WWF submission to Clean Energy Finance Corporation Expert Review

100% renewable energy by 2050 and the role of CEFC

"We need a wide number of clean energy technologies and resources into the energy market as early as possible to create a diverse, competitive, and reliable domestic energy market that can decarbonise faster if science and governments deem necessary."

I. Introduction

WWF welcomes the opportunity to submit its views to Clean Energy Finance Corporation (CEFC) review panel.

WWF-Australia is part of the WWF International Network, the world's largest and most experienced independent conservation organisation, with 80,000 supporters in Australia, five million supporters worldwide and a global network active in more than 100 countries. WWF's mission is to stop the degradation of the planet's natural resources and to build a future in which humans live in harmony with nature. Climate change is the greatest threat to the survival of species. According to scientists a 2-3 degrees rise could result in between 20-30% of species becoming extinct. WWF has been an advocate for national and international action to avoid dangerous climate change for more than two decades.

WWF's goal is for a reduction of greenhouse gas emissions to keep temperature increase well below 2 degrees Celsius above pre-industrial levels and to achieve 100% global renewable energy by 2050.

Through the Cancun Agreements, Australia and the rest of the international community have agreed that the global aim should be to keep emissions below 2 degrees Celsius. According to the Australian Government, for this global goal to be met Australia will need to take on national greenhouse gas (GHG) emissions targets of 80% below 2000 levels by 2050 (now legislated) and by between 5-25% below 2000 levels by 2020.

To contribute its fair share and minimise risks of tipping points and overshoot, WWF believes Australia must aim for national emissions reductions of at least 25% below 1990 levels by 2020 and at least 90% by 2050. As new scientific evidence comes to the fore, even stronger targets may be necessary and must be anticipated. Indeed it is possible that the goal posts will shift and that the world and Australia will need to act faster and make deeper cuts.

WWF also believes it is in Australia's best interest economically to try and achieve these reductions domestically, and our modelling shows that this is achievable.

We acknowledge that a final decision on the 2020 target will be not be made until 2014 at the earliest as part of the cap setting process for the emissions trading scheme. In the meantime it is vital that we continue to build a policy and regulatory framework that is capable of delivering the full range of short and long-term targets and lay the foundations to transition to a low carbon economy faster if we need to.

The Clean Energy Finance Corporation (CEFC) has the potential, in combination with other mechanisms such as the carbon price, Australian Renewable Energy Agency (ARENA) and the Renewable Energy Target (RET), to be a key part of the Australian policy and regulatory framework to support the reduction goals. It can do this by reducing investment risk and increase capital flows to assist the transition to low carbon economy and build a domestic renewable energy future. In fact we would argue that there is enough money in the CEFC and revenue raised through the carbon price to help achieve most of the abatement in Australia.

WWF supports the inclusion of energy efficiency projects in the CEFC mandate but believes renewable energy projects should be a priority, especially given the role of Low Carbon Australia. The energy sector is the major contributor of Australia's greenhouse gas emissions it will also need to do more of the heavy lifting as some sectors like agriculture may struggle to meet required emissions reduction targets. This means the energy sector will need to undergo massive transformation over the coming decades if we are to meet our global and domestic targets. Given that energy projects have long lifespans of between 15 and 30 years, investments made now have repercussions for how the energy market will look in 20-30 years' time.

The challenge for policy and decision makers is how to achieve multiple and sometime moving objectives. In the case of the energy sector, the objective is to ensure energy security and decarbonise at the latest by 2050.

Australia will need a wide number of clean energy technologies and resources into the energy market as early as possible to create a diverse, competitive, and reliable energy market that can decarbonise faster if science and governments deem necessary.

This requires Government fostering concurrent development of renewable industries now and not waiting for each technology to become 'cost competitive' in their own time.

Transitioning to a low carbon economy and investing earlier in a mix of technologies and resources will require an unprecedented level of capital investment where returns may not be evident for decades. Unfortunately our current financial systems are not suited to taking such a long-term view. Investors expect a return within a couple of years.

However research shows that there are benefits to investing earlier, even at small scale. For example, investment at a comparatively small-scale now leads to exponential growth in installed capacity and reduces the chance of delay to large-scale capacity. Further a recent International Energy Agency (IEA) report argues that for every $1 of investment in low carbon transition between 2011 and 2020, it avoids an additional $4.3 in required expenditure between 2021 and 2035 to compensate for the increased emissions.[1]

Access to capital has and will become increasingly difficult over time due to global market capital volatility and growing demand for capital.

Research[2] and experience from other schemes[3] and countries shows a mix of financial models is needed, that could include:

- Small and large scale feed-in-tariffs with different rates for different technologies/resources
- Feed-in-premiums
- Offtake arrangements
- Renewable energy credit schemes, including different rates or segments for different technologies/resources
- Loan guarantees
- Co-investments – debt and equity investments
- Bonds

[1] IEA World Energy Outlook, 2011 www.worldenergyoutlook.org
[2] Climate Risk (2008) Industrial Constraints and Dislocation to Significant Emission Reductions by 2050http://wwf.org.au/publications/carbon-constraints-2050-report/ **AND** WWF and ECOFYS (2011) The Energy Report: 100% Renewable Energy by 2050. http://www.wwf.org.au/news_resources/resource_library/?1694/The-Energy-Report-100-Renewable-Energy-by-2050
[3] For example Export Finance and Insurance Corporation (EFIC) and Low Carbon Australia.

- Grants

As of July 2012, Australia will have a carbon price which will increase costs of fossil fuels; Low Carbon Australia which will provide financial solutions and advice on energy efficiency; ARENA which will provide grants for research, development and early phase commercialisation for renewable technologies; and the Renewable Energy Target (RET) which has two bands - one to support small-scale renewable energy and one band for large-scale renewable technology.

It is important to emphasise that both the Carbon Price and the RET will only support the cheapest clean technologies as they become cost competitive with coal, so for example in the early years carbon price will support gas and the RET will support wind.

A gap will still exist for currently feasible large-scale technologies such as large-scale solar PV (photovoltaics) and building integrated PV, and emerging technologies such as solar thermal, geothermal and wave. Investing in these technologies and resources now will help provide experience that can reduce the cost or risk of future deployments at scale; drive competition; improve market reliability and security; and accelerate transition.

The CEFC is being established to overcome capital market barriers that hinder the financing, commercialisation and deployment of renewable energy, energy efficiency and low emissions technologies. The CEFC will assist by helping to reduce risk of private investment and increase capital flows. A well designed CEFC could unlock billions of dollars in private finance for a range of projects and develop a range of renewable technologies and resources. If the CECF is clever with the money it could catalyse significant investment domestically and transform Australia's economy.

WWF does not believe that financial viability or cost per tonne of abatement should be the only principles of the CEFC, as this will mean only cost competitive and mature technologies will be prioritised for investment from the CEFC.The CEFC should not be wasted and used to subsidise the carbon and RET market by supporting technologies that the market will take up.

WWF therefore makes the following recommendations:

- The overall objective of the CEFC should be to leverage investment to create a, diverse, competitive, and reliable clean energy market that meets demand and can decarbonise faster if science and governments deem necessary.
- The CEFC should not subsidise the carbon and RET markets and instead seek to leverage further private sector capital that would not otherwise have occurred, especially for emerging technologies.
- The CEFC should incorporate principles beyond financial viability that should be used to prioritise investments, such as:
    - Energy market diversity
    - Energy market reliability
    - Demonstration to accelerate learning rate and drive down costs
    - Industry development
    - Short, medium and long-term emissions impact
- CEFC projects should be eligible for RECs, but must be new and additional to the investments that will already occur under the 20% RET. Each REC generated by CEFC should be 'topped up' in the REC market annually. To avoid the need for 'top ups' the Government should aim to increase the RET to at least 40% by 2030 and from 2015 band an increasing portion of the RET at a high rate for emerging technologies (possibly subsidised from ETS revenue). This in turn will make the CEFC more effective.
- The CEFC should be equipped with a broad and versatile set of financing tools and mechanisms as the barriers will differ by technology, project and investor. Consideration should also be given to tools such as co-investment and equity investments as a signal of regulatory confidence and to support what the market may perceive as 'riskier' investments.

- The CEFC should take a balanced approach to its portfolio with a spread of technologies, sectors, geographies and varied positions in capital structures and financial markets.
- The CEFC should invest in community, industry and large-scale projects.
- Support CEFC taking a direct or partnership approach in investments.
- The CEFC should work with Infrastructure Australia and the Australian Energy Market Operator to facilitate private sector investment in enabling infrastructure such as smart grids and traditional electricity grid infrastructure, especially to support regional renewable energy projects.
- The CEFC should invest only in projects that have an emissions performance standard of less than 0.20 tonnes of CO2e per MWh, with priority given to 100% renewable energy projects.
- The CEFC should be independent of Government, with equivalent status as the Reserve Bank of Australia (RBA), Future Fund and Export Finance and Insurance Corporation (EIFC).
- Consider making the CEFC a repository of market data and transaction information and giving them a role to help advise and make recommendations to government on policy, regulatory gaps or overlaps.

II. Opportunities to 100% renewable energy by 2050

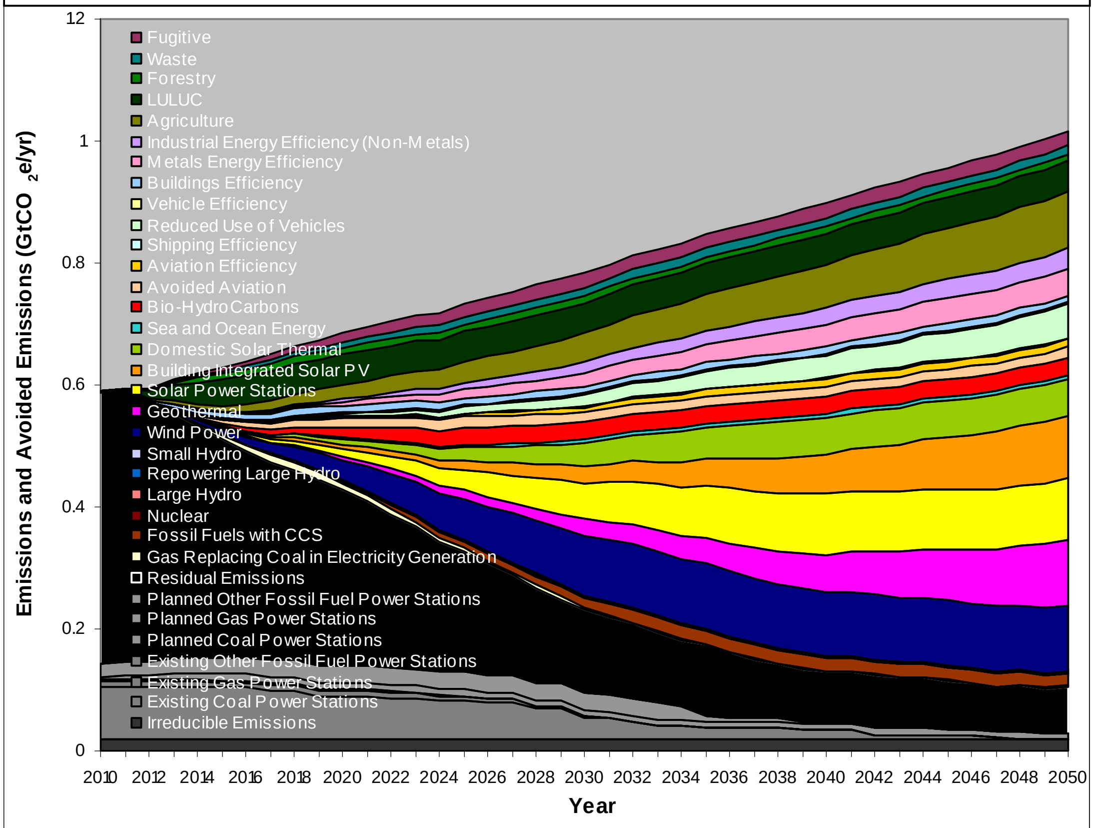
WWF believes that the current national 80% target by 2050 can be achieved domestically, rather than purchasing up to 50% of the target from international offsets. WWF view a number of benefits to achieving most of the abatement from domestic sources, including:

- Minimising overseas cost
- Maximising investment in domestic infrastructure
- Maximising domestic spend of carbon revenue to generate new industries and jobs.

Analysis by Climate Risk Pty Ltd for WWF-Australia[4], shown in figure 1, finds that Australia could achieve its 80% by 2050 target through domestic abatement. The model shows that energy efficiency and renewable energy will play a critical part in achieving these significant reductions.

The analysis (see also figure 2 below) finds that Australia has ample renewable

Figure 1: CRISTAL model Australian emissions forecast, showing emissions baseline and abatement out to 2050 for a domestic 80% scenario



4 The modelling is based on extensive review of 25 low or zero technologies and their application. The core list of technologies is confined to those that are currently available.

energy resources to provide close to 100% of its energy needs - provided efficiency measures are applied to commerce, industry and civil society that would reduce projected energy demand by 450 TWh per year in 2050, or 24% compared to business-as-usual. Australia is comparatively inefficient in its use of energy with numerous options available using technology freely available today to reduce demand and costs, including in the areas of industrial processing, commercial and residential buildings and the transport sectors.

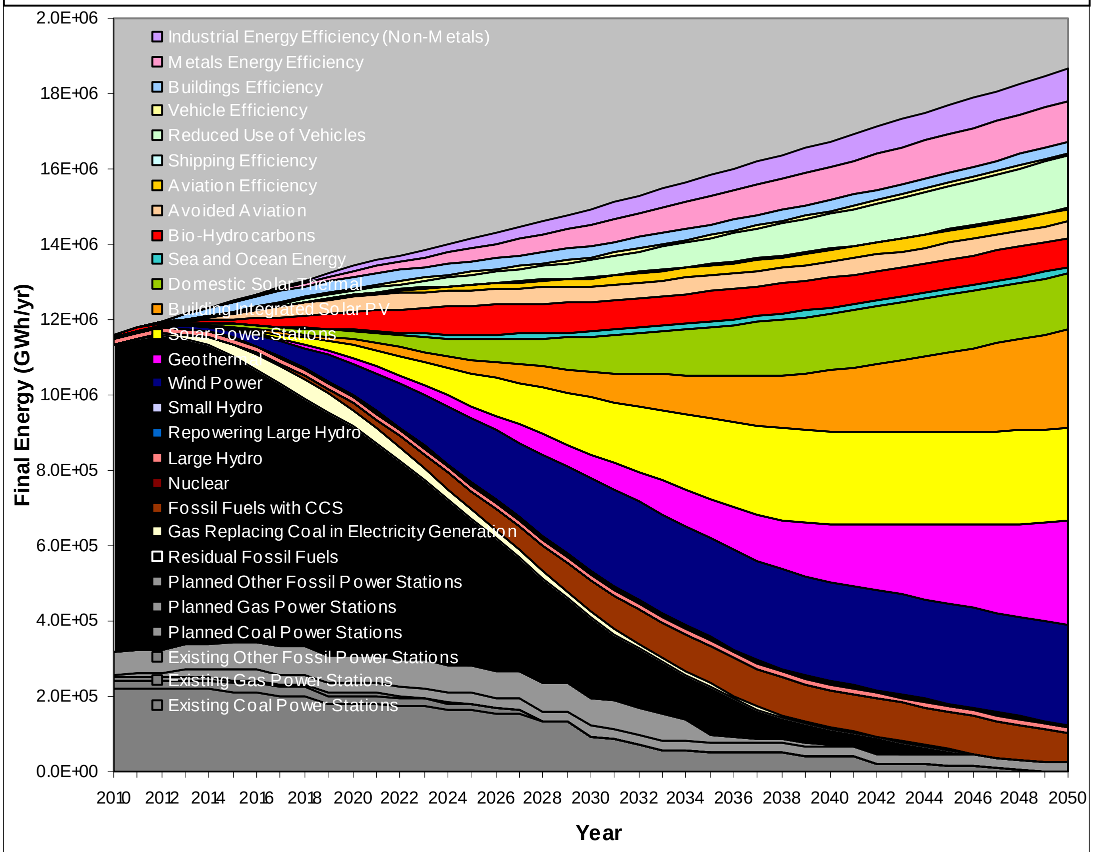
Australia also has access to carbon capture and storage (CCS) opportunities which could provide 5% of energy generation with the rest coming from renewables (as will be assumed in the scenario discussed herein). While close to 100% renewable energy is achievable and is WWF's goal, WWF assumes that CCS is necessary for industrial processes such as cement and steel manufacture that will need to capture emissions as the only means to reducing their emissions profile, as well as any residual fossil fuel use in the stationary energy sector.

Australia has six critical renewable energy resources that must be harnessed to meet the final energy demand (after energy efficiency measures have been implemented). These are wind, solar, bio-energy, geothermal, hydro-electricity and ocean energy. Some of these can be harnessed in quite different ways – for example solar energy can be harnessed on rooftops as electricity or heat, or in large grid connected power stations. Figure 2, created using Climate Risk modelling, shows the extent of these resources and their contribution to the energy demand in each decade (with CCS also included).

It's also worth noting that the modelling also assumes in order to meet a domestic 80% reduction target in 2050, that a significant portion of the transport energy requirements are met using bio-hydrocarbons and the stationary energy sector (relating to the uptake of electric and plug-in hybrid vehicles).

The extent of contribution and the number of Renewable Energy Power Station required in 2050 (and earlier) to meet stationary and transport requirements, is set out in tables 1, 2 and 3. Renewable energy power stations tend to be distributed by nature; wind farms will tend to be placed on existing agricultural land allowing continued cropping and grazing, solar energy will be collected both on building rooftops and in large thermal power stations, geothermal plants will be located in the outback where the geothermal resources exists , hydro-electric installations have largely

Figure 2: CRISTAL model, the final energy contribution of each renewable energy resource and CCS out to 2050.



all been built, although they may be re-fitted for greater efficiency and augmented by small run-off river facilities, and the new breed of wave and tidal energy facilities will likely be located off-shore of major cities.

Table 1: Table of final energy for each renewable energy technology by decade (all units GWh)

Year	Large Hydro	Repower Large Hydro	Small Hydro	Wind Power	Geothermal	Solar Power Stations	Building Integrated Solar PV	Domestic Solar Thermal	Sea and Ocean Energy	Bio-Hydro carbons
2020	14966	2691	3613	84487	14652	32450	15717	23251	3398	46999
2030	14966	3646	5298	246932	65299	150038	69669	90782	15004	78873
2040	14966	3139	5298	265940	152123	247207	160824	149773	16690	78873
2050	14966	2701	5298	265940	275124	247423	260367	149773	16690	78873

Table 2: Table of capacity for each renewable energy technology by decade (all units GW)

Year	Large Hydro	Repower Large Hydro	Small Hydro	Wind Power	Geothermal	Solar Power Stations	Building Integrated Solar PV	Domestic Solar Thermal	Sea and Ocean Energy	Bio-Hydro carbons
2020	6.8	0.7	0.7	32.2	2.0	7.2	11.8	26.5	1.2	5.4
2030	6.8	0.9	1.0	94.0	8.8	33.3	52.1	103.6	5.1	9.0
2040	6.8	0.8	1.0	101.3	20.4	54.9	120.3	171.0	5.7	9.0
2050	6.8	0.7	1.0	101.3	36.9	55.0	194.7	171.0	5.7	9.0

Table 3: Table of required power stations and installations for each renewable energy technology by 2050

Resource	Number of Installations	Installation Size
Small Hydro	101	10 MW installations
Wind Power	203	500 MW power stations
Geothermal	74	500 MW power stations
Solar Power Stations	110	500 MW power stations
Buildings Integrated Solar PV	50%	of total available PV roof-space
Domestic Solar Thermal	100%	of total available solar thermal roof-space
Sea and Ocean Energy	23	250 MW power stations
Bio-Hydrocarbons	23000	GL of bio-fuel

The market for clean technology is booming, and in 2007 was larger than the pharmaceutical industry. Based on IEA scenarios is on track to be the third industrial sector in the world in 2020.[5]

According to the latest *Renewables 2011 Global Status Report,* renewable sources have grown to supply an estimated 20% of global final energy consumption in 2010. In 2010 Investment in renewable power and fuels reached $211 billion, up 32% from $160 billion the previous year. Developing country investment exceeded developed country investment, with China attracting more than a third of global investment.[6]

[5] WWF and Roland Berger Strategy Consultants (2009) Clean Economy, Living Planet - Building Strong Clean Energy Technology Industries. http://wwf.panda.org/?183363/Growing-China-industry-helps-clean-energy-boom
[6] REN21. 2011. *Renewables 2011 Global Status Report* *http://www.ren21.net/Portals/97/documents/GSR/REN21_GSR2011.pdf*

Under the scenario that the global economy will be operating with, or close to, 100% renewable energy by 2050, as outlined in the *WWF Energy Report:100% Renewable Energy by 2050*[7], Australia would occupy a highly competitive position as a supplier of large volumes of low cost, low carbon energy to energy intensive industry. A comparison of international resource levels for wind, solar and geothermal energy in industrialised countries shows that Australia would be well positioned as an energy provider in a carbon constrained world. For example:

- Australia has large tracts of wind farm sites able to deliver average winds speeds above 8 metres per second.[8] Thus the same wind turbine erected in Australia (at 8m/s) can produce more than double the energy of the same machine erected in mainland Europe (at 6m/s)[9]. Put another way, it would produce energy at half the cost.
- A solar power station in Australia could produce 25-50% more energy than the same facility in the USA, and double that of a plant in Europe.
- Collectively Australia, New Zealand and other Oceania nations have the fifth largest geothermal resource in the world and nearly 6% of the total global resource. Australia has the particular advantage of having mineral deposits and processing needs close to large geothermal reserves.[10]

III. Barriers to 100% renewable energy by 2050

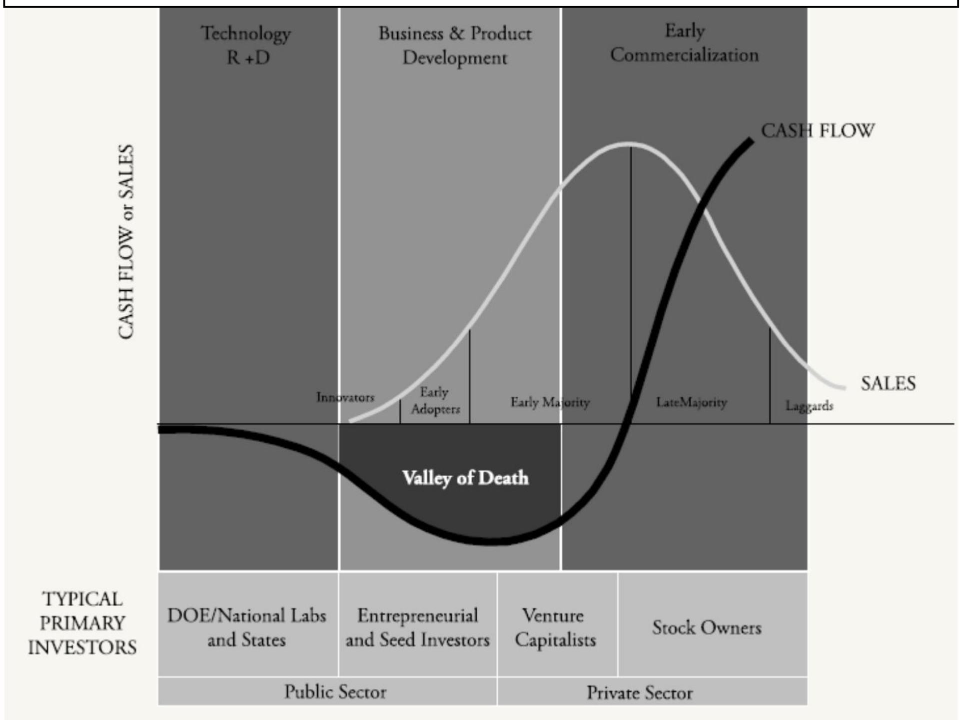
There are a number of market and non-market barriers to investing in clean energy projects, including:

Technology maturity and investment risk

The clean energy technologies to harness the renewable energy and clean energy resources vary in maturity – some are highly mature and already becoming competitive in some markets, others are evolving quickly and others are still in the process of being demonstrated.

Financers and investors are reluctant to invest in technologies that are new, risky and have not been proven. The business and marketing literature describe phenomena known as the 'valley of death' that describes the high probability that a start-up firm, innovation or technology will die off before a steady stream of revenues is established. As shown in Figure 3 below a mix of public and private finance can be valuable in avoiding the 'valley of death'.

Figure 3: Payback timeline in research and development of business



[7] WWF and ECOFYS (2011) The Energy Report: 100% Renewable Energy by 2050. http://www.wwf.org.au/news_resources/resource_library/?1694/The-Energy-Report-100-Renewable-Energy-by-2050
[8] Geoscience Australia and ABARE (2010) Australian Energy Resource Assessment
[9] The energy available in wind varies with the cube of the wind speed
[10] Bertani, R (2009) Long term Projections of Geothermal-Electric Development in the World

Industry growth constraints

As identified in the WWF commissioned report *Industrial Constraints and Dislocations to Significant Emission Reductions by 2050*[11] the rate at which industries can grow (due to constraints in inputs like skills, infrastructure and resources) will be a major barrier to achieving 100% clean energy by 2050.

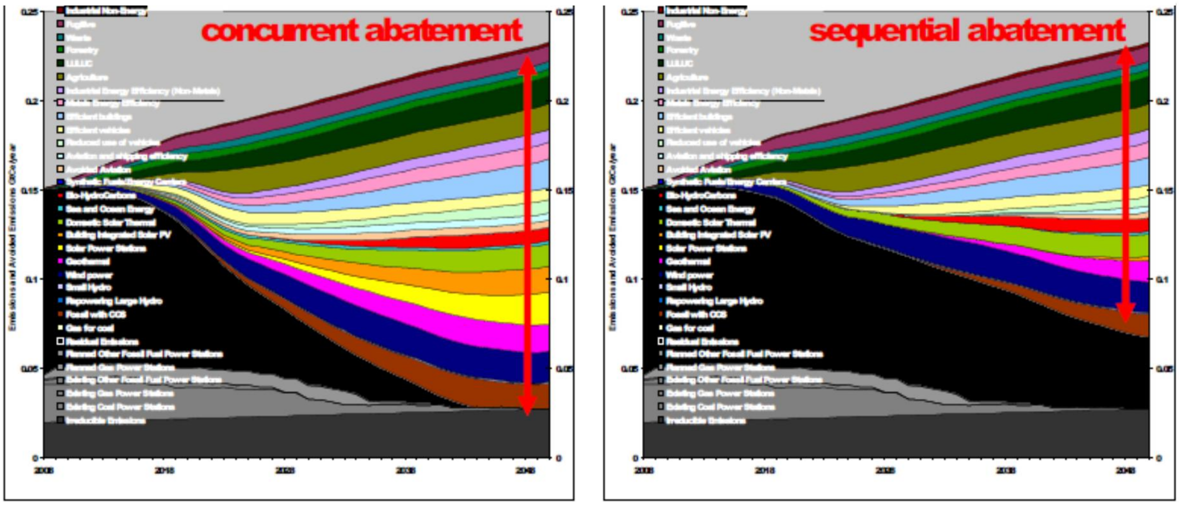
The objective of the modelling reported in *Industrial Constraints and Dislocations to Significant Emission Reductions by 2050* was to identify industrial constraints and dislocations to achieving national greenhouse gas emissions reductions of 60%-90% below1990 levels by 2050. The Report complements economic modelling by analysing physical industrial constraints such as the availability of skilled personnel (engineers, technicians, project managers, lawyers, etc.), production equipment and materials (whether raw, component or finished).

The Report analysed physical constraints and dislocations by using a computer-based model to calculate the rates at which low emission technology and service industries need to grow to provide the equipment (and/or practices) needed to supply energy (or commodities) and to attain domestic greenhouse gas emissions reductions of 60%, 80% and 90% respectively, by 2050. The model then compared that output with the findings of international industrial development literature. This literature suggests that industry growth rates of more than 20% per year are possible, though difficult to achieve year on year, but that industry growth rates of more than 30% per year are generally unsustainable and therefore implausible.

The Report finds that there are sufficient low emission energy resources, energy efficiency opportunities and emissions reduction opportunities in non-energy sectors to achieve reductions of 60-80% by 2050, and that there is sufficient time for the low emission technologies and services to grow at sustainable rates if development across a range of resources and technologies starts now.

Importantly, the model finds that a sequential approach to low emission industry development (lowest-cost technology first, next-lowest-cost technology next and so on) requires much higher growth rates for each industry than one that grows a number of technologies/industries concurrently. As a result and irrespective of the quantum of the carbon price, emission reductions of 60- 80% by 2050 cannot be achieved unless a concurrent growth approach is adopted. Figure 3 shows that concurrent development of industries will lead to more significant emissions cuts than sequential development with stable industry growth rates.

Figure 3: Comparison of concurrent versus sequential industry development and abatement potential[1]



To leave industry development late or to provide inadequate market certainty will require more rapid changes later. This would

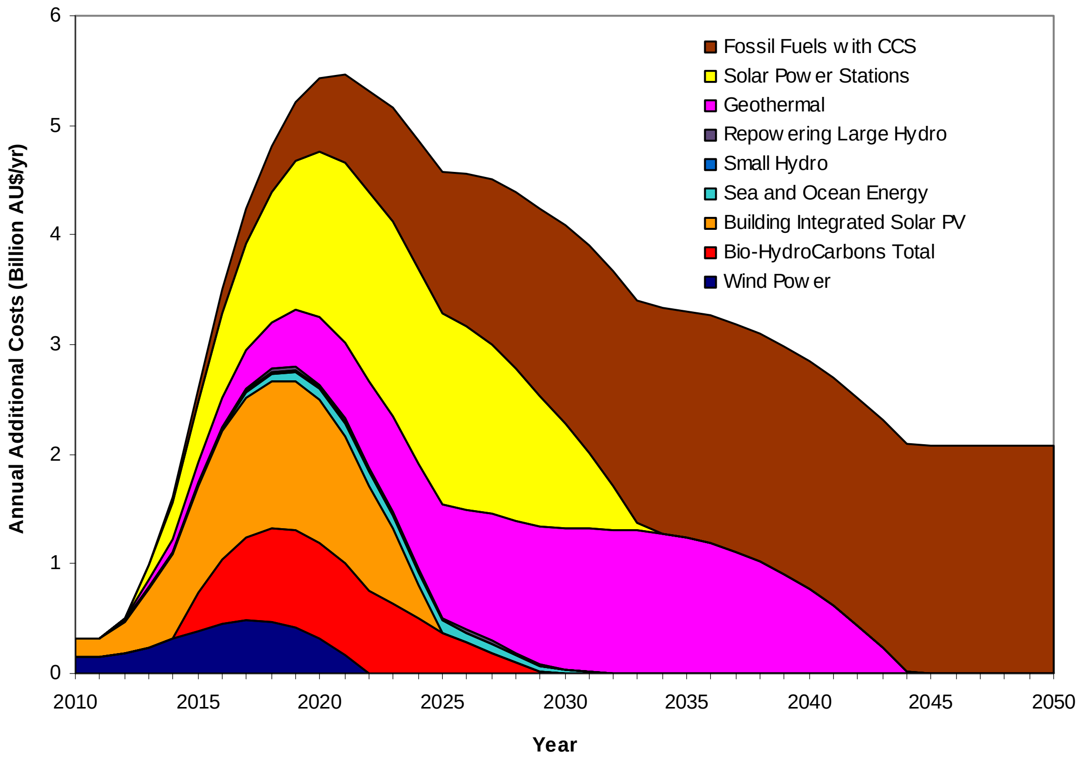
[11] Climate Risk (2008) Industrial Constraints and Dislocation to Significant Emission Reductions by 2050. http://wwf.org.au/publications/carbon-constraints-2050-report/

result in demand spikes, supply shortages and ultimately high delivery costs from industries with unstable growth.

Cost

Cost is another major constraint. Figure 4 outlines the additional expenditure (compared to using fossil fuels without CCS) required for each renewable energy resource and CCS, where each cost gap is added on top of the other. This overall 'cost barrier' represents the annual additional expenditure which – about $3.25 billion per year on average - required to achieve the transition to the low carbon economy in 2050 (assuming no carbon price). The modelling indicates that with this level of additional financial assistance or incentive by 2045 all of the renewable energy resources (accept CCS) are projected to be producing energy at or below the cost of fossil fuel generation due to the process of industries learning and economies of scale.

Figure 4: The combined cost hurdle: Additional expenditure required for each renewable energy resource and CCS.



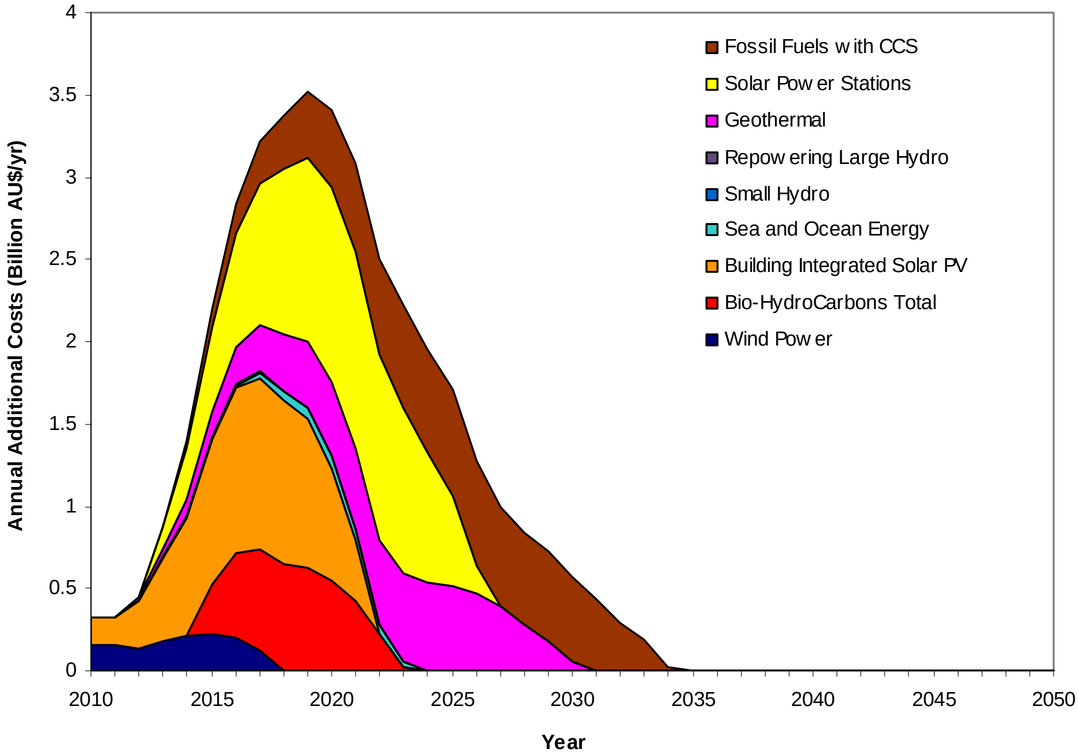
The recently legislated price on pollution will be critical for sending an economy wide price signal to reduce pollution and, as shown in Figure 5, a price will reduce the price gap between currently low cost fossil fuels - coal, oil and gas (without CCS). If a carbon price is assumed to be in place as per modelling by Australian Treasury and taking into account projected EU carbon market price (starting at $23/tCO$_2$e rising to $131/tCO$_2$e in 2050) all renewable energy sources will offer cost saving relative to fossil fuel generation around 2031 and CCS in 2034 (assuming standard international industry learning rates).

This means the cost hurdle to get the renewable energy resources into the market will be achieved much more quickly and at an average additional cost of $1.6 billion per year. The cost curves in Figure 5 also show that a pollution price with a starting value of $23 tCO2e will not be enough to reduce the cost gap for ALL clean technologies early enough to effectively deal with the issue of industry growth constraints. It's important to understand that if the need to achieve significant emissions reductions was not time bound to 2050, industrial growth rates would not be an issue and a price on pollution on its own would be enough to drive the slow transition.

But the transition is time bound for the purpose of staying well below the 2 degrees warming considered by most government to be the level required to avoid dangerous climate change.

Rather than additional costs being spread evenly over the period to 2050, the results show that there is a very strong compression of the costs, with distinct expenditure peaks. This is driven by two factors: (a) The effect of deploying low emission industries concurrently compresses the costs into a shorter period; and (b) Initially large increases in the scale of deployment lead to rapid increases of volume while costs are still relatively high.

Figure 5: The combined cost hurdle with a carbon price: as per figure 3, the additional expenditure (compared to using fossil fuels without CCS) required for each renewable energy resource and CCS with carbon price starting at $23/tCO2e and rising to 131$/tCO2e in 2050



Australia is a technology taker in many areas and this leads to the suggestion that it may be in Australia's interests to delay deployment processes until lower costs are achieved due to economies of scale driven by larger markets. As identified in the WWF commissioned report *Industrial Constraints to Emissions Reductions by 2050,* there are two important flaws in this argument.

The first flaw is that even for a sector which uses primarily foreign manufactured equipment, typically 50% of the total labour value of the installation and operation will be domestic and that means that a commensurate part of the scale and learning will occur on shore (Passey, 2003)(KPMG 1999).

The second possible flaw is that delayed uptake may mean that Australia is seeking to develop industries at a time when many more countries around the world are intending to do the same, leading to competition for skills, equipment and resources, which may add a further impediment to the successful delivery of intended emissions reductions.

A well designed CEFC could unlock billions of dollars in private finance for a range of projects and develop a range of renewable technologies and resources. If the CECF is clever with the money it could catalyse significant investment domestically and transform Australia's economy.

Grid access and performance
Renewable resources are often in remote locations or away from current grid infrastructure requiring new transmission lines and grid connectors. According to the Clean Energy Council, the connection of distributed renewable energy generation will be required to achieve the 20% by 2020 Renewable Energy Target (RET) but they note that the existing electricity grid may not be sufficient to include this additional load and thus presents a real impediment to meeting the RET.[12]

Further current grids are poor at managing variable power, grid congestion and distributed generation resulting in barriers to renewable energy in the system. Investing in smart grids will alleviate these problems and better manage a variety of clean end renewable technologies and resources in the grid.

Cash flow variability
Current renewable energy resources are generally intermittent (like wind and solar), combined with changing REC prices and electricity and LGC price volatility, can produce variable and unreliable cash flows often perceived as too risky (especially if there is less experience in the market) to attract sufficient debt and equity capital to develop projects.

Access to capital/capacity constraints
Wholesale debt markets in Australia are typically short-term in nature typically having a loan or contract period in the range of 1-5 years, whereas renewable energy projects will require financing up to 25 years. Compounding this challenge is the repercussions from the 2009 global financial crisis and the current sovereign debt crisis in Europe; the new **BASEL III** global regulatory standard on bank capital adequacy and liquidity which is reducing ability to provide large volumes of debt; and the growing demand for capital.

Unstable political frameworks and regulatory uncertainty
As identified above, renewable energy projects are long-term projects up to 25 years or more and are currently reliant on regulatory mechanisms such as the RET (and soon the carbon price) to support their financial viability. Changes to or threats to change regulation and policy which will reduce the support previously relied upon creates uncertainty and risk for financers and investors in an industry already facing significant barriers.

IV. Mechanisms to achieving 100% renewable energy by 2050

There is no one solution or 'silver bullet'. It will require multiple solutions across numerous policy portfolios including climate, energy, finance and industry.

The solutions include:
- Energy efficiency
- Price on carbon pollution
- Redistribution of subsidies away from fossil fuels to renewable technologies
- Access to new and smart grid systems
- Research and development
- Financial models to overcome capital market barriers and cash flow variability
- Bi-partisan political support

Transitioning to a low carbon economy and investing earlier in a mix of technologies and resources will require an unprecedented level of capital investment where returns may not be evident for decades. Unfortunately, as identified above, our current financial systems are not suited to taking such a long-term view. Investors respect a return within a couple of years.

[12] CEC (2011) submission to the **NEM** AEMO National Transmission Network Development Plan 15 March 2011 http://www.cleanenergycouncil.org.au/cec/policyadvocacy/Submissions/current.html

Research[13] and experience from other schemes[14] and countries shows a mix of financial models is needed, that could include:

- Small and large-scale feed-in-tariffs with different rates for different technologies/resources
- Feed-in-premiums
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Because the Carbon Price and the RET are essentially market based systems they will only support the cheapest clean technologies as they become cost competitive with coal, so for example in the early years carbon price will support gas and the RET will support wind.

A gap will still exist for currently feasible large-scale technologies such as large-scale solar PV and building integrated PV, and emerging technologies such as solar thermal, geothermal and wave. The Climate Risk modelling shows that if one or two of the available technologies fail or contribute too late, necessary abatement may not be achieved.[15]

The modelling around industry growth constraints in Section III shows that supporting clean energy industries concurrently can lead to greater abatement in the future.

The modelling around cost hurdles in Section III of this report shows that while the carbon price will assist renewable energy to become cost competitive around 2030, the cost hurdle is narrow and an injection of funds in the short-term can lead to technologies being cost competitive sooner, eventually eliminating the need for a RET and making the carbon price more efficient.

The modelling also suggests that working on the assumption that Australia is a price taker and therefore early investment in the Australian market will not drive down costs, ignores that fact that up to 50% of costs can come from domestic sources such as labour and infrastructure. Investing early, even in small scale projects, can drive down domestic and technology costs in second and third phase deployment.

The modelling also finds that the learning rates (reduction in costs for a doubling of production capacity) are very dependent on stable and steady policies that deliver predictable markets and a close relationship between supply and demand. The report argues that “the absence of policies to ensure an adequate supply of abatement resources and services is likely to result in both retardation of learning rates and slow price reductions which will increase the ‘cost’ of the carbon price in the longer term”.[16]

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[13] Climate Risk (2008) Industrial Constraints to Emission Reductions by 2050 http://wwf.org.au/publications/carbon-constraints-2050-report/ AND WWF and ECOFYS (2011) The Energy Report: 100% Renewable Energy by 2050. http://www.wwf.org.au/news_resources/resource_library/?1694/The-Energy-Report-100-Renewable-Energy-by-2050

[14] For example Export Finance and Insurance Corporation (EFIC) and Low Carbon Australia.

[15] Climate Risk (2008) Industrial Constraints and Dislocation to Significant Emission Reductions by 2050. http://wwf.org.au/publications/carbon-constraints-2050-report/

[16] Climate Risk (2008) Industrial Constraints and Dislocation to Significant Emission Reductions by 2050, page 80. http://wwf.org.au/publications/carbon-constraints-2050-report/

A well designed CEFC could unlock billions of dollars in private finance for a range of projects and to develop a range of renewable technologies and resources.

If the CECF is clever with the money it could catalyse significant investment domestically, leading to a faster and more comprehensive transformation to a low carbon economy which would improve Australia's competiveness as the rest of the world transitions.

Investing in emerging technologies and resources now will help provide experience that can reduce the cost or risk of future deployments at scale; drive competition; improve market reliability and security; and accelerate transition.

It is important that the CEFC should not be **wasted and used to subsidise the carbon and RET market by supporting technologies that the market will take up** (i.e. wind and gas). Rather it should be invested in technologies where private sector investment is not flowing, with emphasis on emerging technologies, which will help make market based mechanism such as the RET and the carbon price, as well as the energy market, more efficient and cost effective in the longer term.

WWF believes it is therefore appropriate for the CEFC to utilise a broad range of financial models including offtake agreements/feed-in-tariffs, as well as loan guarantees, co-investments etc.

WWF supports CEFC funded projects being eligible for RECs, but they must be new and additional to the investments that will already occur under the 20% RET. Each REC generated by CEFC should be 'topped up' in the REC market annually. The 'top up' mechanism already exists in the RET to accommodate waste coal mine gas projects.

To avoid the need for 'top ups' the Government should aim to increase the RET to at least 40% by 2030 and from 2015 band an increasing portion of the RET at a high rate for emerging technologies (possibly subsidised from ETS revenue). This in turn will make the CEFC more effective.

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