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Overcoming barriers to wind project finance in Australia

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ABSTRACT

The wind power industry in Australia is expected to grow rapidly over the next decade, primarily due to a forthcoming expanded national renewable energy target (RET) which will mandate that renewable sources provide approximately 20% of Australia's electricity production by 2020. However, development of new wind generation in Australia has stalled as a result of several barriers to project finance, the mechanism through which most wind farms have been developed historically. This paper provides an overview of wind power financing in Australia in light of recent political and financial trends. Drawing upon existing literature and a series of stakeholder interviews, it identifies three primary barriers to project finance: regulatory risk surrounding legislation of the RET, semi-privatization of electricity retailers in New South Wales, and limited capital availability resulting from the recent global credit crisis. The paper concludes that the confluence of these barriers limits the availability of long-term contracts that provide revenue certainty for pre-construction wind projects, while simultaneously making these contracts a necessity in order to obtain project finance. In an attempt to mitigate these effects, this paper identifies four alternative development strategies that can be pursued.

1. Introduction

Australia has one of the highest per-capita greenhouse gas emissions levels in the industrialized world (Turton, 2004). In part, this is due to its large domestic reserves of coal, which have kept electricity prices low and attracted energy-intensive industry. Currently, coal-fired power provides more than 75% of domestic electricity generation (ABARE, 2008). However, in recent years concerns over climate change have prompted Australian policymakers to seek mechanisms to increase the proportion of emissions-free renewable energy. As a result, in 2001 Australia became the first nation to introduce a national renewable energy market using tradable certificates (Andrews, 2001). The policy that created this market, called the mandatory renewable energy target (MRET), requires that electricity retailers source an additional 9500 gigawatt-hours (GWh) of electricity from renewable sources by the year 2010.

Following its introduction, the MRET triggered a boom in wind power development. Some regions in Australia, particularly in South Australia and Tasmania, are home to world-class wind resources (Office of the Renewable Energy Regulator, ORER, 2008), and wind power is currently considered the most affordable, reliable renewable electricity generation technology for Australia (Kaspura, 2007). The MRET spurred investment in wind by providing renewable generators with a secondary revenue stream – in addition to selling power – in the form of Renewable Energy Certificates (RECs). Prior to seeking project financing, developers would sign long-term contracts to sell a wind farm's power and RECs at a known price. This provided revenue certainty for the wind farm and convinced financiers to provide project capital. However, due to rapid industry growth the target was reached by 2006, 4 years earlier than intended. As a result long-term contracts became unavailable and investment in new wind generation stalled. Since then, few projects have been constructed, investment has been difficult to obtain, and some investors, developers, and manufacturers have gone overseas.

The Australian government is now expected to replace the MRET with a new national renewable energy target (RET) of 45,000 GWh by 2020, which will approximately double the percentage of renewable electricity in Australia to 20%. This ambitious expansion has not yet been legislated, but the federal government considers it a central element of its plan to reduce Australia's greenhouse gas emissions. However, development of new wind generation in Australia remains stagnant due to several barriers to project financing. These include regulatory risk surrounding the legislation of the expanded target, semi-privatization of electricity retailers in New South Wales, and limited capital availability stemming from the current global credit crisis. The confluence of these barriers limits the availability of the long-term contracts that provide revenue certainty for wind developers, while simultaneously making these contracts a necessity in

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order to obtain project finance. Despite the likelihood of an increased renewable energy target, these barriers threaten to curb the growth of wind power in Australia. However, there are a number of alternative development strategies that are resistant to the current regulatory and financial constraints. In order to withstand project financing barriers, developers should be aware of these alternative strategies.

This article provides an overview of wind power financing in Australia in light of recent political and financial trends. Drawing upon existing literature on wind power financing and a series of stakeholder interviews, the paper identifies the current barriers to project finance and suggests alternative development strategies to overcome them. The primary intent of this research is to illuminate the means by which wind developers can adapt and survive when faced with regulatory and financial barriers.

The paper is organized as follows. In order to understand the current situation in historical perspective, Section 2 provides a brief overview of recent trends and policies relating to electricity and renewable energy in Australia. Section 3 describes the methodology behind the remainder of the paper. Next, Section 4 discusses the standard financing structure for wind projects in Australia. Section 5 draws upon interviews with industry stakeholders to identify the current barriers to project finance. Section 6 introduces alternative development strategies that may enable developers to withstand these barriers. Finally, the article concludes in Section 7 with an assessment of the current situation in a broader context.

2. Overview of Australian electricity and renewable energy policy

2.1. Electricity industry restructuring

Australia began restructuring its electricity industry in 1991. Prior to restructuring, the industry was comprised mainly of state-owned, vertically integrated utilities that were regulated as regional monopolies. During restructuring, individual components of electricity supply such as generation, transmission, distribution, and retail sales, were disaggregated and in some cases privatized. In December 1998, a National Electricity Market (NEM) was formally created, along with policies and frameworks to support market functionality. The NEM functions as a wholesale electricity market and system operator for an area that includes 90% of Australia's population and six of its eight states and territories (MacGill et al., 2006).[2] The process of restructuring has been ongoing since its inception, though it is nearly complete in the Eastern and Southern states (Outhred and MacGill, 2006a).

The NEM operates as a gross pool market, in which the output from all generators is aggregated and scheduled to meet demand (NEMMCO, 2005). Although all generation is bid into the NEM, it is common for generators to enter into bilateral forward contracts with retailers, large purchasers, or speculators. These contracts serve to manage the risks associated with volatile spot prices for electricity. In some cases, as this paper discusses in Section 5, forward contracts can also provide the basis for investment in new generation capacity.

Although restructuring is nearly complete in most of Australia, the status of privatization of electricity retailers and generators varies greatly from state to state. In New South Wales, this process has been particularly contentious. In early 2008, the New South Wales Government announced it would divest its state-owned retailers as well as introduce long-term leasing of state generation assets. However, introduction of the corresponding bill faced almost certain political failure in parliament as a result of trade union pressure (Owen, 2009). As a result, the bill was withdrawn. The government then announced its intention to proceed with the sale of the retailers even without parliamentary approval, but this move was postponed when the premier of New South Wales resigned in September 2008. Currently, privatization of New South Wales retailers remains on the table, but there is no plan for its completion (Owen, 2009).

2.2. The mandatory renewable energy target

Rapid growth of the wind industry in Australia began with the introduction of a federal mandatory renewable energy target. Prior to this, a limited amount of wind development had taken place through two primary mechanisms. First, state-funded research and development had resulted in a few demonstration projects, mainly small-scale installations for remote areas (Bunting, 2004). Second, through a government program known as Green Power electricity customers could pay a premium on their electricity bill in exchange for an equivalent amount of electricity to be sourced from renewable energy. This program spurred the introduction of a small number of grid-connected wind farms. Although these mechanisms resulted in limited developments, wind power remained insignificant on the scale of national electricity generation.

In 1997, then-Prime Minister John Howard issued a statement entitled *Safeguarding the Future: Australia's Response to Climate Change*, in which he stated that the government would set targets for the introduction of renewable energy into Australia's electricity generation mix (see Howard, 1997). Following this statement, two acts were passed: the *Renewable Energy (Electricity) Act* 2000 and the *Renewable Energy (Electricity) (Charge) Act* 2000. The acts introduced renewable electricity targets for Australia and created a market for Renewable Energy Certificates, each of which represents one megawatt-hour (MWh) of electricity generated from a renewable source. Their stated intentions were to:

- Encourage the additional generation of electricity from renewable sources.
- Reduce emissions of greenhouse gases.
- Ensure that renewable energy sources are ecologically sustainable (Parliament of the Commonwealth of Australia, 2000).

The MRET scheme places an obligation on any wholesale purchaser responsible for more than 100 MW of electrical demand. In practice, the majority of these parties ("liable parties") are electricity retailers. For each electricity purchase a liable party makes, it must also purchase and retire enough RECs to meet its liability, which increases linearly each year until 2010, at which point it remains level through to 2020. If a liable party does not meet its obligation, it is charged a penalty of $40/MWh.[3] However, REC purchases are tax-deductible, whereas penalty payments are not. With current corporate tax rates, penalty payments equate to

[2] The two exceptions to this rule are the Northern Territory and the state of Western Australia, which are not part of the NEM because of a lack of interconnections and vast distances between their load centers and the NEM. Western Australia has an independent wholesale electricity market that operates only in that state. Despite having areas with excellent wind resources Western Australia did not receive much new wind capacity in the MRET, primarily because there were policies in place requiring the operator to precisely balance a wind farm's output with a customer's demand prior to construction (Ernst and Young, 2008). Some recent regulatory reforms make Western Australia a likely site for more investment in the expanded MRET, but it remains a higher-risk region for wind developers.

[3] Please note: all monetary values in this paper are expressed in Australian dollars.

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roughly $57/MWh in real terms (McLennan Magasanik Associates, 2007). This generally sets an upper limit on REC prices, since liable parties will find it less expensive to pay the penalty if the REC price is above $57/MWh. However, liable parties who do not meet their obligations also face public censure, which has led REC prices to rise above $57/MWh briefly on a number of occasions.

If a liable party creates or purchases RECs in excess of its annual obligation, it has the option to "bank" the RECs for sale or surrender in later years. Once created, RECs remain valid until the end of the scheme or until they are surrendered. This provides liable parties with flexibility in meeting the MRET targets in later years.

In 1997, prior to the MRET, renewable energy (primarily hydro power) accounted for approximately 10.5% of electricity generation in Australia. The MRET targets were intended to increase this proportion to 12.5% in 2010. Based on expected demand growth to 2010, the final MRET target was set at 9500 GWh. In other words, liable parties are required to retire a total of 9500 GWh, or 9.5 million RECs, in 2010.

There is a public market for RECs overseen by the Office of the Renewable Energy Regulator (ORER). Most liable parties, however, prefer to contract forward for RECs rather than purchase them on the spot market, and approximately 80% of REC trades take place outside the public market (ORER, 2008). The majority of REC deals are over-the-counter forward contracts, primarily between retailers and generators. In contrast, the public REC market is viewed principally as a site for liable parties to engage in marginal trading to meet their obligations. As a result, the REC market is relatively illiquid, with small trading volumes and few participants.

Prior to the introduction of the MRET, some stakeholders anticipated that most of the target would be met with bagasse generation from sugar mills (Andrews, 2001). However, the expense of such generation facilities has proven considerably higher than some expected, and bagasse has provided only a small portion of REC production. In contrast, pre-existing hydro power has been a significant contributor to the MRET obligation to date. The inclusion of pre-existing hydro power in the MRET was intended to support maintenance and additional investment in existing generators. In order to avoid providing a windfall gain for existing electricity generators, pre-existing hydro power is eligible to create RECs only for production above an historic baseline. In practice, pre-existing hydro facilities have regularly exceeded this baseline and produced a significant quantity of RECs, contributing approximately 28% of the total target as of 31 December, 2007 (ORER, 2007). However, hydro power is unlikely to grow significantly in the future because there is a shortage of new sites to develop (Kaspura, 2007; ABARE, 2008). In addition, a long-term decrease in rainfall throughout Australia has begun to negatively impact the output of existing hydro facilities as well as the potential for new developments. The Australian Bureau of Agriculture and Resource Economics (ABARE, 2008) projects that hydro power capacity will only grow by 0.9% per annum through 2029–30.

In the beginning of MRET's operation, wind farm development proposals grew rapidly, taking advantage of wind power's low comparative costs and the proven nature of the technology (Andrews, 2001; BCSE, 2003). Over time, wind power has taken on an increasingly significant role under MRET, accounting for the largest proportion of generation under MRET in 2005 and 2006 (ABARE, 2008). By 2007 wind power accounted for 48.9% of non-hydro installed renewable energy capacity (Clean Energy Council, 2007). Fig. 1 displays comparative REC creation by fuel type in 2002 and 2007.

Despite its relative success, MRET has been plagued by political uncertainty and insufficient targets. The first instance of uncertainty arose from the "Parer Review", a report commissioned by the Council of Australian Governments (COAG), which announced its findings in December 2002 and recommended replacing MRET with a federal emissions trading system (COAG, 2002). Although this suggestion was rejected, uncertainty regarding its outcome delayed some new projects (Kent and Mercer, 2006). As early as 2002, there was growing support for increasing the target as a result of faster-than-expected electricity demand growth (MacGill and Watt, 2002). In addition, it quickly became clear that the renewable energy industry, and the wind power industry in particular, had been underestimated. Growth in development was occurring faster than expected, and the target did not appear sufficient to sustain industry development through 2010 (MacGill et al., 2006; Healey and Bunting, 2008).

Greater uncertainty arose in 2003 with a review of the MRET commissioned by the federal government called the "Tambling Review" after the leader of its four-person panel, the review found that "by 2007, sufficient capacity is expected to have been installed to meet the MRET target of 9500 GWh for 2010. As a consequence, investment is expected to fall away rapidly"

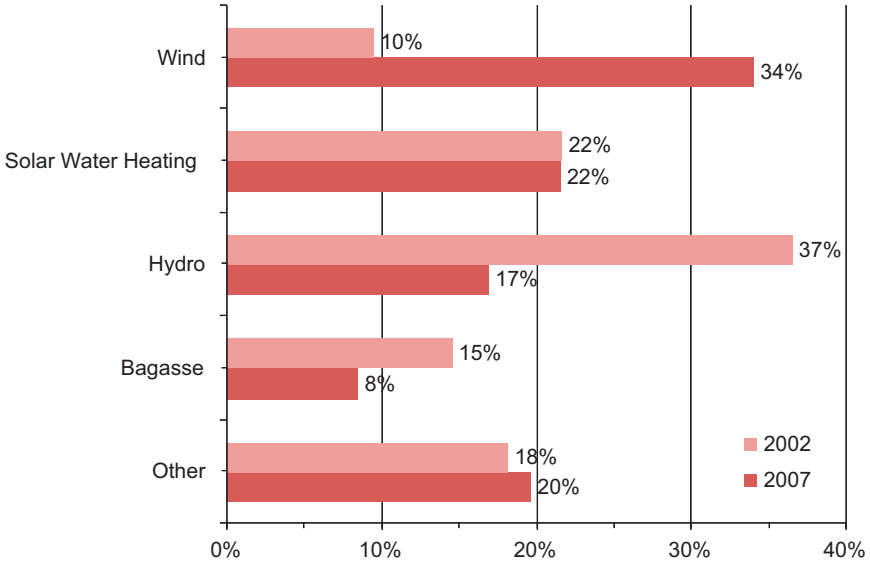

Fig. 1. Percentage of total REC creation by fuel type in 2002 and 2007. *Sources*: ORER, 2002, 2006, 2007.

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(Australian Greenhouse Office, 2003). The report also found that the current target was insufficient to develop a sustainable domestic industry (Kent and Mercer, 2006). The review panel recommended the target remain the same through to 2010, but be increased to 20,000 GWh by 2020. However, the government elected not to provide any expansion of the MRET target.

Following the federal government's decision not to increase the MRET targets, prices on the REC market began to decline. Although the spot market displays only a small proportion of REC deals, it remains an indicator of market dynamics. In November 2006, the spot market REC price fell as low as $12, from average prices of $38 in early 2005. Even if the market had not been not fully contracted, the low spot and forward prices for RECs at the time would have substantially affected the revenue stream for proposed projects at the time (Intelligent Energy Systems, 2007).

Two major factors contributed to the decline in REC prices. First, it became clear that most liable parties were fully contracted forward for their REC obligations through to 2010 (Outhred and MacGill, 2006b; Lustman and Bukhshtaber, 2008; Passey et al., 2005; Saddler et al., 2007; Kent and Mercer, 2006; Intelligent Energy Systems, 2007). There were fewer liable parties seeking RECs, and market prices declined as a result. Second, RECs from solar water heaters catalyzed the decline. Despite not producing electricity, solar water heaters are included in the MRET because they are deemed to create a positive greenhouse gas benefit by displacing electricity demand (Australian Greenhouse Office, 1999). REC eligibility for a solar water heater is based upon the amount of electricity it is deemed to displace. However, because solar water heaters are viable without financial support from REC sales, declines in REC prices do not significantly reduce the number of installations. As the market began its decline, solar water heater retailers continued to flood the market with RECs, driving prices even lower.

With the REC price dropping, investment in new wind generation came to a halt. New installed capacity fell from a high of 328 MW in 2004 to just 8 MW in 2007 (Lustman and Bukhshtaber, 2008). Fig. 2 displays cumulative installed wind capacity through 2007. Some smaller development companies collapsed, while others were sold. Several larger development companies sought projects outside Australia. In the growth years of the MRET, a number of wind turbine component manufacturers had opened operations in Australia. However, the decline in investment in new projects in 2005–2007 forced much of the domestic manufacturing capacity to shut down.

During this time, many developers still actively pursued projects. However, they found financing increasingly difficult (Healey and Bunting, 2008). Many developers were left with projects that had completed the permitting and approvals process, but had not reached financial close. The main focus for major developers became preparing projects for investment once conditions improved (Lustman and Bukhshtaber, 2008).

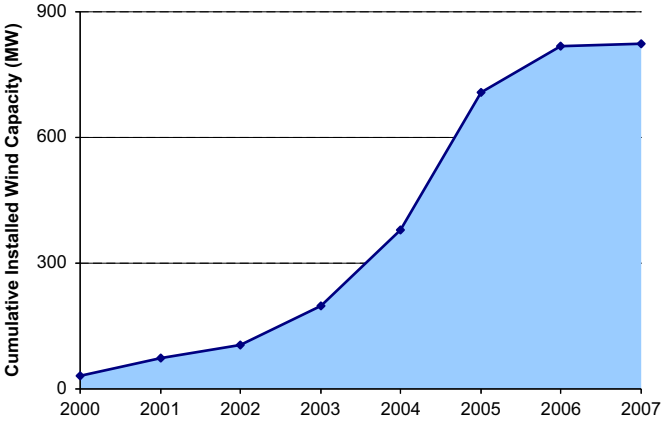

Fig. 2. Cumulative installed wind capacity in Australia. *Source*: Lustman and Bukhshtaber, 2008.

2.3. State-level renewable obligations

In the absence of federal expansion of the MRET, a number of Australian states began planning their own renewable energy targets. In late 2006, Victoria announced its Victorian renewable energy target (VRET), which requires 10% of all retail electricity sales to be sourced from renewable energy by 2016. The VRET took effect on 1 January, 2007. The VRET mechanism replicates the MRET, placing an obligation on large-scale purchasers of electricity to obtain RECs from eligible generators. However, the VRET differs from the MRET in two major ways. First, the penalty price for the VRET started at $43/MWh, and increases annually in tandem with the consumer price index (CPI). Second, solar water heating is not an eligible technology under the VRET. Several other states have announced their own renewable energy targets. New South Wales followed Victoria with the New South Wales renewable energy target (NRET), which requires 10% renewable electricity by 2010 and 15% by 2020. The NRET was legislated, though it has not commenced. Other potential state schemes emerged in South Australia, West Australia, Queensland, and the Australian Capital Territory, although none of these were legislated. Apart from the VRET, the state schemes appear to be on hold in anticipation of the expanded federal RET. Table 1 contains a summary of state and commonwealth targets.

The introduction of the VRET and the announcement of the NRET were successful in briefly reinvigorating the market, spurring a flurry of development applications in Victoria and New South Wales (Lustman and Bukhshtaber, 2008). In addition, over-the-counter REC prices began to climb, rising above $40 in late 2007 (ORER, 2008). However, this investment has been limited, as the state targets remain small compared to federal targets. Some retailers have also noted that they will not enter into long-term contracts on the basis of the VRET, owing to the uncertainty surrounding how it will be collapsed into the national RET. As a result, the market growth spurred by state schemes has been limited by the likely introduction of the national RET.

2.4. National renewable energy target

In November 2007, a new federal government was elected, led by Prime Minister Kevin Rudd of the Australian Labor Party. During the election campaign, Rudd had vowed to significantly exceed his predecessor in reducing greenhouse gas emissions and promoting renewable energy sources. One of his election promises was to replace the MRET target of 9500 GWh by 2010 with a new national renewable energy target of 45,000 GWh by 2020 (ORER, 2008). Together with approximately 15,000 GWh of pre-existing renewable electricity generation, this would bring total renewable generation up to approximately 60,000 GWh by 2020, or roughly 20% of Australia's projected electricity supply (Australian Labor Party, 2007). Since his election, Rudd has repeated his commitment to this policy. However, the target is yet to be legislated because its design must balance the interests of the states as well as industry stakeholders. This process has been assigned to the Council of Australian Governments, a political forum comprised of local, state, and federal policymakers.

In July 2008, the COAG Working Group on Climate Change and Water released a paper with potential design options for the national RET (see COAG, 2008). Following the reception of stakeholder comments, the Department of Climate Change

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Table 1
Commonwealth and state renewable energy target schemes.

	Existing MRET	Expanded RET	Victoria	New South Wales	Queensland	South Australia	Western Australia	Australian capital territory
Stage of implementation	Legislative mandate	Draft legislation released	Legislative mandate	Legislation before parliament	Announced May 2007	Legislated	Announced, scheme design paper released	Announced July 2007
Proposed start of scheme	2001	Targets increase in 2009	2007	2008	2010	Not available	2011	Not available
Energy above pre-existing level (GWh)	9500	45,000	3274	7250	Approximately 6,700	1500	2469	Approximately 500
Peak target to be reached in	2010	2020	2016	2020	2030	2014	2020	2020
Measure ends	2020	2030	2030	2030	2030	Not available	2035	Not available

Sources: COAG Working Group on Climate Change and Water, 2008; Parliament of the Commonwealth of Australia, 2008.

released a draft amendment to the Act in December 2008. According to the document, the increase to a 20% target will begin at 12,500 GWh in 2010, and increase by 1900 GWh per annum through 2015, and by 4600 GWh per annum through 2020. After 2020, the target will gradually decrease until it is eliminated in 2030. See Fig. 3 for the proposed targets.

Two important characteristics were not included in the draft legislation, however. First, the mechanism through which the state targets would be collapsed into the RET was left to be finalized in early 2009. Second, the penalty price had not yet been determined (Parliament of the Commonwealth of Australia, 2008). The draft legislation provided a great deal of information on the national RET, but uncertainty regarding these two characteristics will remain until they are finalized and legislation has passed through parliament. As of now, the government expects to have legislation in place by mid-2009 (ORER, 2008; COAG, 2008), which would extend the period in between the election of the Labor Government and the legislation of the RET to approximately 20 months.

3. Methodology

The following analysis of project financing barriers and alternative development strategies situates information from stakeholder interviews within the framework of existing literature on renewable energy financing (e.g. Cory et al., 2008, Harper et al., 2007, Pollio, 1998, Sonntag-O'Brien and Usher, 2004, Wiser and Pickle, 1997, Wiser et al., 1997). Sources of public information employed include agency reports, company press releases, and academic publications. The literature review is intended to provide both theoretical and practical grounding for the barriers and alternative development strategies, which were initially identified through interviews (see Strauss and Corbin, 1998 pp. 48–52).

Qualitative information was collected through semi-structured interviews with stakeholders involved in wind power in Australia. Interview subjects were sought in six categories: wind developers, electricity retailers, integrated utilities, financiers, government agencies, and energy consultancies. Developers, utilities, financiers, and consultancies were selected based on their historic or planned involvement in wind development in Australia. Electricity retailers were selected based on their obligation under the MRET. Finally, government agencies were selected to represent each of the primary federal agencies responsible for developing and implementing renewable energy policy. In total, 21 face-to-face interviews were conducted in the period from July to November 2008, prior to the Commonwealth Government's release of draft RET legislation. Interviews generally lasted 45–90 min. All interviews were conducted on the basis of confidentiality in order to enable interviewees to discuss commercially sensitive internal strategies. Thus, no references are made to individual interviewees. Classification of interview subject types is provided in Appendix A.

All interviews were analyzed using the framework of the grounded theory (see Strauss and Corbin, 1994). Using grounded theory methodology, data collected from interviews were coded, organized, and placed in conceptual categories, which were then compared against each other. Through the practice of "abstraction" or elevating empirically grounded categories into higher-order conceptual constructs, theories were generated (Goulding, 2002 p.77). These theories were then tested against further interviews in an ongoing process throughout the interview cycle. This form of analysis permitted the comparison of a number of perspectives on the same identified concept, ensuring that no idea

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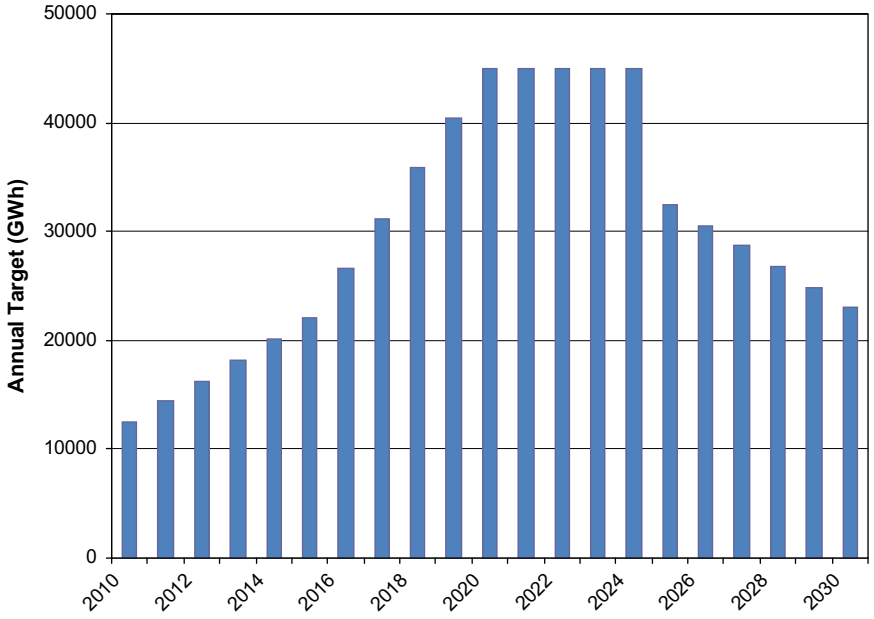

Fig. 3. Annual REC targets under draft expanded renewable energy target. *Source*: Parliament of the Commonwealth of Australia, 2008.

arose from a single interviewee. The discussion below draws upon this analysis.

4. Wind project finance

Historically, most wind farms in Australia have been developed through project finance. Project finance involves developing a project in an off-balance-sheet arrangement in which equity and debt financiers rely on the cash flow generated from the project itself for repayment. The developer will create a single-purpose financial vehicle to maintain ownership of the project. This is sometimes also known as non-recourse or limited-recourse financing because external investors to the special purpose entity are not liable if the project fails. In contrast, a corporate, or on-balance-sheet, financing approach will allow financiers to claim against the assets of the primary developer in the event of default.

Project finance has a number of benefits for developers. First, loans received by developers, being non- or limited-recourse, do not materially impact the developer's balance sheet. This allows small- and medium-sized development companies to pursue a number of projects simultaneously, or pursue larger projects. In addition, debt-equity ratios in project finance are typically high. Because debt service costs tend to be lower than equity payments, this lowers project costs for developers. All other things held equal, wind developers will seek as much debt as possible (Harper et al., 2007). A typical project finance structure will include 70–80% debt (Pollio, 1998). However, project costs are highly sensitive to financing variables, so the feasibility of projects rests with the availability of affordable capital (Wiser and Pickle, 1997).

In order to provide non-recourse financing, both equity and debt, investors generally require revenue certainty from project developers (Anderson et al., 2007; Sonntag-O'Brien and Usher, 2004). This certainty is provided by off-take contracts for the generator's output, often referred to as power purchase agreements (PPAs). A PPA for a wind farm will generally include two components: power and RECs. Since all power in Australia is traded through the spot market, it is important to note that these contracts are financial rather than physical. According to Anderson et al. (2007), a standard forward contract for power is for a particular quantity Q at a strike price f. The purchasing party (generally an electricity retailer) agrees to pay the selling party (generally a developer or generator) an amount $\$(f-p)Q$ after the spot market price p is determined. If the spot price during that period exceeds the strike price, the seller will pay the difference to the buyer. Conversely, if the spot price is below the strike price, the buyer will pay the difference to the seller. Because RECs are not required to be traded through the spot market, the REC component of the contract is generally a simple agreement to purchase accredited RECs from the power station at a particular price. For financiers of new generation, a PPA reduces investment risk by creating a cash flow that can be forecast based upon the expected output of the power plant.

Once a wind project developer has received planning approval for a project, it is considered investment-ready. At this point, the developer will generally seek a long-term PPA to cover the majority, if not all, of the expected output of the completed wind farm, both power and RECs. This allows the developer to obtain project capital and then commit to a turbine order. In the early years of the MRET, project-financed wind farms became the norm, with one estimate suggesting that 90% of existing wind generators were contracted forward for RECs for at least the next 5 to 10 years (McLennan Magasanik Associates, 2007).

5. Barriers to wind project finance

5.1. Regulatory risk

Electricity industry restructuring typically makes traditional project financing more difficult (Wiser and Pickle, 1997). Prior to restructuring, regulated monopolies were able to transfer investment risk directly to energy consumers through tariff structures, once they had the approval of regulators. In a restructured industry, developers are independent from retailers and cannot directly increase tariffs for consumers. This has a particularly large effect on renewable energy developers, because most renewable technologies tend to be highly capital intensive. However, renewable obligations like the MRET can mitigate this effect by requiring retailers to purchase RECs, the cost of which are ultimately passed through to electricity users.

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In Australia, the effects of the MRET have stalled, awaiting legislation for the national RET. Although spot prices for RECs remained above $45/Mwh for the majority of 2008, reflecting industry anticipation of the expanded target, interviewees report that risk surrounding the expansion has led most liable parties to avoid signing new long-term PPAs with renewable developers. This is to be expected, as uncertainty in renewable certificate markets such as the MRET normally limits the number of available REC purchase contracts (Wiser and Pickle, 1997; Wiser et al., 1997). Since the REC market in Australia is relatively illiquid, liable parties prefer to await regulatory clarity before signing long-term REC purchase contracts. Thus, very few PPAs for wind farms are likely to be signed until legislation is in place. If legislation proceeds as anticipated by COAG this will be in mid-2009.

Interviewees report that a limited number of wind PPAs have been signed during this period, despite regulatory risk. However, they share two unappealing characteristics for project developers. First, the REC portion of the contracts tends to be at significantly below-market prices, with purchasers receiving a discount because of regulatory risk. Second, they tend to be short-term contracts, usually lasting less than 10 years. Historically, PPAs with wind developers would typically last 15–20 years, in order to provide developers with revenue certainty beyond the term of their debt repayments. Because greater uncertainty increases capital costs, short-term PPAs can significantly raise the cost of new projects (Wiser et al., 1997).

Once the national RET has been legislated, some of this risk will abate and liable parties will begin seeking renewable PPAs to meet their obligations. However, the historic political volatility of the MRET suggests that regulatory risk may remain even after legislation of the new target. The political process is ongoing, and renewable energy obligations are likely to remain contentious among stakeholders. Because the investment timeframe for wind projects (typically 15–20 years) exceeds the timeframe of political governance, liable parties may remain reticent to commit to long-term PPAs even after the national RET is legislated.

5.2. Semi-privatization of New South Wales retailers

As discussed in Section 2.1, the major electricity retailers in New South Wales are in a state of flux, expecting to be privatized but on an unknown timeframe. In interviews, a number of developers reported that the retailers are effectively barred from entering into long-term PPAs with generators as a result of this uncertainty. New South Wales retailers serve approximately 35% of Australia's total electricity demand (ABARE, 2008), so their obligations represent a significant portion of the MRET. Until privatization has been completed in New South Wales, these retailers will be unlikely to seek long-term PPAs from any developers, and will be more likely to purchase RECs and power on the spot market or through short-term contracts with existing generators. This further limits the total number of long-term contracts available to developers.

5.3. Capital availability

In the absence of a PPA, developers may consider building a merchant project. A merchant project is developed without prior contracts for most, or any, of its output. In the United States, there has been a trend toward merchant plants, in part due to lenders' increasing comfort with wind power and the limited availability of PPAs (Barradale, 2008; Cory et al., 2008). Given the current difficulty in obtaining PPAs in Australia, this is a logical option for developers. However, non- or limited-recourse financing contains more risk for merchant projects than those with PPAs. Without a revenue stream locked up prior to construction, merchant projects are subject to spot market prices, which are volatile and sometimes unpredictable. In the United States, it has long been difficult to obtain debt financing for merchant projects, as banks are often unwilling to shoulder the increased risk (Cory et al., 2008). Interview subjects report that, until recently, a limited amount of non- or limited-recourse debt had been available for merchant projects in Australia, up to approximately 50% of total project capital. But this debt typically had shorter maturity and higher interest rates than debt available for contracted projects. Equity capital, though potentially available, also tends to be significantly more expensive for merchant projects, which increases project costs even more.

However, project financing for merchant plants is no longer available to most developers. Recently, the global credit market has faced a crisis, depleting the capital reserves of most financiers. This has had dual effects for project developers. First, global financiers have reported that the total amount of capital available for projects has constricted, allowing fewer projects to reach financial close (Environmental Finance Online News, 2008). Second, financiers have become more risk-averse and less willing to accept construction or market risk for wind farms. A survey of international lenders by Ernst and Young (2008) found that 40% considered "appetite for merchant financing" to be the most affected by the credit crisis. While revenue certainty in the form of a long-term PPA has been important in the past for project-level capital, it has now become essential. Interview subjects, both developers and financiers, noted that previously considered merchant projects are now being rejected as a result of the financial crisis.

6. Alternative development strategies

The previous section discussed the current barriers to wind development in Australia: regulatory risk, semi-privatization of NSW retailers, and limited capital availability. Together these barriers limit the availability of long-term power purchase agreements while simultaneously increasing their importance in order to attain project financing. This has resulted in very few projects receiving investment. However, despite the absence of project finance, some developers have identified alternative development strategies to overcome these barriers. In interviews, developers and financiers were asked their strategies in the face of financing barriers. This section compiles and analyzes those strategies. For a visual display of developer options, see Fig. 4.

6.1. Corporate finance

In the absence of long-term PPAs, larger developers have the option to finance merchant projects on their balance sheets, also known as corporate financing. Under a corporate financing arrangement, financiers can claim against the assets of a developer in the event of a default. Corporate financing for large-scale wind projects is available only to developers with a significant asset base and corporate debt facility (Sonntag-O'Brien and Usher, 2004; Wiser et al., 1997). Debtors can lend such developers funds on the basis of their entire portfolio of projects, as opposed to a single project. This reduces risk to lenders.

Integrated utilities are in a unique position to pursue corporate financing. Three of Australia's largest electricity retailers, AGL, Origin Energy, and TruEnergy, have begun the process of vertical reintegration by purchasing and developing generation assets and, in some cases, transmission and distribution lines. As part of this strategy they have begun to develop their own renewable assets, rather than contracting for RECs from outside generators. Because integrated utilities are liable parties under MRET as well as developers, they have the capacity to attach a long-term PPA to their own development projects. AGL has already pursued this strategy by corporate financing

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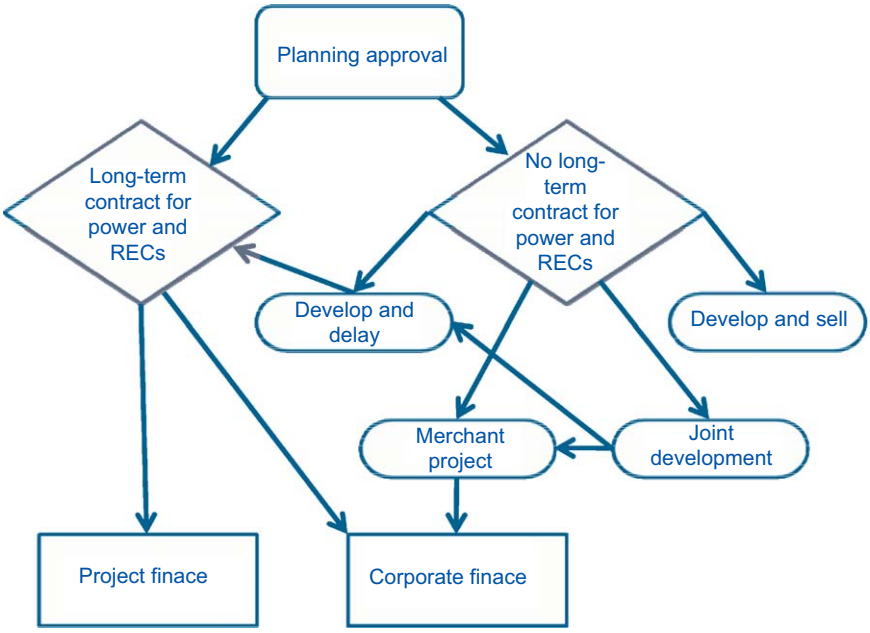

Fig. 4. Options for wind developers when faced with regulatory and financial barriers.

its 71 MW Hallett II wind farm and attaching a long-term PPA from its own retail operation. Following construction, the asset was sold to a long-term, low-risk investor, freeing up capital on AGL's balance sheet. AGL maintains and operates the facility, but physical ownership remains with the purchaser (AGL, 2006). By developing the Hallett II project itself, AGL earned a $58 million profit (AGL, 2008). This strategy effectively transfers regulatory risk from the utility's development operation to its retail operation, the latter of which is often prepared to manage significant risk (Anderson et al., 2007). Origin Energy and TruEnergy have not had as much wind farm development experience as AGL, and they are yet to follow AGL's development model. However, they are both looking to develop or co-develop wind projects to meet a portion of their MRET obligation.

Non-utility developers that are not sufficiently capitalized are unlikely to be able to take advantage of corporate financing, and there are a limited number of developers in Australia with the ability to do so. However, in interviews a number of larger developers expressed their intent to finance new projects on their balance sheet because of the limited availability of non- or limited-recourse debt and the absence of long-term PPAs.

6.2. *Develop and delay*

Developers who are unable to attain project finance for wind farms, and are not sufficiently capitalized to finance projects on their balance sheet, can consider delaying development until conditions improve and PPAs become available at higher prices. There has been considerable research on the value in delaying investment in new energy projects as a result of regulatory risk. Investment in a typical power generation project will be based on analysis of the net present value (NPV) of future cash flows. A positive NPV across a variety of future scenarios will mean that the project is worthy of investment. Real options theory has shown that uncertainty, particularly surrounding forthcoming environmental regulation, creates additional value in waiting to invest in new generation assets until uncertainty abates (Reedman et al., 2006; Venetsanos et al., 2002; Blyth et al., 2007). The greater the uncertainty, the greater the value in delaying investment (Walls et al., 2007). In Australia, there is value in waiting to invest not only because more PPAs will become available once legislation is passed, but also because REC prices under the expanded RET are unknown. The illiquidity of the REC market causes forward REC prices to be largely determined by regulatory factors, such as target levels and the penalty price, rather than the cost of production. As a result, more stringent legislation could substantially increase forward REC prices and result in more attractive off-take agreements for developers.

Despite the value in delaying, few developers are remaining entirely inactive. Although Australia has large areas with high wind speeds, developers also have to consider the costs of connecting a new plant to the electricity grid. The electricity grid in Australia contains mostly long, thin transmission lines that were evolved for large centralized power stations (Saddler et al., 2007). Wind developers need to pay for the cost to connect to an existing transmission line, as well as any augmentation costs as a result of their connection. This is a particularly salient issue because much of Australia's wind resource resides in areas such as South Australia with low population density and relatively low-capacity transmission lines (Healey and Bunting, 2008). In practice, rather than delaying investment in new projects all together, developers prefer to bring projects to the investment-ready stage, and then await new regulation. In interviews, a number of developers claimed to have projects in the development pipeline, awaiting the availability of PPAs before reaching financial close. The initial development costs, called "soft costs", represent a small portion of the total project costs, normally ranging from a few hundred thousand to a few million dollars, depending on project size and location (Walls et al., 2007). Developers can subsequently halt development before placing a turbine order, which represents the first major project cost.

This strategy may also be available only to developers with a strong balance sheet. The costs of early-stage development, as well as maintaining human resource capability, are normally covered on the developer's balance sheet. In order to delay, a developer must have enough operating capital to continue to pay landowner leases and legal fees while awaiting legislation. In the absence of a revenue stream from at least one project, this limits smaller developers' ability to pursue multiple projects simultaneously, a crucial element of any developer's strategy.

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6.3. Develop and sell

For smaller developers who do not have the capability or preference to delay financial close of new projects, there is an option to develop a market niche in early-stage development. Site identification, the first stage in any wind development, requires specific expertise in wind resource assessment. The next stages, which include sound, wind, landscape and visual assessment, stakeholder consultation, grid connection cost assessment, and planning applications, can be time consuming and similarly require particular expertise. In interviews, many of the larger developers, including integrated utilities, noted that they intentionally lack this expertise. Rather, they prefer to invest in projects that have already received planning approval. This provides an opportunity for smaller developers to focus their efforts on the first stages of project development with the intention of selling the investment-ready project to a company with more financial backing. This arrangement could also include the smaller developer's continued involvement through operations and maintenance of the project.

For example, in June 2008 Japanese company Mitsui & Co. (Australia) acquired 100% of the shares in Bald Hills Wind Farm Pty Ltd, the special purpose company with development rights to a 104 MW wind farm in Victoria. The initial developer, Wind Power Pty Ltd, had already received planning approval, and will continue its involvement in the project through a development agreement with Mitsui & Co. (Mitsui & Co. (Australia) Ltd, 2008). This strategy can enable smaller developers to remain solvent while awaiting more favorable investment conditions. One interviewee, a developer, described this business model as a "bridge" until the market for PPAs improves.

6.4. Joint development

A final option for developers facing financial constraints is to seek joint development arrangements with firms with greater access to capital. These firms are likely to be integrated utilities or investment banks that lack development expertise, but view wind farms as a stable long-term investment. The development partners will share the regulatory risk, but the larger partner may have the option of on-balance-sheet financing, enabling the development of merchant projects. Alternately, with the capital backing of a larger firm, the project could be put on hold until a long-term PPA becomes available. The smaller developer, while not receiving the full development margin, will retain a minority equity share in the project. This has already occurred in Australia. For example, in January 2007 wind developer Epuron Australia entered into a joint development agreement with Macquarie Capital Group to develop a 1000 MW wind farm, which will be the largest in Australia. This combined Epuron's development expertise with Macquarie's financing strength (Epuron, 2007), and enabled Epuron to develop a significantly larger project than it could have alone. In interviews, most financiers and integrated utilities expressed openness to the possibility of joint ventures with wind developers lacking capital strength.

7. Conclusions

Wind developers in Australia face a period replete with both difficulty and promise. The Australian government has pledged to replace its mandatory renewable energy target, the primary driver for wind industry growth since 2001, with a significantly expanded renewable energy target of 20% by 2020. To significantly contribute to this goal, the wind industry will have to grow rapidly. This will create new demand for wind farms and allow the industry to rebound after a 3-year period of stagnation due to an insufficient initial target. However, this paper has identified three barriers to project financing that threaten to prevent developers from taking advantage of upcoming regulatory support. These barriers are regulatory risk surrounding legislation of the expanded renewable energy target, semi-privatization of electricity retailers in New South Wales, and capital constriction resulting from the recent global credit crisis. The impact of these barriers is twofold. First, the availability of long-term power purchase agreements which provide revenue certainty for pre-construction projects is limited. Second, the existence of project finance, historically the standard development model, increasingly depends on the same long-term contracts. As a result, few new projects are receiving investment.

The current barriers to project finance are not exceptional. Australia's mandatory renewable energy target has always been highly contested among stakeholders, and regulatory risk has always been present as a result. While introduction of the expanded target will provide a boost for wind developers, it is unlikely to eliminate all regulatory risk. Political volatility may arise again, resulting in another lack of long-term power purchase agreements for wind projects. Similarly, external financial barriers can emerge during any period of national or global financial constriction. Thus, these barriers can be viewed as potentially recurrent.

In the long term, wind power in Australia will almost certainly be a good investment. Australia is faced with a formidable task in significantly reducing its greenhouse gas emissions from the power sector. As a proven, affordable technology with excellent resources in Australia, wind power has the potential to be a major contributor to this effort. With an increased proportion of wind energy in Australia's electricity mix, technical issues such as grid integration, capacity constraints, and accurate forecasting will need to be addressed. Although these challenges are looming, considerable progress has already been made toward their resolution, and by continuing to update physical and regulatory systems the electricity industry is likely to successfully manage increased levels of wind penetration (Outhred and MacGill, 2006b). However, barriers to financing similar to those identified in this paper may emerge again, placing new constraints on developers and halting wind industry development. Thus, steady growth of the wind power industry in Australia will depend on developers' ability to adapt to new, sometimes difficult circumstances. This paper presents four alternative strategies, each of which has already proven successful in Australia. The first two strategies, corporate finance and develop and delay, are generally available to developers with significant capital strength. In contrast, the latter two strategies, develop and sell and joint development, are aimed primarily at smaller developers. As such, by considering one or more of these strategies, any wind developer may be able to operate and even expand despite the current barriers to project finance.

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Appendix A

See Table A1.

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Table A1
Classification of interviewees.

Classification	Number
Developer	8
Financier/investor	3
Government agency	3
Electricity retailer	3
Integrated utility	2
Energy consultant	2
Total	21

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