

**Electricity Act 1989 (Sections 36, 37, 62(3) & Schedule 8) Town and  
Country Planning Act 1990 (Section 90) and the Electricity Generating  
Stations and Overhead Lines (Inquiries Procedure)(England and Wales)  
Rules 2007**

**Application by SP Manweb PLC, dated 2 December 2009 for consent  
under Section 37 of the Electricity Act 1989 to install and keep installed a  
132kV overhead electric line connection from the proposed Llandinam  
Wind Farm to Welshpool Substation (the “Application”)**

**Summary Proof of Evidence**

**Of**

**Dr Andy Beddoes**

**On**

**Network Design**

**SPM/NETWORK/POE/BEDDOES/001B**

## **1. INTRODUCTION / DUTIES ON DISTRIBUTION NETWORK OPERATORS**

1.1 My evidence outlines the need case for the proposed 132kV overhead electric line connection from the Llandinam Repowering Wind Farm to the SP Manweb distribution network at Welshpool Grid Substation (the "Llandinam Scheme").

1.2 SP Manweb, as the holder of an Electricity Distribution Licence for the Cheshire, Merseyside, Shropshire, North and Mid Wales area, must comply with various statutory and licence duties and obligations.

1.3 Such duties require SP Manweb to develop, maintain and continue to provide an efficient, co-ordinated and economical system of electricity distribution, to facilitate competition in the supply and generation of electricity and to provide a connection to an owner or occupier of any premises on request.

## **2. THE EXISTING 132KV AND 33KV NETWORK**

2.1 The Legacy / Oswestry 132kV BK overhead line serves as the main arterial route in the supply of energy for the Legacy, Oswestry, Welshpool, Newtown and Whitchurch areas to some 85,000 customers. The Legacy / Oswestry group currently has a time limited<sup>1</sup> derogation from ER P2/6 (Appendix 3), granted by Ofgem on 7 March 2011, for non-compliance with Licence Condition 24 (Appendix 2).

2.2 Consent for a 3rd Legacy / Oswestry 132kV circuit was granted in May 2013. Construction of this circuit is expected to be completed mid 2015. It will ensure the security of supply for the group.

2.3 The other 132kV circuits south of Oswestry (EJ, BU and MB) are also of relevance as they connect the Llandinam and general area to the south west of Oswestry to the SP Manweb Distribution network

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<sup>1</sup> 30<sup>th</sup> September 2015

2.4 The overall Distribution Network in the Legacy / Oswestry area has approximately 140MVA of wind generation connected (across both the 132kV and 33kV networks).

2.5 For the Llandinam area, there is some degree of 33kV interconnection via a 33kV 'ring' from Newtown Grid. The current Llandinam 34MVA wind farm is connected to this circuit at 33kV, the wind farms location being at the edge of the existing SP Manweb Distribution Network.

### 3. **THE NEED FOR THE LLANDINAM SCHEME**

3.1 Llandinam wind farm currently has an unfirm<sup>2</sup> connection to the existing 33kV SP Manweb Distribution Network, and exports up to 34MVA of connected generation capacity.

3.2 A request for a connection to the SP Manweb Distribution Network was received by SP Manweb from CeltPower Ltd to provide a new stand alone connection for the Llandinam Repowering Wind Farm for a capacity of up to 90MVA.

3.3 The connection of 90MVA of generation capacity is typically achieved at 132kV rather than 33kV. The connection of 90MVA at 33kV would require up to 5 x 33kV circuits and an equivalent number of circuit breakers at either end. This is less efficient and more expensive than a single 132kV circuit connection with additional upstream 132kV reinforcement also required (some 46km of 132kV OHL between Oswestry and Newtown), even if a local 33kV connection was achievable.

3.4 The nearest 132kV connection point to Llandinam Repowering Wind Farm is Carno or Newtown Grid. The combination of existing wind generation connected in this area (up to 88.8MVA), and the rating of the 132kV circuits, is such that any additional generation cannot be accommodated on the Carno (MB) or Newtown (BU) circuits without reinforcement or their off-line rebuild.

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<sup>2</sup> An 'unfirm' connection is a connection which, under first circuit outage conditions, would require the customer to either disconnect or constrain their contracted levels of demand and/or generation under such conditions. A simple example would be a single circuit to a connected customer which would be classed as 'unfirm' since it is a single connection.

3.5 The EJ circuit from Welshpool to Oswestry does not have any direct connected embedded generation. Power flows indicate that there would be sufficient capacity on the EJ circuit to accommodate up to 90MVA of direct connected generation without introducing thermal issues. The current 34MVA of generation at Llandinam would however have to be removed from the 33kV network to minimise upstream circuit thermal issues.

#### 4. **ALTERNATIVE CONNECTIONS TO MEET THE NEED**

4.1 A range of strategic options was considered as part of developing the Llandinam Scheme. These ranged from a connection utilising the existing 33kV connection/network to 132kV and 400kV options.

4.2 The connection of an additional 56MVA of generation at Llandinam Repowering Wind Farm (90MVA total minus existing 34MVA), using the existing 33kV customer connection, will introduce severe 33kV circuit overloads and voltage issues. This would place existing customer supplies within the group at risk and would be considered to be a breach of Licence Condition 21 (Appendix 2).

4.3 The introduction of additional 33kV circuits and the additional upstream 132kV reinforcement required to provide the necessary capacity is not considered a feasible solution which met the needs of the current and future network. It does not demonstrate the maintenance of an efficient, co-ordinated and economical system of electricity distribution.

4.4 Alternative 132kV solutions are considered to either be not technically viable from a capacity perspective, have a greater environmental impact or be more expensive and less efficient than the Llandinam Scheme. Such solutions do not, therefore, offer any material advantages over the Llandinam Scheme.

4.5 Alternative 400kV solutions are considered to either: provide a connection at a later date with increased dependencies and risks; provide for increased environmental concerns; require additional Transmission infrastructure and provide unnecessary network over

capacity; fail to utilise existing capacity within the SP Manweb Distribution Network; or be a more expensive solution with higher Transmission losses.

- 4.6 The integration of the Llandinam Repowering Wind Farm into the SP Mid Wales Connections Project would necessitate additional 132kV circuits between the proposed hub substation and SSA C<sup>3</sup> to ensure that suitable circuit capacity is provided for the current contracted levels of generation.
- 4.7 Additional circuits between the proposed hub substation and SSA C would, depending upon the routeing corridor used (CC1 or CC2), result in either: increased environmental concerns than that of a single circuit (the current SP Mid Wales Connections Project); be a more expensive solution with higher Transmission losses; require additional infrastructure at the proposed hub; provide for unnecessary excess network capacity; provide a connection at a later date compared to the Llandinam Scheme or fail to utilise existing capacity within the SP Manweb Distribution Network.
- 4.8 Welshpool Grid is considered to be the nearest available location in order to provide a connection to the existing SP Manweb Distribution Network for the Llandinam Repowering Wind Farm.
- 4.9 When compared to the alternatives outlined in my proof, discussed further in the Alternatives paper, in the evidence of Mr Paalman (SPM/ENGINEERING/POE/PAALMAN/003A), and evidence of Mr Leavy (SPM/COMPANY/POE/LEAVY/002A), the Llandinam Scheme provides for:
- 4.9.1 the needs of the current and future network;
- 4.9.2 the maintenance of an efficient, co-ordinated and economical system of electricity distribution;

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<sup>3</sup> TAN 8 Strategic Search Area C (SSA C)

- 4.9.3 the utilisation of existing capacity within the SP Manweb Distribution Network; and
  - 4.9.4 the most economic and earliest connection date for the customer.
- 4.10 As such, the Llandinam Scheme is the connection solution which best meets SP Manweb's statutory duties.
- 4.11 From a need and network design perspective, the Llandinam Scheme is the preferred option to deliver the need for a connection from the Llandinam Repowering Wind Farm.