WIND POWER IN VICTORIA

Mr Tom Keddie
Executive Manager Development, Pacific Hydro Australia

Victoria is part of the National Electricity Market, or NEM. The name is slightly misleading as the NEM does not include the Northern Territory or Western Australia; rather it is an interconnected electricity network encompassing large parts of Victoria, Tasmania, South Australia, New South Wales, the Australian Capital Territory and Queensland. In terms of generation capacity, Victoria has about 12,500 MW, out of an NEM total of over 46,000 MW. A bit over half of Victoria's capacity is made up of the brown coal generators in the Latrobe Valley (Loy Yang, Hazelwood, Yallourn). Gas-fired generation (mainly large open-cycle peaking plants, designed to operate only in times of high demand) and hydro plants (mainly parts of the Snowy scheme) add about 20% each, with wind currently making up the balance of around 9% of installed capacity in Victoria. In terms of wind farm location across the NEM, installed capacity is predominantly located in Victoria and South Australia, and to a lesser extent in Tasmania, with very small amounts in New South Wales and Queensland. This distribution is almost entirely due to the quality of the wind resource across the country.

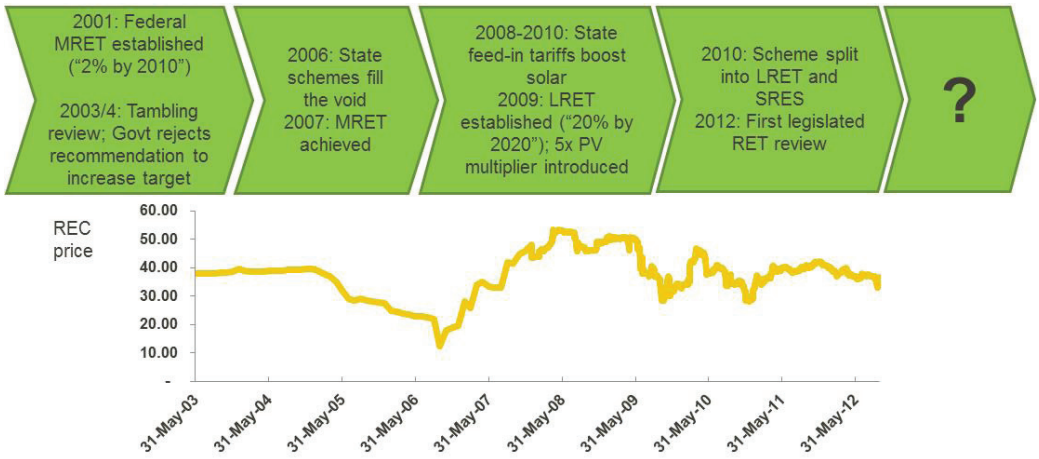
Victoria has a world-class wind resource. Several regions of our state in particular have excellent characteristics with respect to wind resource for power generation.

Figure 1 shows the location of the 1100 MW or so of wind farm capacity currently installed across the state. The south-west coast, central Victoria around Ararat and Ballarat, and parts of the Gippsland coast all have excellent average wind speeds, as well as good access to electrical transmission networks resulting in a concentration of projects in these areas. The high voltage backbone that was built to connect the Alcoa aluminium smelter at Portland to the coal generators in the Latrobe Valley now also provides a link between the wind farms of the south-west and the main electricity demand centres in the state. Land use in these high-wind regions is typically agricultural, which co-exists well with wind farms. As the turbine bases typically occupy less than 1% of the land area of a typical wind farm, existing farming can generally continue largely unaffected.

Victorian wind farms, like others constructed in Australia, rely on the supporting legislation that has enabled the construction of wind farms across the country over the

Figure 1: Locations of installed wind farm capacity in Victoria 2013

Figure 2: Historical Australian Renewable Energy Certificate (REC) prices 2003–2012



past decade or so. There has been a lot of discussion in the press about the carbon price, more recently about the Abbott Government's intention to repeal the legislation as soon as possible. While the carbon price is a positive for the general competitiveness of renewable energy (as it prices the emissions of competitor technologies such as coal) it is not in fact the main legislation that has underpinned the $18 billion invested in wind farms over the past decade or so. Rather, it has been the renewable energy target, or RET. The RET was introduced by the Howard Government back in 2001, as the Mandatory Renewable Energy Target, with a notional target of 2% of electricity to come from renewable sources by 2010. The target has subsequently been through a number of revisions and amendments at the hands of various intervening governments, but the basic premise has remained the same, requiring a certain amount of renewable energy generated by a certain date. Figure 2 shows the price of certificates generated under the schemes, with some key events plotted above – all of the major price movements have been in response to policy changes.

The scheme is a market-based mechanism, which requires sellers of electricity known as liable parties (the main ones are retailers such as AGL and Origin Energy) to purchase the required number of certificates to reflect their share of the target. These certificates, currently called Large-scale Generation Certificates, or LGCs, are generated by qualifying renewable energy projects such as wind farms. The idea, therefore, is that the liable parties enter into arrangements with developers of renewable projects to purchase the certificates, or develop their own renewable energy projects to meet their LGC requirements. This latter approach has been adopted by AGL in particular.

For a wind farm developer, the price received for these certificates bridges the gap between the price at which the electricity can be sold, and the overall price required for investors to fund the construction of new projects. This mechanism should mean that the best renewable electricity generation projects (e.g. those that are able to offer their LGCs the cheapest) will be built to satisfy the requirements of the target, delivering the desired level of renewable energy at the lowest cost.

In practice, the operation of the market mechanism is somewhat distorted by the concentration of liable parties (three utilities – Origin Energy, Energy Australia and AGL – collectively make up something like two-thirds of demand under the scheme) and by the uncertainty arising from repeated government review and intervention in the scheme. In fact, relatively few wind farms are currently under construction, despite a need to deliver around 7000 MW of capacity by 2020 to meet the current target. This pause in activity has been caused in part by a further RET review announced by the Coalition Government, which is being undertaken in 2014. What is particularly frustrating from an industry point of view is that the Climate Change Authority undertook a comprehensive review of the RET scheme in 2012, which included the appropriateness of the target level, operation of the scheme and many related aspects. The ongoing uncertainty caused by repeated reviews is certainly undermining the industry's ability to efficiently deliver renewable energy projects to meet the target.

With regard to the question of the impact of renewable energy on the existing NEM grid, the Australian Energy Market Operator (AEMO), the entity responsible for managing our electricity network, has undertaken a number of significant studies into various aspects of the way our grid will evolve as more renewables are integrated. One major initiative has been the introduction of the wind forecasting system. This world-class system, which was introduced in 2010, provides the market operator with highly accurate forecasts of output from wind farms in the system, assisting with balancing of supply and demand.

The increase in wind farms has also had an impact on the economics of generation in the NEM. Wind power,

like all renewable technologies, utilises a free fuel, and so has a short-run marginal cost of close to zero. This means that wind farms are almost always called on to generate in priority to thermal units such as gas peakers, which have to pay for their fuel. This means that when the wind is blowing strongly, the more expensive fossil fuel generation is displaced out of the market, reducing the overall marginal cost of the system. This so-called 'merit order effect' is placing older, less efficient fossil fuel generators (which are typically those with higher marginal cost) under significant financial pressure. The merit order effect isn't the only factor of course – its impact is in combination with subdued demand from manufacturing and a more general reduction in demand across the network. People are, it seems, turning their lights off when they leave the room. The net result of this is that we have seen several large units of coal-fired generation mothballed for all or part of the year in response to market conditions. The system-wide savings to wholesale prices caused by increasing amounts of renewable generation in the mix act to partially offset the cost of the RET scheme via the purchasing of LGCs mentioned earlier.

The AEMO continues to study how our electricity system will respond to increasing levels of renewables – not just wind farms, but also solar PV and other technologies, as well as storage. These forward-looking studies rely heavily on assumptions about future technologies, as well as predicting the behaviour of current market participants, but do provide a positive indication that our electricity system can, with appropriate reform, support large amounts of renewable generation.

So, where to from here for wind power in Victoria? The Coalition's planned review notwithstanding, even considering a reduced target level we could perhaps expect a further 2000 MW of renewables installed in Victoria over the next decade – and on current expectation, the majority of these projects will be wind farms. The AEMO already has almost 3000 MW of planned projects in its database, concentrated in those high-wind zones in south-western Victoria, the western district and parts of Gippsland. Will our existing network and electricity market mechanism be able to cope with this level of wind generation? The answer is yes, comfortably. Overseas experience and, indeed, our own experience in South Australia, suggests that wind farms can make up over 25% of the generation mix without major implications for network operation, and without imposing additional cost on the system.