behind in the journey that other economies and companies are undertaking towards the expected multi – trillion dollar markets already emerging in clean energy and pollution reduction.

As a model for future individual and collective Climate Partner initiatives, Westpac and The Climate Institute commissioned Bloomberg New Energy Finance to assess global trends in clean energy investment, the recent and future outlook for Australia and the implications of this for Australia's pollution reduction targets.

Globally, 2010 is expected to see record new investment in renewable energy. This is expected to occur on the back of increasing levels of asset investment in China and as more of the USD184 billion in global clean energy stimulus money starts flowing into the sector in the USA and similarly in other major economies.

In Australia, despite having world class renewable energy resources, investment in renewable energy has historically been subdued and Australia still contributes a very small fraction of total global investment in clean energy – reaching 2.4% of total investment in Asia and 0.8% of the global total in 2009.

Investors need certainty around climate policy and a long, loud and legal framework for a price on climate pollution so Australian business can take full benefit of opportunities in a global low-carbon economy. Assuming the Renewable Energy Target (RET) passes the Parliament, Australian investors will potentially have access to a $20 billion opportunity in clean energy.

The RET has the potential to deliver emission reductions of around 120 million tonnes over ten years to 2020, beginning the transformation of the energy sector in Australia. In the process previous research commissioned by The Climate Institute shows that thousands of new jobs would be created.

The Bloomberg New Energy Finance report also sends a warning though that a sectoral approach will not put Australia on track to meet current international commitments to reduce emissions. Without policies across the economy that ensure that companies and individuals take responsibility for the pollution they cause, many low cost pollution reduction measures will not get investment backing.

Australia will not be competitive in the emerging global low-carbon economy and will fail to meet our national commitments to reduce emissions without a carbon price to drive medium and long term investments in clean technologies and climate solutions. Policies to limit climate pollution and put a price on carbon are inevitable.

That is why partnerships between business and the community such as the one established by the Climate Institute are so vital in identifying key barriers to be overcome, and the solutions required, to achieve long term emission reductions and positive competitive outcomes for Australia.

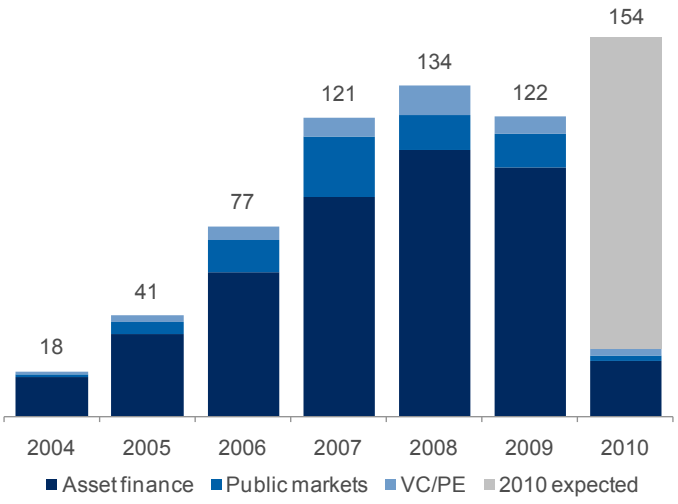
John Connor, CEO
The Climate Institute
May 2010

Section 1. Global Investment in Renewable Energy

Global renewable energy investment levels held up well during the financial crisis in 2009. Asset financing proved to be the most resilient, with particularly strong growth in China, while investment in publicly listed clean energy companies weakened. The biggest decline was seen in the volume of venture capital and private equity investment in small fast-growing companies, which was down 43%.

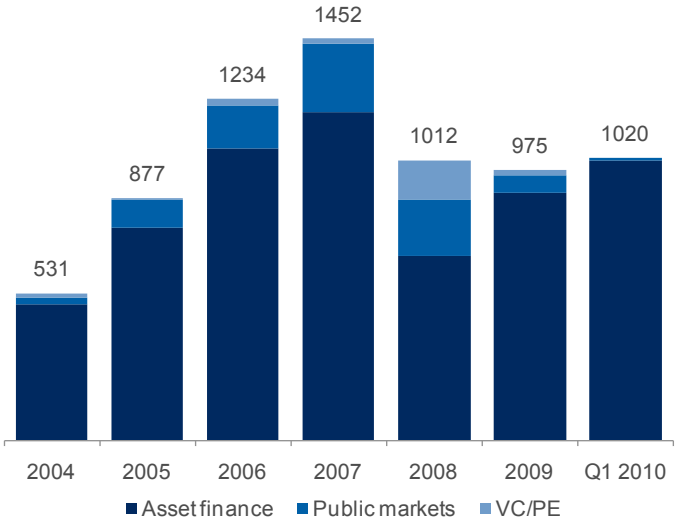
In Q1 2010 financial investment in renewable energy was up sharply from the same period last year, but down on Q4 2009. Despite this somewhat indifferent start, we forecast that 2010 will set a record of USD 154bn of new investment for the construction of renewable energy plant. This will be driven by a range of factors including: increasing levels of asset investment in China, better conditions in the world debt markets, and a larger fraction of the USD 184 billion in global clean energy stimulus money beginning to flow into the sector.

Figure 1: Global investment in renewable energy plant by asset class
USD bn



Source: Bloomberg New Energy Finance Note: Figures represent new financial sector investment which excludes government and corporate R&D and small distributed capacity. Figures are not adjusted for re-invested equity.

Figure 2: Australian investment in renewable energy plant by asset class
USD m

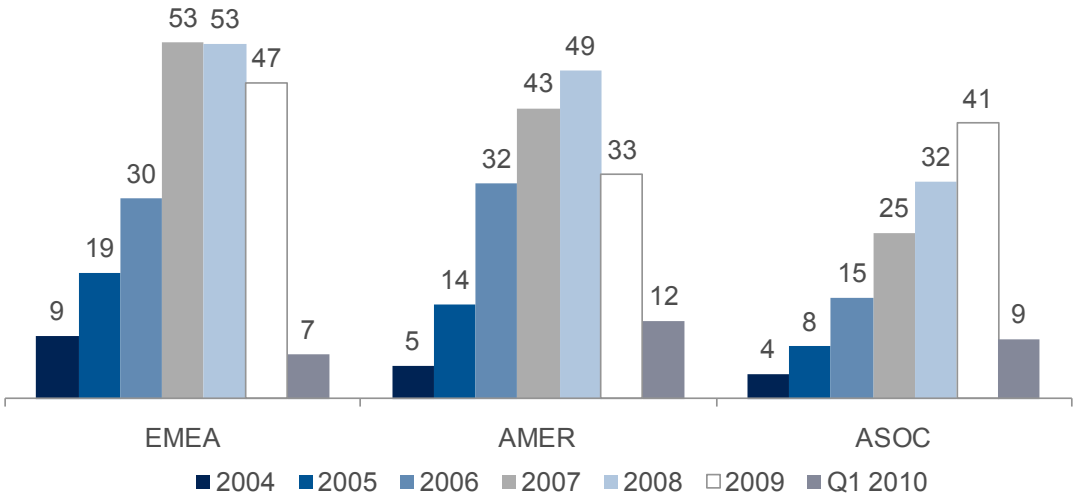


Source: Bloomberg New Energy Finance Note: Figures represent new financial sector investment which excludes government and corporate R&D and small distributed capacity. Figures are not adjusted for re-invested equity.

In Australia the past two quarters have set records for project financing, a result driven by a few large projects (Figure 2). Although investor sentiment overall was weak in 2009 (particularly in private equity, venture capital and equity markets) recent changes to the RET scheme appear to have reinvigorated the sector and strong growth is forecast. Overall, Australia contributes a small fraction of total global investment in clean energy – reaching 2.4% of total investment in Asia and 0.8% of the global total in 2009.

Europe remains the strongest performing geography in 2009 followed by Asia which continued its impressive year-on-year growth despite the financial crisis (Figure 3). For the first time in 2009 Asia overtook the Americas in total investment in clean energy plant, driven mainly by China. This trend appears set to continue with investment in China reaching USD 6.5bn in Q1 2010 compared with USD 3.5bn in the US. Both figures are however substantially up from the same time last year.

Figure 3: Global investment in renewable energy plant by geography
USD bn

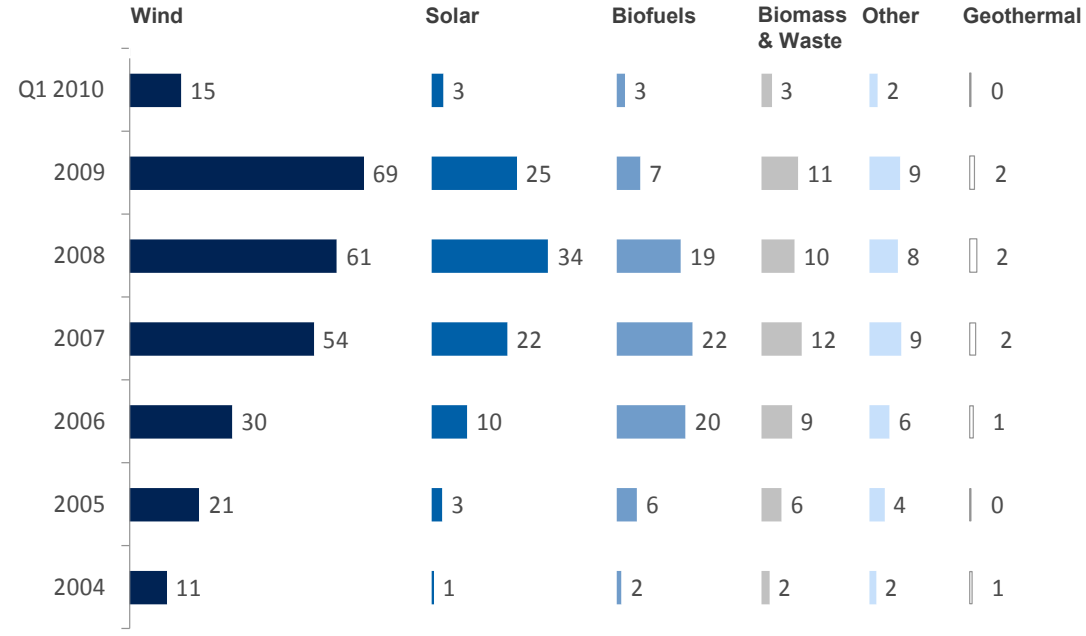


Source: Bloomberg New Energy Finance Note: EMEA – Europe, Middle East & Africa, AMER – Americas, ASOC – Asia & Oceania.

Almost 80% of all clean energy financing is invested in physical assets that generate energy. On-shore wind has been the most dominant sector due to its relative maturity and scalability. Investment in large-scale solar, a comparatively risky investment, was down in 2009. Investment in biofuels declined significantly due to falls in the global oil price.

In Australia investment is even more heavily skewed toward wind plant. Since 2005 a total of USD 3.35bn of asset finance has been allocated to constructing wind farms, compared to USD 511m for biofuels, USD 432m for biomass and waste, USD 121m for solar and USD 13m for geothermal.

Figure 4: Global investment in renewable energy plant by technology type
USD bn



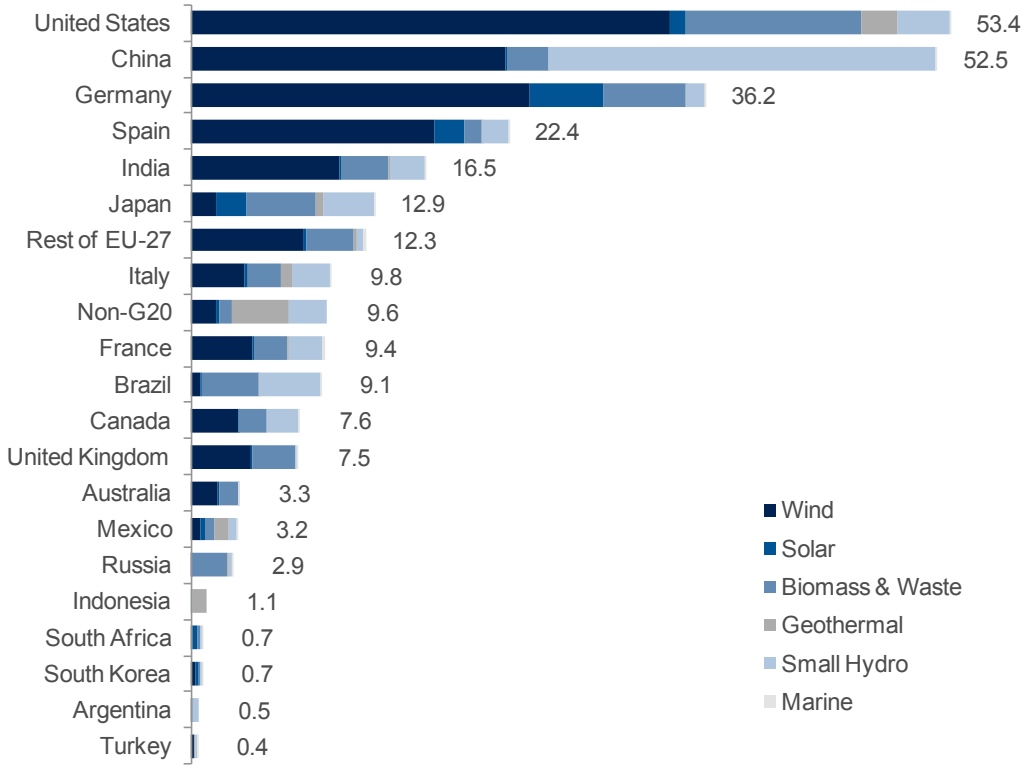
Source: Bloomberg New Energy Finance Note: Other includes energy smart technologies, small hydro, low carbon services and support and marine

The total global renewable energy capacity[1] of 250 GW constitutes about 6% of total power generation capacity worldwide. Figure 5 shows that the United States currently leads in installed wind, biomass and geothermal capacity, but is very close to losing its lead in overall installed plant as China

[1] Renewable energy capacity excludes contributions from large hydro.

surges forward. Germany is the undisputed leader in the solar sector with a total installed capacity of 5.3 GW. Japan and Spain, with 1.7 and 3.6GW respectively, are the next leading countries for installed solar power capacity. China doubled its wind capacity in 2009 in pursuit of its ambitious target of installing 30GW of wind by 2020. Australia's 3.3GW of installed renewables, which includes a notable amount of large non-grid connected biomass, represents 1.32% of global renewable generating capacity.

Figure 5: Global installed renewable generating capacity by country
GW



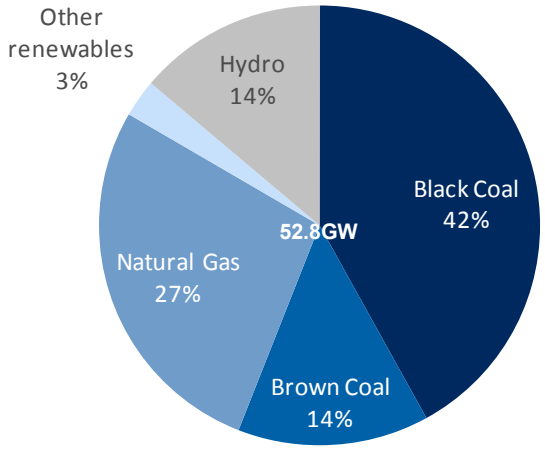
Source: Bloomberg New Energy Finance

Section 2. Renewables in Australia

Despite excellent clean energy resources, fossil fuels currently generate the majority of electricity in Australia with 82% of generation coming from coal. While cleaner burning natural gas accounts for 27% of capacity it is mainly used as peaking plant and contributes only around 10% of total electricity production.

Renewable energy is projected to generate 9% of Australia's electricity needs in 2010. Of this, approximately 78% is expected to come from existing large scale hydro plant in the Snowy Mountains and Tasmania. Figure 6 shows the breakdown in installed capacity in Australia in 2010.

Figure 6: Projected capacity of grid connected electricity generating plant in Australia in 2010



Source: Bloomberg New Energy Finance, Energy Supply Association of Australia

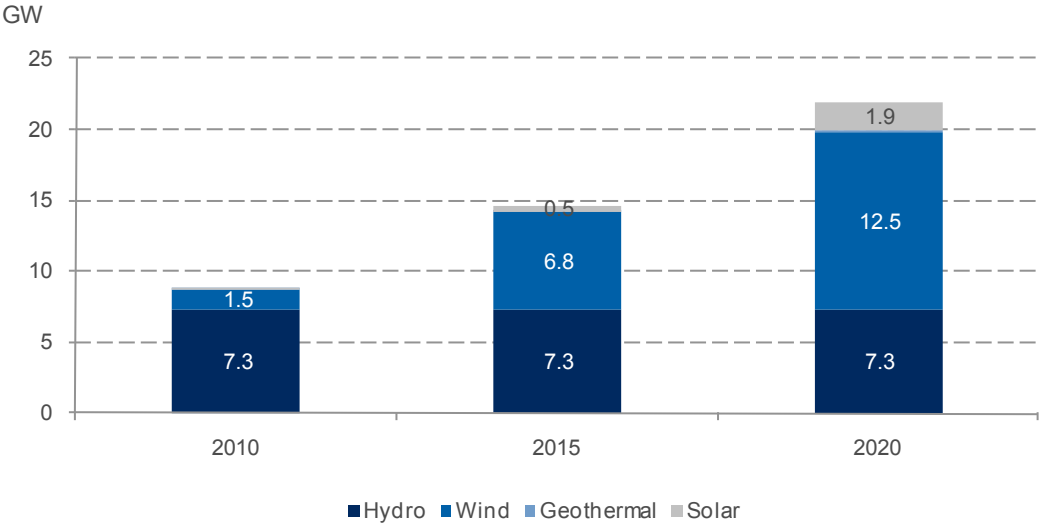
The federal Renewable Energy Target (RET) scheme is the dominant driver of new large scale renewable energy infrastructure in Australia. The scheme mandates that 45TWh of additional generation[2] must come from renewable resources in 2020. Currently there is legislation before parliament to split the RET into two separate schemes, a Large-scale Renewable Energy Target (LRET) and a Small-scale Renewable Energy Scheme (SRES). The LRET mandates that 41TWh of the 2020 target must come from large-scale renewable sources and the SRES allows for a further 4TWh from small-scale renewable sources such as domestic solar PV and solar hot water[3].

By providing additional revenue for large scale projects, the LRET supports new renewables, particularly wind power which is the most mature technology. Wind is expected to make up the majority of the 41TWh generation target. Biomass technology is economically viable in certain situations where uniform feedstock is readily available (such as sugar cane farms) although these opportunities are limited.

Other large scale renewable energy technologies are further from commercial or technological viability and require additional subsidisation. Solar power receives special support under the AUD 1.5bn Solar Flagships program, which sponsors the development of 1GW of large-scale solar generation by 2020. Geothermal technologies are still under development and receive grants for project development and demonstration under the AUD 50m Geothermal Drilling Program. Australia has world-class wave and tidal resources, but this technology is still in its infancy. All of the above technologies receive grant funding from the AUD 410m Federal Renewable Energy Demonstration Program (REDP).

[2] This is in addition to a 1997 baseline of installed hydro and renewable generation of approximately 15TWh. The combined 60TWh is expected to comprise 20% of national electricity demand in 2020.
[3] Solar hot water systems technically do not generate electricity but reduce consumption. Small-scale renewables are defined as small generating units less than 100kW in capacity.

Figure 7: Projections of large-scale renewable capacity under the LRET



Source: Bloomberg New Energy Finance Note: 2015 and 2020 projected capacities are calculated to generate enough renewable energy to meet the LRET targets taking into account the spending of approximately 8.6TWh of banked RECs over the last 4 years of the RET.

Figure 7 shows the capacity of renewable energy plant on the grid in 2010, and our projections of the additional capacity that will need to be constructed by 2015 and 2020 to meet the LRET. Overall we expect over 7GW of renewable plant to be built over the next 10 years representing around AUD 20bn of new investment.[4]

In total, more than 13GW of wind projects have been announced, are seeking finance or are under construction – enough to satisfy the entire LRET. Project economics and Renewable Energy Certificate (REC) prices will determine which of these projects ultimately get constructed.

Two large-scale solar projects are due to be operational by 2015 under the first phase of the solar flagships program. We anticipate the projects will be a 150MW large scale solar PV plant in 2012 and a 250MW solar thermal electricity generating (STEG) plant in 2013. It is likely that a further 150MW of solar PV plant will be commissioned in 2016 and 450MW of STEG in 2017 under the second phase of the program. Two STEG plants totalling 63MW which received REPD funding are also anticipated to come online in 2012.

Small-scale solar is strongly supported by state-based feed-in-tariffs and substantial subsidies through the Solar Credits scheme[5]. Coupled with falling system prices, we estimate that at least 600MW of small scale solar PV will be installed in Australia by 2013. This is based on a conservative growth scenario of 15% per annum between 2013 and 2020. The number of solar hot water system installations will continue to grow, although we expect the reduction in the upfront unit subsidy from AUD1,600 to AUD1,000 to moderate growth.

Driven by the LRET, Solar Flagships and other government subsidies, the composition of electricity generation in Australia will look markedly different in 2020 relative to today. A growing proportion of generation will be sourced from wind power and there will be small contributions from large-scale solar projects. The SRES, supported by small scale state-based solar feed-in-tariffs, will effectively reduce demand for large scale generation. We project solar hot water to save over 5TWh and small scale solar PV to produce nearly 4TWh in 2020 – a substantial overshoot of the 4TWh SRES target despite conservative growth assumptions.

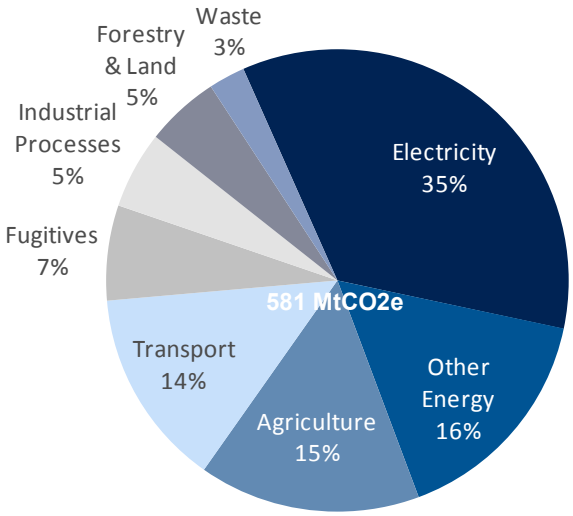
[4] Clean Energy Council using figures reported by Access Economics, *The net employment impacts of climate change policies*, 3 June 2009.
[5] The Solar Credits scheme allocates RECs to small generating units (<100kW) such as solar PV and solar hot water, with multiplying incentives to provide an upfront cash subsidy.

Section 3. Reaching Australia's Emissions Reduction Objective

Under Kyoto accounting rules Australia's emissions totalled 581MtCO2e in 2008. The majority of this comes from electricity generation, but agriculture, transport and other fuel combustion for energy make up a larger fraction. Based on a business as usual scenario which excludes the renewable energy target (RET), but includes other emissions reduction policies, we expect Australia's emissions to increase by around 21% by 2020 to 720Mt.[6] To achieve a 5% reduction in emissions based on 2000 levels Australia needs to find 195Mt of abatement from this trajectory per year by 2020.

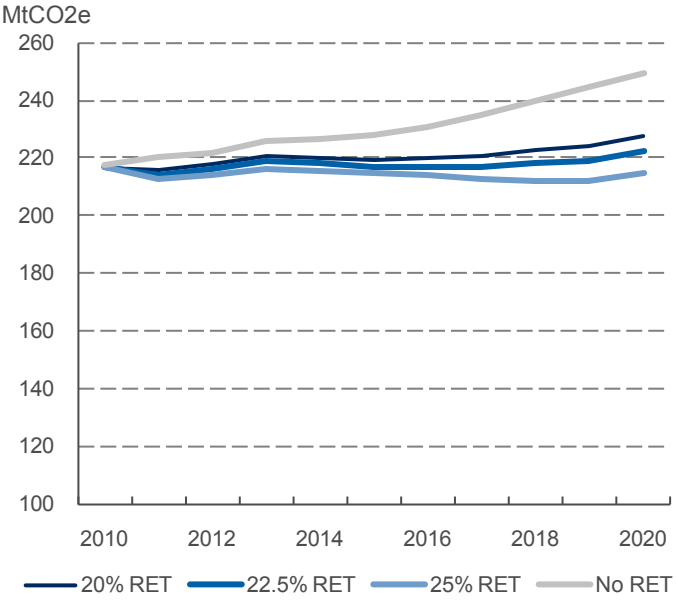
In the absence of the RET, emissions from the electricity sector are set to increase to around 250Mt in 2020. Figure 9 shows the reduction in emissions we expect form the power sector as a result of new renewable energy installations under the RET scheme. Our modelling suggests that the 20% RET[7] will result in 120Mt of power sector abatement over the 10 years to 2020. More investment in renewable energy up to a 22.5%[8] or 25%[9] RET increases the emissions savings by 34MtCO2e and 76MtCO2e respectively over the decade.

Figure 8: Emissions in Australia, 2008



Source: Department of Climate Change Note: Kyoto accounting

Figure 9: Projected BAU power sector emissions under different RET targets



Source: Bloomberg New Energy Finance

However despite these important savings, the RET will only achieve a 23Mt reduction in 2020 - 172 Mt short of Australia's reduction target. Figure 9 shows that despite an increase in the volume of renewables, emissions from the power sector are unlikely to fall much below 2010 levels. This can be explained by looking at the breakdown of large-scale electricity generation, as shown in Figure 10. What is evident is that in the absence of real or implicit carbon pricing across the sector, the volume of low-cost, carbon-intensive coal-fired generation remains relatively constant in the mix over time

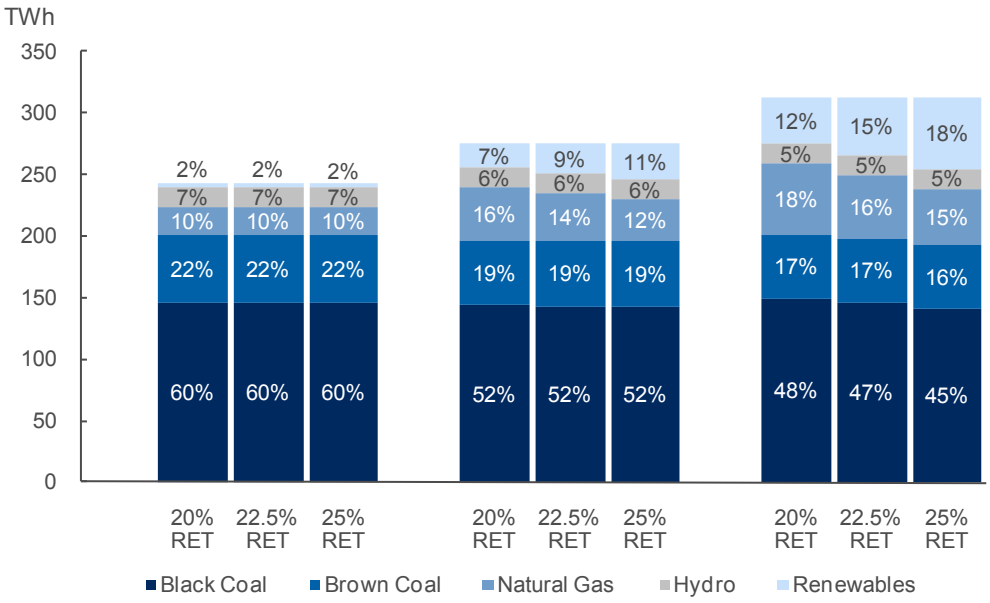
Furthermore in the absence of a policy to make gas more competitive with coal, the amount of new gas plant is likely to be moderate and the addition of more renewables to the generation mix is actually likely to preferentially displace natural gas (Figure 11). This is due to the following:

1) The running cost of natural gas fired power generation is greater than that of black and brown coal plant. This means that gas plant is the first technology to be pushed out of merit as more renewables are added to the generation mix.

[6] BAU scenario excludes a RET but includes all other climate change policy measures such as the National Strategy on Energy Efficiency and Energy Efficient Homes Package.
[7] The 20% RET consists of a 41TWh LRET and 4TWh SRES.
[8] A 22.5% RET is modeled to consist of a 50TWh LRET and 4TWh SRES.
[9] A 25% RET is modeled to consist of a 60TWh LRET and 4TWh SRES.

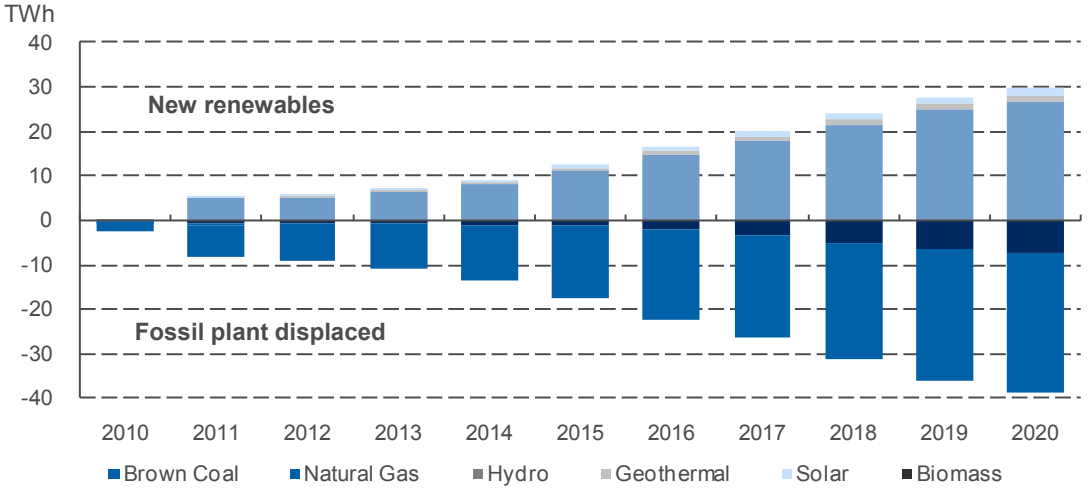
2) The RET-induced build of new renewables reduces the need for new build of thermal plant - much of which would be fired with natural gas.

Figure 10: Projected composition of large-scale electricity generation under different RET targets



Source: Bloomberg New Energy Finance Note: Renewable generation quantities are from large scale plant only. Small scale generation/savings from solar PV and solar hot water are modelled as a reduction in demand and are projected to be 2.3TWh in 2010, 4.99TWh in 2015 and 8.95TWh in 2020 for all LRET scenarios. Large scale renewable generation amounts are reduced by the spending of banked RECs from 2009/10 in years 2017 (0.86TWh,) 2018 (1.72TWh), 2019 (2.58TWh) and 2020 (3.44TWh).

Figure 11: Projected energy from build of renewable plant and displacement of fossil plant by the RET



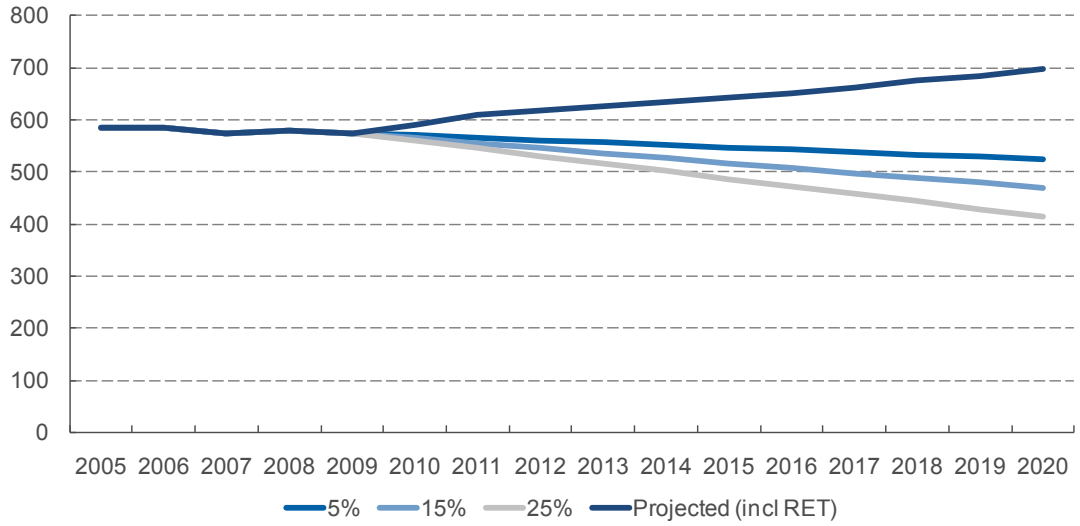
Source: Bloomberg New Energy Finance Note: The quantity of energy from renewables built is less than the quantity of fossil plant displaced due to the projected demand reduction from the SRES

While there is no doubt that increasing the volume of renewables in the electricity system will displace fossil-fuel generation and in doing so reduce emissions, the lack of a carbon price signal and the ongoing prevalence of low-cost coal means that the reduction in power sector emissions as a result of the RET will remain relatively modest in the short-term.

Section 4. Making up the shortfall

The RET will promote a significant increase in investment in renewable energy in Australia, in line with the global trend towards ongoing growth in renewable energy generation. However, in the absence of further emission reduction policies, Australia is likely to miss its unilateral -5% target by around 170MtCO2e, increasing to over 270MtCO2e relative to the -25% target. Figure 12 shows the distance between national emissions and the -5%, -15% and -25% emissions reduction target levels.

Figure 12: Australia's emissions projection including RET and the national reduction targets
MtCO2e



Source: Bloomberg New Energy Finance

It should be remembered however that the RET was not intended to achieve Australia's emissions reduction targets on its own. Rather, it was designed to work in tandem with an early stage carbon price that would incorporate the cost of emissions into generation and new investment decisions. By putting a price on carbon, cleaner burning natural gas would be made more competitive, displacing a larger number of high emitting and inefficient coal plants, and in doing so achieve more significant cuts in emissions.

However even in the absence of a carbon price the RET still has a pivotal role in supporting the development and deployment of renewable energy technology and this will put Australia in a much stronger position to achieve deep emissions cuts in the long-term.

It is also evident that renewable energy policy alone is not enough to achieve Australia's emissions reduction targets. Electricity makes up only 35% of emissions and hence abatement needs to occur across the economy, not just in the power sector. While policy options such as the RET and energy efficiency are critical, a carbon price would be the most effective and efficient way to achieve emissions reductions as it will promote the consumption of low emitting goods and services over high emitting ones and seek out the lowest cost abatement options wherever they might occur in the economy.

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