

Comments by Powercor on Wind Energy Policy Working Group Paper “Integrating Wind Farms into the National Electricity Market”

1.0 CONTEXT

Powercor Australia is the distribution utility in western Victoria. The supply area includes the western part of the Melbourne and suburbs and the western rural areas of the state. Several wind farms have been developed or are currently under development in these rural areas. In addition, a large number of other wind farm proposals are at various stages of development of connection proposals. In this context, Powercor has a strong interest in the development of the NEC to more directly correspond to the regulatory and technical issues arising from the connection of wind farms.

2.0 REGULATORY ISSUES

2.1 Access Standards Structure

Section 5.8 refers to the establishment of the access standards. Powercor supports the Automatic Access and Minimum Access structure of Chapter 5 of the NEC. The arrangements for Negotiated Access are not sufficiently clarified for the various technical clauses. The requirements for provision of data to NEMMCO and to NSPs need clarification.

Recommendation

*Continue with the current Automatic and Minimum Access arrangements
Clarify Negotiated Access and NEMMCO requirements for data and negotiation.
Detail the requirements of NSPs for data and negotiation with developers.*

2.2 Inclusion of Distribution Network

As a distribution utility, Powercor has no responsibility for generation scheduling and provision of auxiliary services so no comment is included on that aspect of the report.

An important regulatory issue for Powercor relating to the NEC is that the technical clauses of the existing Code are basically directed at the transmission system. For example clause S5.2.5.3 on ‘Generating unit response to disturbances in the power system’ is specifically directed at disturbances on the transmission system. This clause is particularly important as it determines the requirements for dynamic performance.

The wind farms in the Powercor supply area have been connected to the 66kV network which is classified as part of the Powercor distribution network. The Code does not specifically apply to the distribution network and this has caused some difficulties of interpretation of Code requirements.

Section 6.3 refers specifically to studies necessary to determine the capability of the *transmission* network. Studies should also proceed to consider the capability of the distribution networks to accommodate wind farm generation.

The description of “Network connection of large scale wind generation” (Section 5.4) seems to imply connection to a transmission network. The same issues of access can arise for connection of wind farms that would not be described as large for connection to distribution networks. The issue is not the size of the wind farm development but of the connection of multiple developments.

Recommendation

The Code should be reviewed to consider amendments that recognize the fact that substantial wind generation will be connected to distribution networks.

2.3 Regulation of Technical Aspects of the Code

The clauses in Section 5 of the Code are necessarily highly detailed technical requirements. Consequently they require engineering expertise of a different type to the clauses in the other sections of the Code. Section 5.9 refers to the possibility of technical requirements being considered by a different mechanism to the regulatory sections. Section 6.6 of the WETAG document refers to this requirement for review of the technical clauses as the technology of wind generation develops.

The existing arrangements with the technical clauses within the Code can result in delays in adapting the Code to developments in technology. This issue has been approached in Germany and Ireland by establishing a “Grid Code.” These Grid Codes set out technical requirements for connection of generation including the specific requirements of wind energy technologies.

Recommendation

There is a need to establish an appropriate arrangement for review, updating and administration so there is minimum delay where Code changes are required.

2.4 Definition of a Wind Farm

As discussed in the WETAG document, a wind farm is currently only required to provide technical information if it is greater than 30MW in size. In the context of distribution systems, although individual wind farms connected to a particular distribution network can all be less than 30MW, the aggregate can be greater than 30MW.

Even if only one wind farm less than 30MW is currently proposed, there may be future proposals for further wind farms. In that case, there would be no requirement for provision of technical information about the first wind farm but assessment of the overall system behaviour for the new proposal would require knowledge of the original installation.

This issue could be resolved by distinguishing between the registration of data about generation and the necessity for studies which would depend on the particular situation.

Recommendation

Require all generation proponents proposing to provide technical information about the generators and the connection arrangement as required by the NSP.

2.5 State Examples

The material from ESPIC has been drawn upon in the WETAG report. The assessments of proposed wind farm developments in Victoria have been facilitated by the existence of the Victorian Electricity Distribution Code. This has specified system performance requirements which have provided the basis for detailed system design.

Victoria has several wind farms already in operation connected to distribution networks and further wind farms under construction and committed for connection to the transmission and distribution networks. The Victorian transmission and distribution networks have specific requirements for system development as detailed in the Victorian Electricity Distribution Code. It is appropriate for WETAG to draw upon the Victorian experience utilizing this Code.

Recommendation

Include representation of the Victorian transmission and distribution utilities in the WETAG.

Refer to the experience utilizing the Victorian Electricity Distribution Code to indicate the value of incorporating distribution practice and performance requirements into the NEC. Consistency across the national grid for connection of generation is essential in going forward for the stability of the now interconnected national system.

3.0 TECHNICAL ISSUES

3.1 Dynamic Models for Generators Section 5.9

The comments on the need for accurate dynamic models are supported. Specifically, there is a need for a specification of the nature of an acceptable model. This has two aspects:-

- a) The mathematical definition of the model. This should be in a “block diagram” format to enable the model to be independent of particular software packages and releases of that software. The block diagram also provides an understanding of the operation of the plant.
- b) The validation of the model. The requirements for acceptable validation need to be defined to provide an agreed basis for acceptance of models. The existing practice for validation of the models of synchronous machines and their controls does not require fault tests under full loading. Instead the standards define various tests which indicate the behaviour and which can be used as input to the model. A corresponding definition is required for wind generation.

Recommendation

- a) *Define the requirements for wind farm dynamic models*
- b) *Define the requirements for validation of wind farm dynamic models*

There is a reference to “aggregated generation plant models” in section 5.9. It is not clear what is meant by this expression. Wind farms use a wide range of technologies and it would not be practical or appropriate to develop a model that encompassed all these technologies.

3.2 Islanding Section 5.5

Islanding is a significant issue for distribution networks as it can occur both for multiple outages in the network local to the wind farm and in the network remote from the wind farm. This situation can be aggravated by the absence of communications in parts of the network. Hence it would be both technically difficult and costly to detect islanding from the system state and to initiate disconnection of an islanded wind farm.

Generally wind turbine-generator manufacturers have used frequency change or rate of change of frequency protection to detect islanding.

Recommendation

Include distribution system characteristics in an examination of approaches to disconnecting islanding wind generation.

Review the effectiveness of approaches to protecting networks against islanded wind generation.

3.3 Definition of Reliability Standards

Wind farm output is not firm however the reliability requirements for the connection of wind farms is not distinguished from that for plant which can be included in the firm generation. Powercor have considered arrangements for wind farms in which the output would have to be reduced after network outages.

Recommendation

Clarify the reliability requirements for the connection of wind farms.

3.6 Information Disclosure Section 5.12

The WETAG report refers to the need for disclosure of wind forecasting data.

Another area of information disclosure not referred to in the WETAG report is the NEC requirement to provide detailed technical data on the wind farm and equipment. These requirements are detailed in the NEC clauses S5.5.1 – S5.5.5. Much of this data is not

appropriate to wind farms. However NSPs do require detailed data about possible wind farms for analysis and to provide the basis for preparation of a connection agreement.

Recommendation

Rewrite Sections S5.5.1 – S5.5.5 of the NEC to reflect the range of technologies used in wind farms.