

Reactive Power Ancillary Service Arrangements For Wind Farms

25th January 2008



Summary

This document sets out the implementation of Reactive Power Ancillary Service arrangements for Wind Farms (WFs). This document has been agreed with the CER. The implementation arrangements are summarised as follows:

- EirGrid may enter into commercial arrangements for the provision of Reactive Power Ancillary Services with a WF provided the WF has been certified as meeting the appropriate Grid Code requirements and can provide a useful service to EirGrid.
- The commercial and contractual Reactive Power Ancillary Service arrangements for WFs will be identical to those currently applied to thermal and hydro generation.
- As with existing arrangements with thermal and hydro generation, Reactive Power payments to WFs will be split into 'utilisation' payments (for production or consumption of Reactive Power) and, where appropriate, 'capability' payments (for being available to produce or consume Reactive Power).
- The Reactive Power Ancillary Service arrangements will not distinguish between differing WF technologies except in the area of Reactive Power capability. Reactive Power capability payments will only be made to WFs that can maintain a Reactive Power capability that is not dependant on energy production.
- These arrangements will apply to transmission connected WFs only. Further consideration of the implications of distribution connected WFs (including 110 kV connected) providing Reactive Power services is required.
- Sufficient Ancillary Service expenditure allowance has been provided in 2006-2010 Revenue Determination to facilitate these arrangements.
- These arrangements relate solely to WFs located in the RoI and are interim in nature pending all-island harmonisation of Ancillary Services.
- The provision of other Ancillary Services from WFs, namely Operating Reserve and Black Start are not proposed at this time.
- WFs will be offered commercial arrangements to provide Reactive Power Ancillary Services from 1st July 2007.

1. Introduction

Until now only thermal and hydro (including pumped storage) generation is contracted to provide Reactive Power Ancillary Services (AS). This paper sets out the implementation of Reactive Power AS arrangements for Wind Farms (WFs). These implementation arrangements have been agreed with the CER.

Background information on existing Reactive Power AS arrangements is set out followed by corresponding arrangements for WFs. Related issues are discussed and next steps identified.

2. Existing Reactive Power Ancillary Service Arrangements

Reactive Power along with Operating Reserve and Black Start are three services provided by generators to EirGrid which are collectively known as 'Ancillary Services'. EirGrid currently procures these services from thermal and hydro stations (including pumped storage) only. These services are procured through Regulatory approved agreements between EirGrid and the respective generating company and paid for at Regulatory approved rates¹. The following summarises the existing Reactive Power AS arrangements (this paper does not discuss Operating Reserve or Black Start arrangements).

There are two components to the current Reactive Power payments made by EirGrid to generators:

- a **capability** payment for a generator's ability to produce and consume² Reactive Power and
- a **utilisation** payment for actual Reactive Power production and consumption by the generator.

A generator's Reactive Power capabilities (known as 'leading' and 'lagging' capabilities) are technical characteristics of the machine and are agreed parameters contained in the AS agreement between EirGrid and the generator. Generators are paid for reactive power capability as long as the generator is declared available to provide Reactive Power.

To obtain the Reactive Power utilisation payment, a generator must produce or consume reactive power. The production and consumption of reactive power is instructed by EirGrid on an individual generator basis in accordance with locational system requirements.

¹ Reactive Power payment rates are contained in EirGrid's 'Statement of Charges & Payments for Ancillary Service Providers 2008' which can be found at www.EirGrid.com.

² Note that it is not just the production of reactive power that is required of a generator. The ability of a generator to consume reactive power when instructed to do so by EirGrid assists in maintaining system voltages within upper limits during low demand periods for example.

EirGrid's total Reactive Power payments are split approximately 50:50 between capability and utilisation although this proportion will vary on a generator by generator basis. The Reactive Power capability and utilisation payment rates are the same for all generators.

The Grid Code sets out minimum Reactive Power capability requirements. Reactive Power is a mandatory service that must be provided by all generators covered by the Grid Code.

3. Reactive Power Ancillary Service from Wind Farms

While historically WFs have not provided AS, the introduction of new Wind Grid Code provisions now requires WFs to have a degree of voltage control capability. These requirements present opportunities to WFs to provide useful Reactive Power services to EirGrid. As discussed in Section 2, there are currently two reactive power payment components made to thermal and hydro generators: a 'capability' payment for having the ability to produce or consume Reactive Power and a 'utilisation' payment for actual Reactive Power production and consumption. The arrangements for WFs in respect of each of these components are presented below.

Utilisation:

WFs may provide Reactive Power through the inherent capability of certain types of wind turbines and/or through the application of reactive power compensation devices such as shunt capacitor banks, Static VAR Compensators ('SVCs') or Static Compensators ('STATCOMS'). While these technologies have differing voltage performance characteristics, no distinction will be made between the technologies with respect to reactive utilisation payments provided that the appropriate Grid Code requirements are met.

All Grid Code compliant WFs will be paid at the same rate for production and consumption of reactive power. WFs will be paid at the same rate as is applied to thermal and hydro generation. With respect to Reactive Power utilisation payments, WFs would therefore be treated identically to thermal and hydro generation.

Capability:

Reactive Power capability payments will depend on the availability of the WF to produce Reactive Power as outlined below.

According to the Grid Code, the Reactive Power capability of a WF can vary with energy output and a WF is not required to have any Reactive Power capability when it is not generating³. However, depending on the Reactive Power technology employed at the WF it may be capable of providing Reactive Power even when it is not generating. WFs that utilise compensation devices (like STATCOMS) rather than the turbines themselves to provide Reactive Power are more likely to have this capability.

³ See Wind Farm Grid Code Provisions – Figure WFPS1.4.

WFs that just meet the minimum requirements of the Grid Code Reactive Power capability requirements are therefore dependant on the wind to realise this capability and would therefore not be considered a reliable source of Reactive Power. However, WFs that have a Reactive Power capability that is not wind related can be relied upon to provide Reactive Power as their availability would be comparable to that of a thermal or hydro generator.

As a WF with a reliable source of Reactive Power can provide a much more useful service to EirGrid than a WF without, such WFs would be paid a Reactive Power capability payment in line with that paid to thermal and hydro stations. For the avoidance of doubt, WFs with a Reactive Power capability that is dependant on energy production would not be given a Reactive Power capability payment.

In summary, all Grid Code compliant WFs will be paid for Reactive Power utilisation (i.e. production and consumption of Reactive Power) but that only WFs with a Reactive Power capability that is not dependant on energy production would be paid for Reactive Power capability. Both utilisation and capability payment rates for WFs would be the same as for thermal and hydro generators.

4. Related Issues

Revenue Allowance

Provision for Reactive Power payments to WFs was specifically allowed in the 2006-2010 Revenue Determination. Table 1 below presents the total Reactive Power payment allowance made in the Determination and the proportion of this allowance that was estimated for payment to WFs (the remainder being the estimated payment to thermal and hydro generation). Based on the arrangements set out in this document, the estimated Reactive Power payments to WFs are within the allowances made for WFs.

	2006	2007	2008	2009	2010
Total Reactive Power Allowance (€m)	10.87	11.66	11.78	12.05	11.82
Wind Farm Allowance Included in above figure (€m)	0.45	0.79	1.15	1.39	1.65

Table 1 Reactive Power Expenditure Allowance 2006-2010 (in 2004 money)

AS Harmonisation

SONI and EirGrid are currently engaged in a process to create a harmonised set of AS arrangements. Consultation on harmonised proposals is planned for mid 2007 with implementation estimated to be of the order of 12 to 18 months from this time. The arrangements set out in this document are therefore only interim in nature and relate solely to WFs in the RoI. While SONI are aware of the arrangements set out in this document, there is currently no agreed policy position between SONI and EirGrid with respect to the provision of AS from WFs (although a stated guideline of the AS harmonisation workstream is that the ability to provide a service is determined by the technical requirements of the service rather than the technology providing the service).

Distribution Connected Wind Farms

Some WFs connected to the distribution network may be capable of providing Reactive Power services that would be of benefit to EirGrid in the operation of the transmission system. In particular, distribution connected WF connected at 110 kV are likely to be of benefit to EirGrid. Further consideration of the operational and commercial issues of such WFs providing this service to EirGrid is required before this option can progress.

Other Ancillary Services

Operating Reserve and Black Start capability are other Ancillary Services that can be provided by thermal and hydro generators. While WFs are not technically suitable for the provision of Black Start service, the frequency regulation capabilities that WFs should have (as required by the Grid Code) may make them suitable for the provision of some Operating Reserve services.

When thermal and hydro generators provide Operating Reserve, as well as an AS payment, they also receive a constraint payment through the energy market if they are dispatched away from their nomination. This constraint payment keeps the generator financially whole with respect to the energy market. As the energy market rules regarding the treatment of WFs when constrained or curtailed are currently under

development, it is proposed that the possibility of WFs providing Operating Reserve AS is reviewed at a later date once the market arrangements have been determined.

5. Next Steps

The arrangements outlined in this document are for WFs to be allowed to provide AS under identical commercial and contractual arrangements to those currently in place with thermal and hydro generators. As such it was deemed that an industry consultation process was not required as the process would only delay the introduction of the arrangements.

Transmission connected WFs will be offered commercial arrangements to provide Reactive Power Ancillary Services from 1st July 2007.

The arrangements for distribution connected WFs will be considered following implementation of the arrangements for transmission connected WFs.