



South Wales

Network Development Report – South Wales

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**Electricity
Distribution**

nationalgrid

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South Wales

1. Network Overview

The South Wales licence area is one of the four licence areas within National Grid Electricity Distribution (NGED) network, serving just over 1 million customers. The area covers approximately 11,800 square kilometres and extends from Pembrokeshire in the west to the Monmouth in the East and from the south coast of Wales up to the towns of Aberaeron and Rhayader in mid-Wales. The area is largely rural but includes the cities and towns of Cardiff, Swansea, Newport, St Davids, Abergavenny, Brecon, Carmarthen and Pembroke as well as many coastal communities.

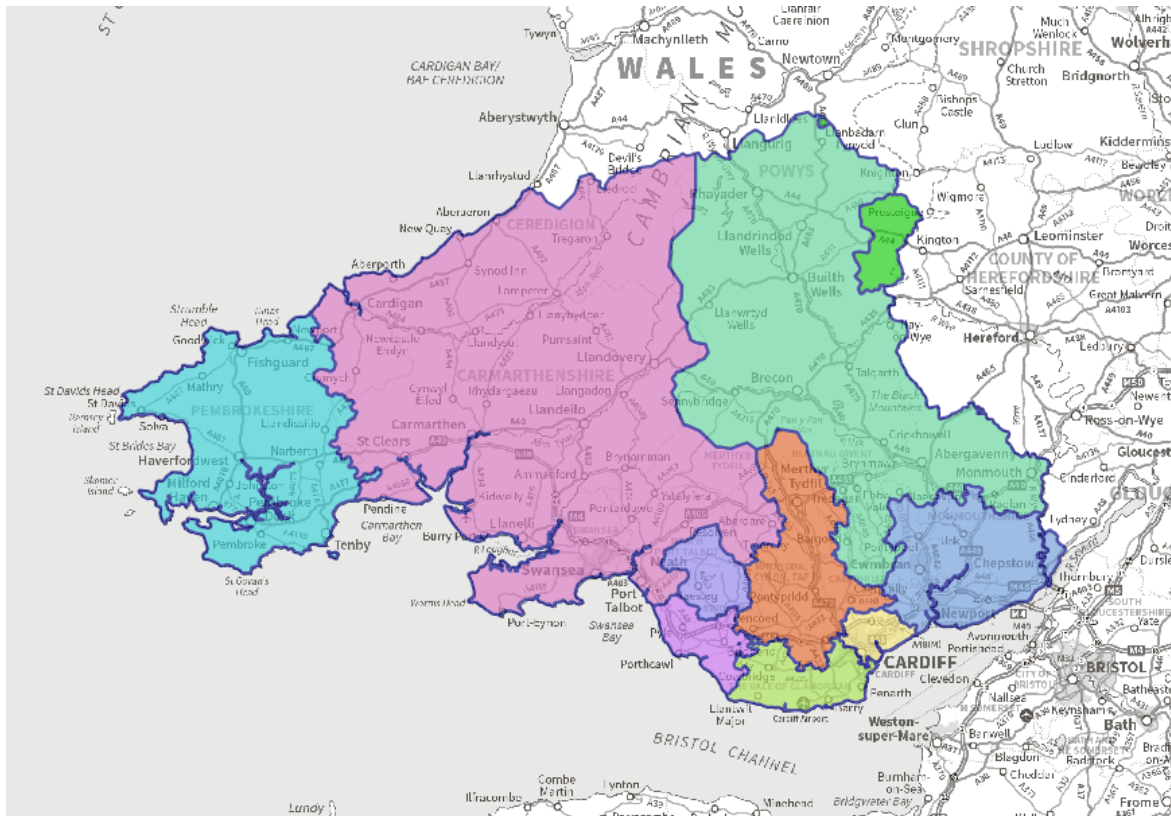


Figure 1.1 South Wales licence area geographic area

The South Wales network is currently covered by 9 Grid Supply Points (GSPs), each feeding a number of Bulk Supply Points (BSPs) to cover its geographic area. Analysis has been carried out across the primary distribution network and reports discussing existing and future network constraints over a 0-10 year horizon have been provided.

For the purposes of this analysis the NGED Best View Distribution Future Energy Scenario (DFES) has been used to study each year up to and including 2034. Representative days for each of the four seasons (Winter, Intermediate Cool, Intermediate Warm, and Summer) have been studied to cover the edge case scenarios for the network.

1.1 Network Topology

The GSPs form the boundaries between transmission and distribution networks. The South Wales GSPs are listed below:

- **Aberthaw:** supplied via 3x 275/132 kV SGTs
- **Cardiff East:** supplied via 2x 275/132 kV SGTs
- **Margam:** supplied via 2x 275/66 kV SGTs
- **Pembroke:** supplied via 2x 400/132 kV SGTs
- **Pyle:** supplied via 2x 275/132 kV SGTs
- **Rassau:** supplied via 2x 400/132 kV SGTs
- **Swansea North:** supplied via 3x 400/132 kV SGTs and 2x 275/132 kV SGTs
- **Upper Boat:** supplies via 2x 275/132 kV SGTs and 2x 275/33 kV SGTs
- **Uskmouth:** supplied via 3x 275/132 kV SGTs and 2x 275/33 kV SGTs

Most GSPs in South Wales are normally operated independently, but Aberthaw and Cardiff East are normally operated in Parallel at 132 kV. The 132 kV and 33 kV networks supplied from Upper Boat GSP are remotely coupled by a 132/33 kV Grid Transformer at Mountain Ash Bulk Supply Point.

The GSPs typically supply multiple BSPs including 132/66 kV, 132/33 kV and 132/11 kV sites. The South Wales network also includes two areas where 66 kV networks perform all or part of the conventional role of 132 kV networks:

- The Llynfi valley 66 kV network, supplied directly from Margam GSP; and
- The East Wales 66 kV network, supplied via the 132 kV network at Abergavenny, Llantarnam and Panteg BSPs. This network supplies a particularly large geographic area, stretching from the outskirts of Newport in the south to rural mid-Wales in the north. This network can be further subdivided into:
 - The Mid-Wales 66 kV ring, originating at Abergavenny BSP;
 - The Southern 66 kV ring, interconnecting Abergavenny and Panteg BSPs; and
 - The Llantarnam 66 kV network, supplying Rogerstone primary substation and part of the Pontypool North primary substation.

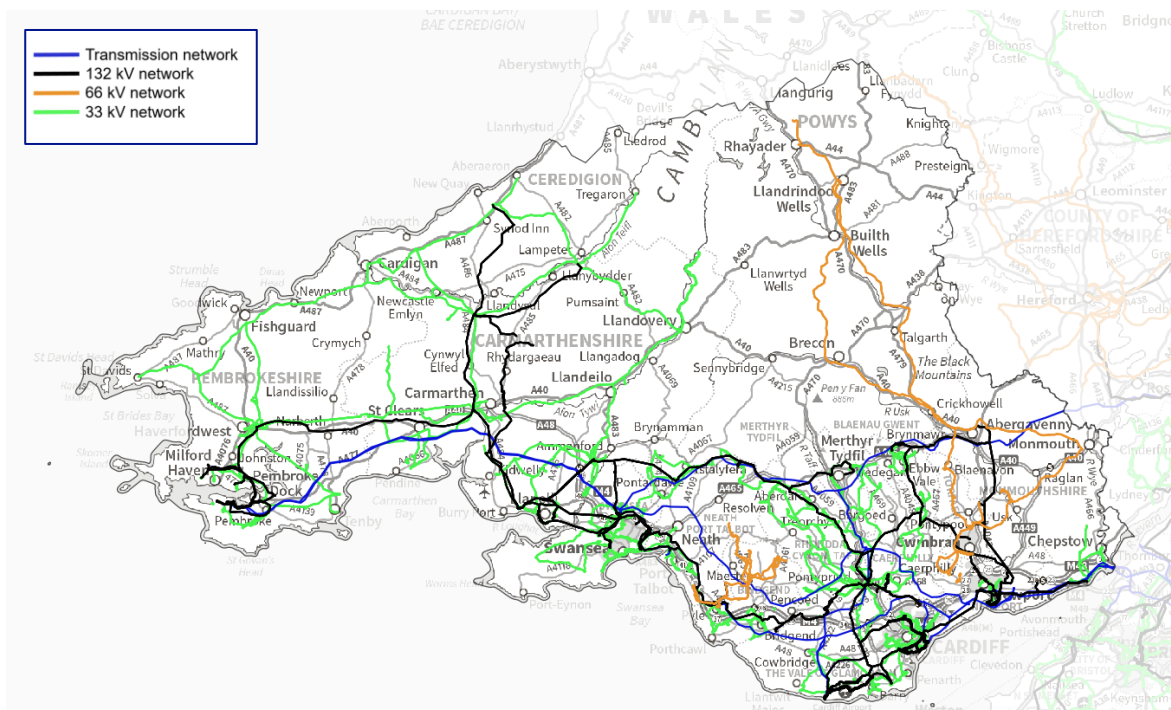


Figure 1.1.1 South Wales network geographic

2. GSP Network Constraint Summary

The tables below highlight the BSPs within each GSP, and the number of constraints identified in each area up to and including 2034. Details of the individual constraints are covered within the GSP reports.

Cardiff East & Aberthaw GSP:

GSP / BSP / 132 kV	Number of constraints
132 kV Network	1
Cardiff Central & West	4
Cardiff North and East BSPs	1
Brynhill (Barry) BSP & East Aberthaw BSP	3

Pembroke GSP:

GSP / BSP / 132 kV	Number of constraints
132 kV network	1
Golden Hill, Haverfordwest & Milford Haven BSPs	14

Pyle & Margam GSPs:

GSP / BSP / 132 kV	Number of constraints
Pyle & Margam GSPs and associated 132 kV and 33 kV Network	3
Bridgend 33 kV	3

Rassau GSP:

GSP / BSP / 132 kV	Number of constraints
Rassau GSP and 132 kV network	4
Abergavenny & Panteg BSPs	4
Crumlin BSP	1
Ebbw Vale	2

Swansea North GSP:

GSP / BSP / 132 kV	Number of constraints
Swansea North 132 kV network	0
Briton Ferry & Tir John BSPs	5
Carmarthen BSP, Ammanford BSP, Rhos BSP, Llanarth BSP and Lampeter BSP	4
Hirwaun and Travellers Rest 33 kV	2
Swansea North BSP	2
Swansea West BSP	3
Trostre BSP	2

Upper Boat GSP:

GSP / BSP / 132 kV	Number of constraints
Upper Boat 132 kV and 33 kV	15
Dowlais 33 kV	3

Uskmouth GSP:

GSP / BSP / 132 kV	Number of constraints
Uskmouth GSP and Associated 132 kV Network	4
Sudbrook BSP	2
Llantarnam BSP	0
Newport South BSP	0

3. Transmission-Distribution Interface

As discussed earlier, these GSPs typically form the boundary between the transmission and distribution networks. Across the South Wales licence area and in most of its GSPs the growth of low carbon technologies such as heat pumps and electric vehicles as well as high levels of New Connection activity (mainly dominated by Battery Storage connections and Photovoltaic generation schemes) have triggered constraints at the transmission network including SGT capacity, 275 kV and 400 kV circuit ratings, and 132 kV switchgear fault level limits.

Discussions are ongoing with the transmission network owner with regards to the best viable solution to mitigate these constraints, with options varying from uprating the existing assets to establishing additional GSPs in locations that best suit the network and its serving customers.

Some of the GSPs where new sites are being considered include:

- Llandyfaelog GSP
- Hirwaun GSP

In addition to thermal and fault level constraints, there are spaces limitations at several of the GSPs with regards to installing additional bays for new connection and network reinforcement purposes; establishing new sites could therefore help mitigate this and make provisions for accommodating the increasing number of bays required.

4. Grid Transformer Cyclic Ratings

Across South Wales, BSPs include Grid Transformers (GTs) that do not always have their cyclic ratings utilised. This generally applies to 132/66 kV, 132/33 kV, 132/11 kV, and three-winding 132/11/11 kV grid transformers. Utilising these cyclic ratings would include carrying out further assessments and site checks to determine the appropriate level to uprate them to.

These have been included in the NDP reports where relevant.



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