

Under Frequency Management – Appendix 1

Wind Generators and Reserve Offers

System Operator

22/11/2011



*Keeping the lights on
24 hours a day, 7 days a week*

SYSTEM OPERATOR

Keeping the energy flowing

TRANSPower



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1 Wind Generators and Reserve Offers

1.1 Capability to provide reserve

Wind generators can vary their MW output by changing the angle of their blades (feathering) for a given wind speed. They would provide less MW energy in order to offer the difference as reserve.

They could provide Fast Instantaneous Reserve (FIR) as that is required 6 seconds after a Contingent Event and this must be sustained for 60 seconds.

It is unlikely they could provide Sustained Instantaneous Reserve (SIR) as that is the average additional MW output during the first 60 seconds after a Contingent Event and this must be sustained for 15 minutes after the Contingent Event (unless they are re dispatched). It is unlikely they could guarantee meeting the 15 minutes requirement.

The SO's preference would be for this reserve to be offered as a MW figure (rather than as a percentage of energy output) as that is the way reserve is currently offered and dispatched.

As long as wind generators offer energy and reserve in the same format as other generators then SPD should not have a problem in clearing and dispatching them. It is not anticipated that RMT should have any problems either.

1.2 Testing wind generators' reserve capability

The ability of wind generators to provide reserve should be tested under the same procedure used to test other generators providing reserve. The Companion Guide for Testing of Assets section 2.3.3.6 describes the tests that should be applied to prove reserve capability, but descriptions of measured inputs and outputs relate to hydro & thermal units. This section needs to be amended to include wind generators' terminology.

It is likely that requirements and results from the first reserve capability tests will be used to update this section. Testing will also provide more information for modelling of wind generators by the SO.

1.3 Code does not specify how wind generators can offer reserve

The (Electricity Industry Participation) Code does not preclude wind (intermittent) generators from providing reserve. But it does not specify how intermittent generators can provide reserve nor does it specify how they can change their reserve offer within 2 hours of a trading period.

Clause 13.19 (1) (a) (iii) of the Code specifically allows an intermittent generator to change its energy offer within 2 hours. Both embedded and intermittent generators are mentioned with specific conditions under clause 13.19. The revised offer from an intermittent generator must be based on a Persistence Model as mentioned in clause 13.17 (3) (a).

Clause 13.45 states that reserve offers can be revised if energy offers are revised. While clause 13.46 describe how reserve offers can be changed by an ancillary service agent, and by an embedded generator (who is also an ancillary service agent), there is no specific mention of an intermittent generator as an ancillary service agent. Intermittent generators are also not mentioned in clause 13.47 for reserve quantity changes within 2 hours of a trading period. This is unlike the energy offer clauses 13.19 and 13.17.

While it could be argued that clauses 13.19 & 13.45 implies that an intermittent generator who is also an ancillary service agent, should be able to revise reserve offers to complement any energy offers changes within 2 hours of the trading period, the legal opinion is that clause 13.46 and 13.47 should be changed to specifically mention under what conditions intermittent generators can revise their reserve offers.

It could be argued that only the lack of wind would result in zero reserve. So the energy offer must be zero before the reserve offer can reduce to zero. This would only apply for changes within 2 hours of a trading period.

Clause 13.21 (1) excludes intermittent generators making a revised energy offer within 2 hours of a trading period, from having to file a report to the (Electricity) Authority. This reduces the paperwork significantly. Clause 13.49 should be changed similarly.

1.4 Persistence Model used by intermittent generators

The “Persistence Model” is not actually a model. It looks at the actual generation being produced by the wind generator and “forecasts” that will be the generation for the next 2 hours. This information is updated every 5 minutes by the wind generators¹.

There is no requirement for wind generators to provide the maximum energy they can i.e. some reserve can be held back through feathering. Some form of reserve forecasts would need to be done, perhaps in the same way that energy offers are forecasted?

Clause 13.82 (d) does not require wind generators to comply with dispatch instructions. Presumably this is because there may not be the wind available to provide the energy dispatched. How do we ensure that offered reserve (not measured but paid for based on offer/dispatch) is actually available? This could be done in much the same way other generators are evaluated, by their performance following an actual event. As we intend to limit wind generators to FIR (sustained for 60 seconds) they should not be allowed to argue that wind strength has an adverse impact on their performance in those 60 seconds.

1.5 Ancillary Service Provider Contract

The existing ancillary service provider contract is a generic template which can be used to cover wind generators offering reserve. This template can be modified to include any specific conditions if required.

2 Recommendation

The System Operator proposes that the EIPC (The Code) be changed to allow wind generation to provide reserve. The reserve offers will be subject to generator reserve testing. Preference will be given to reserve quantities to energy.

¹ Trustpower did not have the SCADA information to do this at the start, so this was done by Transpower. They now have the SCADA information and have been instructed to update their offer themselves.