

## 1 Executive Summary

- SP Energy Networks (SPEN) owns and operates the electricity distribution network in North Wales and some of Mid-Wales, serving 0.45m customers.
- We aim to invest over £650m in Wales over the period 2023 to 2028 subject to approval by Ofgem.
- Our investment plans will support hundreds of green jobs and the decarbonisation of heat and transport in Wales.
- North and Mid-Wales have contrasting electricity networks. North Wales' network is interconnected but Mid-Wales is sparse.
- Both regions present bespoke challenges that require strategic investment to accommodate forecasted growth in demand and renewable generation in Wales.
- Mid-Wales would benefit from enhanced cooperation and collaboration between the Welsh Government, SPEN, National Grid Electricity Transmission, Western Power Distribution and the Electricity System Operator.
- The GB energy regulator (Ofgem) will make a determination on our investment proposals for Wales in December 2022.

## 2 Introduction

SP Energy Networks (SPEN) owns and operates the electricity network in Central and Southern Scotland (our SP Distribution network) and in North and Mid-Wales, Merseyside, Cheshire, and North Shropshire (our SP Manweb network). It is through this network of underground cables, overhead lines, and substations that 3.5m customers are provided with a safe, economical, and reliable electricity supply.

In Wales, this distribution network supports 0.45m homes, businesses, and public services every day, and we are committed to working with the Welsh Government and other network operators to deliver a network ready for Net Zero. We aim to invest over £650m in the electricity distribution network in Wales from 2023 to 2028<sup>1</sup>, supporting hundreds of green jobs and enabling the decarbonisation of heat and transport that is absolutely crucial to deliver Wales' climate change targets.

The majority of our Welsh network infrastructure is concentrated in North Wales, where there is an interconnected network that supports large numbers of domestic and business customers. As a result, our strategy in North Wales is to alleviate constraints associated with this largely urban network. In contrast, the distribution and transmission network in Mid-Wales is sparse and originally designed to supply low levels of local rural demand, and therefore requires significant strategic infrastructure investments.

In order to accommodate forecasted demand growth in Mid-Wales, we will invest to maximise use of our existing network through to the early 2030s. Accommodating demand growth beyond 2030, will require a larger infrastructure solution. There is an opportunity, involving coordinated development of networks owned by SPEN, National Grid Electricity Transmission (NGET) and Western Power Distribution (WPD), to deliver such an integrated solution which considers the whole Wales electricity system.

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<sup>1</sup> RIIO-ED2 is the regulatory timeframe for the next set of GB Distribution Price controls, referred to as RIIO-ED2

## **SP Energy Networks: Written Response to the Climate Change, Environment and Infrastructure Committee (11<sup>th</sup> February 2022)**

Delivering this requires collaborative working between the Welsh government, SPEN, WPD, NGET, and National Grid Electricity System Operator (NGESO). Given the long lead times of such projects, we have already requested funding from the GB energy regulator (Ofgem) for our element of pre-engineering works within the next regulatory price control (RIIO-ED2) and are committed to working together.

### **3 Structure of this paper**

The following sections outline actions we are already taking and future planned investment in support of Wales' Net Zero targets.

- **Section 3** – details our network investment proposals for Wales over the period 2023 to 2028.
- **Section 4** – sets out specific activities which support the growth of renewable generation by maximising use of existing network capacity.
- **Section 5** – describes frameworks for collaboration, feeding into Wales' Future Energy Grid for Net Zero project.

### **4 Our network development strategy for Wales**

Our network development strategy for Wales reflects the distinct and diverse set of challenges in both North and Mid-Wales.

On 1 December 2021 we submitted our RIIO-ED2 Business Plan to Ofgem<sup>2</sup> for the period 1 April 2023 to 31 March 2028. Our network development strategy is a core part of this plan and incorporates feedback from over 19,000 customers and stakeholders (including the Welsh Government). Ofgem will decide how much of this investment is permitted when it publishes a determination in December 2022.

Achieving Net Zero targets in Wales will require a substantial growth in renewable generation and customers transitioning to electric vehicles (EVs) and heat pumps. By 2030, we forecast up to 250,000 EVs; 160,000 heat pumps; and an additional 1.5GW of distribution-connected renewable generation in Wales. Meeting these forecasts will require the electricity network to operate within statutory limits during peaks created by this increased demand (we refer to this as 'network capacity').

Our proposed RIIO-ED2 investment will create additional capacity and deliver tools which enable us to get best use out of existing capacity at a cost to our customers of around 32p per day.

Given the uncertainties that naturally arise when planning for the future, we create investment plans for a number of growth scenarios; the Baseline Scenario is our 'best view'. In the sections below, we describe this scenario under three of its largest areas of expenditure - (distribution system operator (DSO), load and asset management) and savings we intend to realise through innovation.

#### **4.1 Distribution System Operator**

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<sup>2</sup> Our main business plan document is available here:

<https://www.spenergynetworks.co.uk/userfiles/file/SPEN%20RIIO-ED2%20Final%20Business%20Plan%20-%201st%20December%202021%20-%20FINAL.pdf>. For more information on how we will intervene on the network, the best place to start is our Future System Strategy (a summary of our network intervention plans); available here: <https://www.spenergynetworks.co.uk/userfiles/file/Annex%204A.1%20-%20Future%20System%20Strategy.pdf>

## **SP Energy Networks: Written Response to the Climate Change, Environment and Infrastructure Committee (11<sup>th</sup> February 2022)**

The energy system is undergoing a transformation as the way our customers generate, use, and interact with energy evolves. This means that our role – how we plan, design, and operate the network for our customers – must evolve with it. DSO investment is intended to respond to these challenges. It involves updated and new operational capabilities as well as enabling infrastructure to help us to manage important aspects such as voltage and frequency in a more dynamic, decentralised, and interactive energy system.

Our proposed DSO investment<sup>3</sup> would benefit Wales through:

- The delivery of a new central network planning and operational tool – our Energy Networks Zero (ENZ) Platform. This analytical tool tells us what is happening on the network now and predicts what could happen in the future.
- Enhanced forecasting of customer requirements.
- Dedicated resources for greater working and coordination with local authorities, the Welsh Government and other utilities serving Wales.
- Low Voltage (LV) monitors (a SPEN innovation) at approximately 3,000 High Voltage (HV)/LV substations to give us far greater visibility of the LV network and opportunities to work our assets harder where safe to do so.
- IT and digitalisation investments, so we can create a smarter and more connected network with greater visibility, data sharing, and use of customer flexibility.
- Four new constraint management zones (CMZs) with active network management (ANM) capability. ANM enables renewable generators to connect more quickly and at lower cost.
- Developing markets for flexibility with new and existing customers who are able and willing to control how much they generate or who can control their demand. Flexibility markets help mitigate the need for traditional reinforcement of the network and reduces costs for our customers.

### **4.2 Load**

This category of investment is intended to deliver the additional network capacity needed to accommodate increased electricity consumption.

We plan to invest a minimum of £70m in load-related expenditure (potentially increasing to £111m) across all voltage levels to add capacity. This includes 5,700 looped service interventions<sup>4</sup> and the use of 140MW of flexibility services across 255 sites to defer the need for reinforcement. We will also undertake a series of investments in RIIO-ED2 to promote the development of efficient, coordinated, and competitive flexibility markets.

We have proposed to Ofgem that load-related expenditure should be adjusted up pending the outcome of Ofgem's Access and Forward-looking Charges Significant Code Review (which may shift some generation reinforcement costs from generators to all customers).

### **4.3 Asset management**

Our asset management expenditure keeps network assets in good condition, intervening on environmentally harmful, unsafe or deteriorating assets, and increasing the network's resilience

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<sup>3</sup> Annex 4A.3 - DSO Strategy .pdf (spenergynetworks.co.uk)

<sup>4</sup> A looped service is where multiple properties are supplied by a single shared 'looped' service between neighbours. Net Zero and the electrification of heat and transport means typical household peak demand will triple, exceeding the safe rating of these assets. Many older households have a looped service as this was more economic in the past for domestic consumption.

## **SP Energy Networks: Written Response to the Climate Change, Environment and Infrastructure Committee (11<sup>th</sup> February 2022)**

to a range of external factors. Our proposed asset management investment in Wales totals £345m<sup>5</sup> where:

- We will remove equipment in poor condition, extend the life of assets where it is financially efficient, and ensure assets have the capacity and functionality to meet Net Zero targets.
- We will spend £59m on overhead lines in Wales, re-wiring more than 1,800 km and replacing 46,000 poles to reduce risk and improve network reliability.
- We will improve reliability by ensuring that on average customers will be 19% less likely to experience an unplanned interruption, with average duration also decreasing by 19%. We will install approximately 700 automation points in Wales to restore supply quickly in the event of a fault.
- Environmental legislation now requires the removal of assets contaminated with Polychlorinated Biphenyls (PCBs). We will remove over 5,000 contaminated assets to reduce risk of environmental leaks and ensure compliance with regulations.
- We aim to ensure vegetation does not grow close enough to our overhead lines to cause a short circuit.

### **4.4 Innovation**

We are committed to finding new and innovative solutions which provide benefits to current and future customers and help pave the way to a safer, more reliable, and more cost-effective Net Zero system. We are in the top tier of the electricity sector for innovation in both our portfolio of projects and level of funding. We are delivering the most Network Innovation Competition (NIC) funded projects across the distribution sector and have the greatest share of NIC funding by licence. This innovation has enabled us to deliver £87m of savings in our RII0-ED2 price control submission.

## **5 Maximising network capacity to support growth in renewable generation**

We are undertaking a range of projects and interventions to get the best use out of existing network capacity to support the growth of renewable generation. These include:

1. Constraint Management Zones. These enable renewable generators to connect under flexible connection arrangements, so avoiding the cost and time delays of network reinforcements.
2. Real time fault level measurement (RTFLM) and active fault level management (AFLM). A world-first innovation project we have led to help renewable generators connect more quickly and cheaply by deferring expensive and lengthy switchgear reinforcements.
3. Improving network visibility. This enables us to safely operate the network closer to limits, which has the effect of making more capacity on the existing network available.
4. Angle DC. Another UK-first innovation that achieves 25% more capacity out of the two 33kV cables which supply Anglesey, enabling further demand and generation growth.
5. Enabling greater use of demand-side response and flexibility markets.

### **5.1 Principles we adopt when maximising network capacity for renewable generation**

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<sup>5</sup> Includes network operating costs such as fault response.

## SP Energy Networks: Written Response to the Climate Change, Environment and Infrastructure Committee (11<sup>th</sup> February 2022)

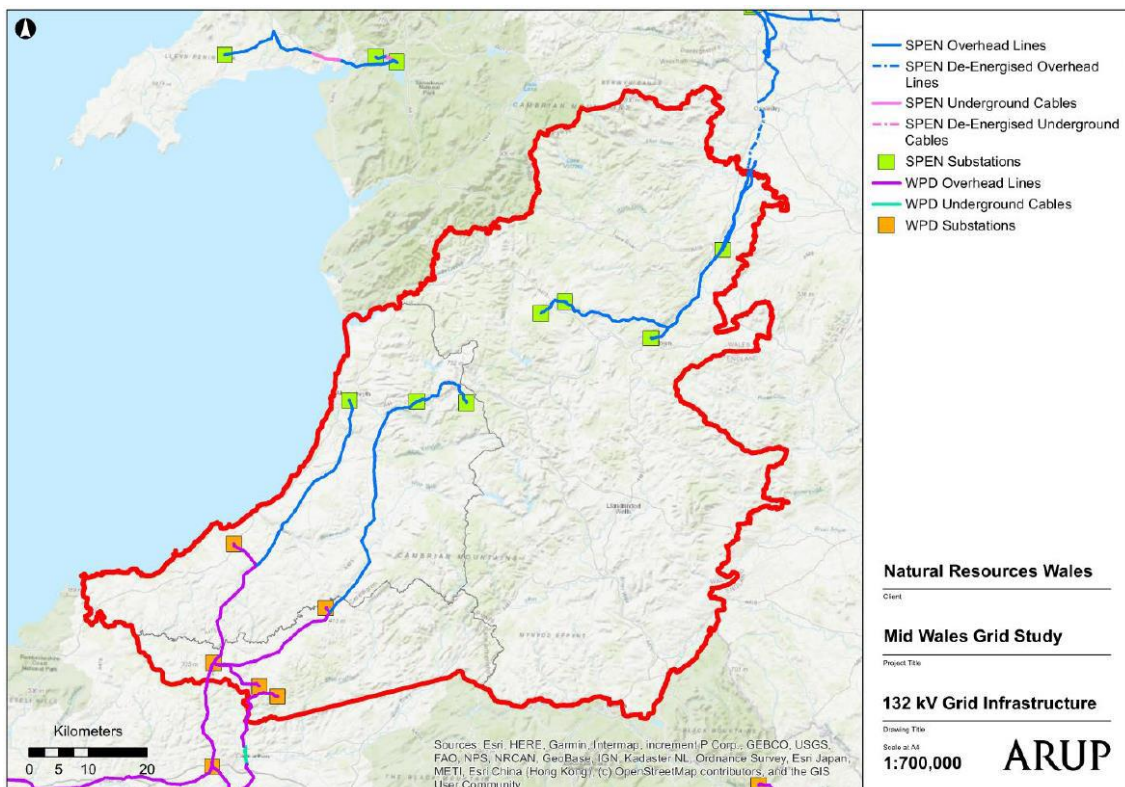
- We always look for the most efficient and effective solutions to get the best out of existing capacity. This includes assessing flexible, smart, innovative, energy efficiency and reinforcement solutions.
- We are committed to finding new and innovative solutions to save costs.
- We get the best out of the existing network by investing strategically and keeping individual assets in good condition through careful asset management.

In the longer-term, if large volumes of generation are to be accommodated in Wales, it will require new additional network capacity. Given consenting requirements, this would require support from Government.

### 6 Collaborating to deliver Welsh Future Energy Grid for Net Zero

We are supporting the Welsh Government’s Welsh Future Energy Grid for Net Zero project which seeks to understand what gas and electricity network infrastructure is needed in Wales to enable legislated Welsh Net Zero targets, and getting plans in place to build them this decade. In RII0-ED2 we will set up a team to work closely with Western Power Distribution, National Grid, NGENSO, WWU, local authorities, and the Welsh Government to carry out assessments and analysis on the electricity network infrastructure requirements for Wales for this project.

A key region that warrants project focus is Mid-Wales. There is currently limited existing electricity infrastructure in Mid-Wales due to the electricity network being originally designed to supply low levels of local rural demand with negligible distributed generation. However, a rapid increase in distributed generation is fundamentally changing the use of the network in Mid-Wales.



Our proposals for Mid-Wales accommodate forecast additional demand through to the early 2030s. However, a collaborative Whole Systems planning approach is required to identify the optimal longer-term distribution and transmission solution to upgrade the Mid-Wales network to

**SP Energy Networks: Written Response to the Climate Change, Environment and Infrastructure Committee (11<sup>th</sup> February 2022)**

meet long term demand and generation requirements and be Net Zero ready. As previously mentioned, consenting requirements would require support from Government.