

## **Increasing Intermittent Generation on the South West Interconnected System**

### ***An expanded national Mandatory Renewable Energy Target scheme***

The Commonwealth Government's Mandatory Renewable Energy Target scheme, in operation since 2001, is designed to achieve the generation of an additional 9,500 gigawatt hours (GWh) of electricity from renewable energy sources each year by 2010. The scheme supported investment in new renewable energy generation in the South West Interconnected System (SWIS) such that penetration has increased from less than 1 per cent in 2002-03 to more than five per cent in 2006-07. 80 per cent of the growth in renewable energy generation has come from new wind farms.

The Commonwealth Government has recently committed to expanding the Mandatory Renewable Energy Target (MRET) scheme to achieve a national target of 20 per cent by 2020, an increase in renewable energy generation in the order of 37,500 GWh. This is four times more renewable energy generation in 2020 than the previous target. The Commonwealth Government plans to legislate for the implementation of the new scheme in early 2009.

It is intended that the expanded national scheme will replace existing state and territory mandatory renewable energy target schemes, including the scheme formerly being developed by the Western Australian Government in the absence of national action to support continued investment in renewable energy. The Western Australian Government is now participating in the development of the new national scheme through the Council of Australian Governments.

### ***Potential growth in intermittent generation in the SWIS***

The expanded MRET scheme is likely to be a major driver of investment in new renewable energy projects located in the SWIS. If all Western Australian liabilities under the expanded MRET scheme were met from generation in Western Australia, penetration in 2020 is likely to be somewhere between 15 and 20 per cent. Modelling analysis undertaken in the context of developing a Western Australian renewable energy target scheme suggests an increase in the level of penetration of this order of magnitude represents approximately half to three quarters of the growth in load to 2020 and would require at least 8 or 9 renewable energy projects of the size of a 100MW wind farm to deliver it.

The number of wind projects developed in the SWIS will ultimately depend upon how competitive wind is with other renewable energy technologies, such as biomass-based electricity generation, and the economics of projects in other jurisdictions. Based on investment for the existing MRET scheme, wind power is likely to be highly competitive among renewable energy technologies due its comparatively low cost and the technological maturity of the turbine industry. The prospects for wind projects located in the SWIS are also helped by the quality of the local wind resources and the comparatively high cost of electricity. The Office of Energy is aware of a number of substantial wind projects that could respond to the stimulus of an expanded MRET scheme within a two to three year timeframe.

### ***Impact on the system and the market***

The Rules for the Wholesale Electricity Market, which commenced in September 2006, incorporate a number of major provisions that support the participation of renewable energy generation. However, the rules were developed in the context of comparatively low levels of intermittent generation.

A number of issues have been identified on the basis of the approximately 190 MW of wind capacity currently on the SWIS. It is believed that failure to address these issues in advance of the development of additional major projects will lead to inefficient investment decisions and higher electricity costs for Western Australian electricity consumers.

The Market Advisory Committee (MAC) has established a Renewable Energy Generation Working Group to assist it in advising the Independent Market Operator (IMO) on the identification of priority issues and recommended options for their resolution. Issues that could require rule changes to maintain the integrity of the market include the:

- efficient allocation of capacity credits to intermittent generators;
- efficient recovery of load-following charges; and
- scheduling of intermittent and inflexible capacity at times of low load.

### ***Capacity credits for wind generators***

Intermittent generators are awarded capacity credits on the basis of historical average annual capacity factors. The credits provide a substantial revenue stream in the order of 10 to 20 per cent of generation costs at prevailing market rates. Variations between output from an intermittent generator at times of peak demand and its average capacity factor will affect the level of protection provided by the reserve capacity mechanism at times of peak demand.

There may be a negative correlation between wind farm output and summer peak load times in some locations. This could be a consequence of the weather conditions that drive demand for electricity at times of peak load. If this is the case, the true contribution of existing wind facilities to meeting system peaks may be overstated, resulting in the reserve capacity margin being less than the IMO has determined it should be. Changes to the annual average capacity factor for wind generators will alter the revenue that generators can expect from the capacity market. The issue is likely to be exacerbated if new wind farms are located in areas with similar weather correlations.

### ***Recovery of load-following charges***

Intermittent generation introduces further variability into the generation profile, requiring additional balancing services to maintain system security. Western Power considers 50 MW of new load following capacity could be required for every 200MW increase in wind capacity on the system. This could imply a cost for additional ancillary services orders of magnitude greater than those understood to currently apply in national market or the SWIS.

Verve provides ancillary services to the market. These may be provided from Verve's own generation facilities or contracted from other market participants. Intermittent generation currently attracts additional ancillary services charges that are equivalent to the balancing charges applied to load. If the charges fail to recover the cost of additional ancillary services required, more wind farms may proceed than is optimal. Therefore rule changes that more directly allocate these costs may be required.

### ***Low load conflicts***

The operation of the Short Term Energy Market (STEM) prioritises intermittent generation in the merit order. System Management reduces generation from dispatchable units to accommodate output from intermittent generation. Intermittent generators and their contracting parties must manage their exposure to prevailing day-ahead market prices. It is conceivable that, in low-load situations, STEM prices may be negative in the future and flow through to contract prices.

The System Manager may amend the dispatch orders and operation of the STEM at times of low load in order to maintain system security. The need to turn down wind generation is most likely at times of low overnight load, when large and comparatively inflexible conventional generation units dominate supply. Changes to dispatch orders by System Management have commercial implications for conventional and intermittent generation, and hence for the selection and design of future generation facilities.

Current market rules may be appropriate to preserve system security, however, it is important that proponents of intermittent renewable projects and the parties they contract with understand the magnitude and probabilities of these risks.

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