Electricity (National Grid Electricity Distribution) – Infrastructure Delivery Plan Topic Paper

Introduction

1.0 This paper considers electricity distribution networks across South Gloucestershire, specifically those owned and operated by National Grid Electricity Distribution (NGED). It will specifically set out the current strategic investment processes and the interface of these with local development plans and developers. It excludes any transmission networks and networks operated by other network operators, be that other Distribution Network Operators (DNOs) or Independent Distribution Network Operators (IDNOs)[1]. NGED is the principal DNO in South Gloucestershire.

2.0 The UK's DNOs distribute electricity from the transmission grid to homes and businesses in fourteen geographical areas throughout the UK called licence areas. National Grid Electricity Transmission operates in England and Wales carrying higher voltages of 275 kV and 400 kV, and NGED operates across the Midlands, the Southwest and South Wales, distribution electricity at lower voltages of up to 132 kV.

3.0 Though there are other network operators within South Gloucestershire, this paper only considers those being operated by NGED. NGED is the regional electricity distribution division of National Grid and operates networks at 132 kV, 66 kV, 33 kV, 11 kV, 6.6 kV and LV. NGED is the primary network operator is South Gloucestershire.

4.0 NGED, formerly known as Western Power Distribution, is the UK's largest electricity distribution network serving nearly 8 million customers in the East and West



[1] "Independent DNOs (IDNOs) own and operate smaller networks located within the areas covered by the DNOs. IDNO networks are mainly connected to the host DNO networks and serve new housing and commercial developments. IDNOs are authorised by licence to carry out the activity of distribution across GB." Ofgem, "*Independent Distribution Network Operators – licence applications from affiliates of existing licensees.*" 2018, https://www.ofgem.gov.uk/publications/independent-distribution-network-operators-licence-applications-affiliates-existing-licensees (Accessed 1st August 2023)

Midlands, Southwest and Wales, delivering essential power to millions of homes and businesses across its regions.

5.0 With a distribution area of 55,000 square kilometres, NGED is committed to providing a safe, stable and reliable electricity supply and ensuring the highest quality of customer service.

6.0 NGED is a regulated business and a natural monopoly. As such, the Office of Gas and Electricity Markets (Ofgem) regulates how much DNOs like NGED can earn and what we need to spend and deliver under regulated price review arrangements. The current price control review will last for five years and is called RIIO-ED2, which stands for Revenues = Incentives + Innovation + Outputs in Electricity Distribution. It is the second price control under this model and covers the investment years of 2023-2028.

7.0 Investment in the network is split into two main categories, connections-driven investment, and strategic investment, which are outlined below.

Connections driven investment

8.0 Ofgem have recently changed the way NGED charges for new development connecting to our network. Ofgem's Access and Forward-Looking Charges Significant Code Review (SCR) was commenced from the 1st April 2023.

9.0 Access SCR changes mean that Demand customers no longer pay a proportion of upstream reinforcement costs and Generation customers only pay a proportion of reinforcement costs at the same voltage level as their point of connection (subject to the high-cost project threshold). All customers still pay for the works to provide their new connection (known as the extension assets) either by the Distribution Network Operator (DNO) or by an Independent Connection Provider (ICP).

10.0 Applications for a Demand connection will not be required to contribute to reinforcement works unless they trigger the Demand High-Cost Project Threshold of £1,720/KVA or are deemed to be a Speculative Development.

11.0 The cost of upstream reinforcement works is therefore now predominantly shared across all customers' bills within that licence area. This encourages early engagement with local authorities, where areas for new development can be highlighted and passed through the NGED's strategic investment process.

12.0 In order to connect a development to the network, a connection application is submitted by the customer once they have the full details of the development that they wish to connect. NGED then need to provide the customer with a connection offer which sets out the works to be undertaken, the cost of delivering those works

and the terms and conditions to be applied. Further information around the connections process can be found on the National Grid Information Hub[2].

Strategic Investment

13.0 Although the funding for the investment years of 2023-2028 has already been allocated for load growth, there is the opportunity for the application of a net zero reopener, to procure additional funding for this period as a result of additional developments or a faster uptake of Low Carbon Technologies (LCTs) than initially forecast in the Distribution Future Energy Scenarios (DFES) at the start of the RIIO-ED2 period.

14.0 The NGED strategic investment planning process is used to identify the required investment and is outlined below. This process is run annually, with the Network Development Plan (NDP) being published every two years, highlighting constraints identified on the network as a result of the load growth forecast in the DFES. Any constraints identified in the NDP are evaluated using the Distribution Network Options Assessment (DNOA), which outlines the optimal investment pathway to resolve the constraint.



15.0 The annual publication of NGED's Distribution Future Energy Scenarios (DFES), with subsequent consultations, provide opportunity for stakeholders to engage on a range of factors key to the delivery of net zero.

16.0 New demand is incorporated into NGED's strategic planning process through using the DFES as an input to project how NGED expect customers to use the distribution network as the UK transitions to a net zero future.

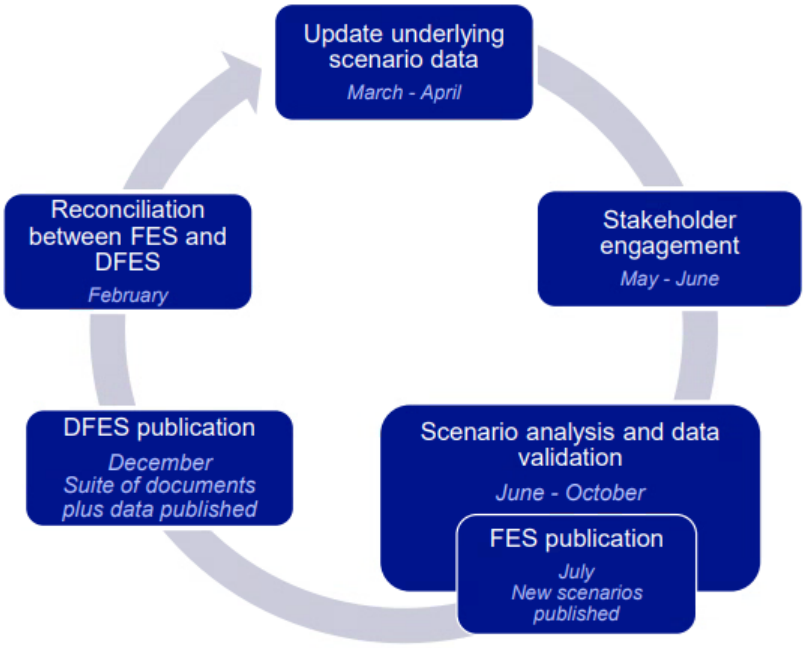
17.0 The annual publication of NGED's DFES, with subsequent consultations, provide opportunity for stakeholders to engage on a range of factors key to the delivery of net zero. The DFES uses a wide range of inputs and data sources to identify what the future use of the network looks like, which includes land allocation from local development plans. This includes an annual survey sent directly to all Local Authorities asking for information about their housing growth and decarbonisation plans.

[2] National Grid - Information hub

18.0 The DFES Map shows what has been included in the South Gloucestershire area for each of the scenarios out until 2050[3].

19.0 As such, once the areas for new development have been finalised through this new local plan, this will be a key input for the DFES, and we will invest as required to support the new demand projections within our forecasts.

20.0 The annual DFES engagement and publication cycle is shown below, which highlights the points where this information can be updated:



Current Infrastructure Assets

21.0 National Grid Transmission (NGET) feeds NGED's network via the Iron Acton Grid Supply Point (GSP) in South Gloucestershire, located between Yate and the M5. Network maps are publicly available at: Network route maps | National Grid ET & System and Network - Groups - National Grid's Connected Data Portal .

[3] NGED DFES Map Application



Iron Acton substation. (James Williams – Google Maps)

22.0 South Gloucestershire straddles the boundary of the Southwest and West Midlands licence areas, as shown by the two colours representing the Iron Acton GSP electricity supply area in the map below.

23.0 Information and data related to network assets and system operation can be found on our connected data portal[4].

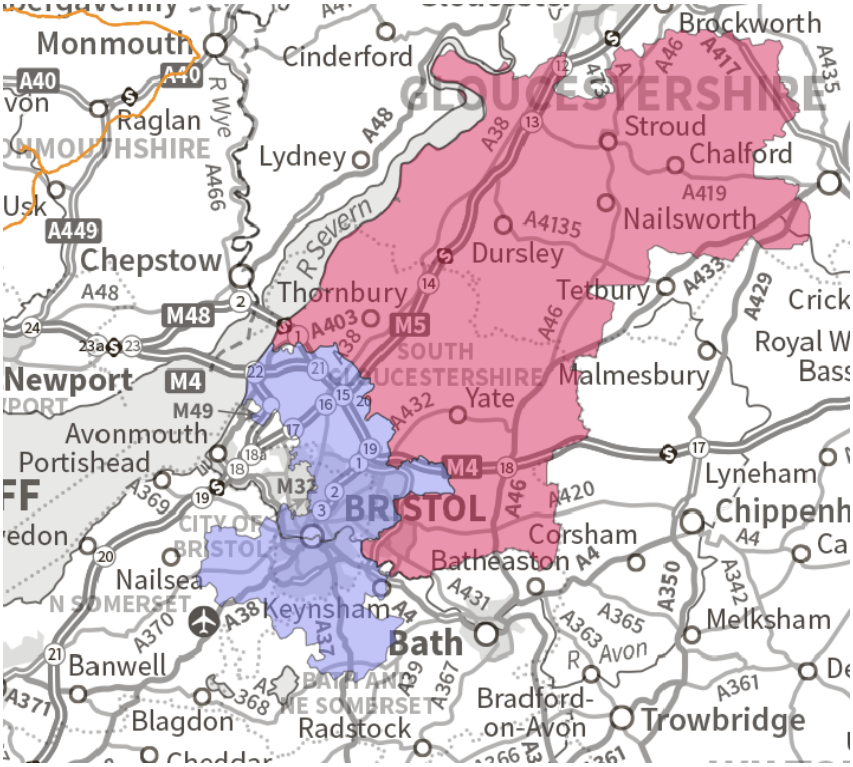
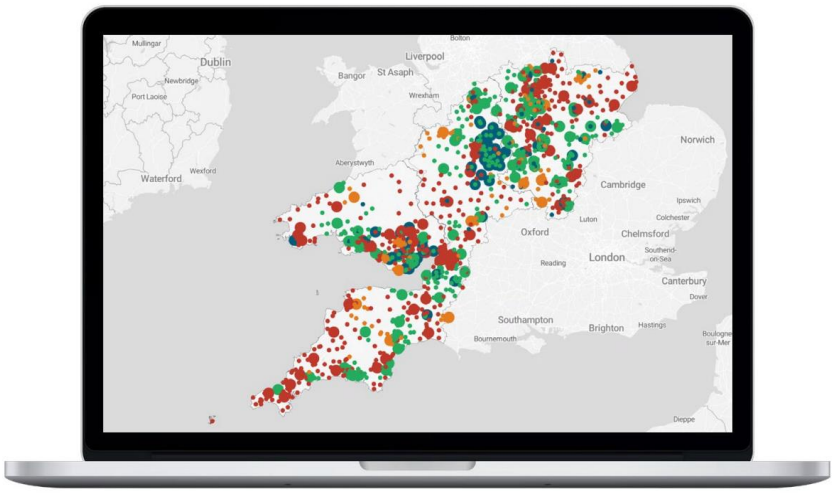


Figure 1 – Map showing the area supplied by Iron Acton GSP, with the purple area falling within the South West licence area, and the pink area falling within the West Midlands licence area. Contains OS data © Crown copyright and database right 2022

24.0 The Network Capacity Map (NCM) below provides an indication of the networks capability to connect large-scale developments to major substations.

[4] System and Network - Groups - National Grid's Connected Data Portal



Colour grading is used as a guide to the areas of the network where connection is more likely to be achieved without significant reinforcement. It is worth noting that this is only an indication and does not replace a full formal application for determining available network capacity[5]. NGED are working to update the NCM with more accurate data.

25.0 The NDP highlights anticipated constraints that will arise in the next 10 years and is published every 2 years. The details of this can be found on the NGED website, and include proposed solutions to identified constraints, including reinforcements[6]. Alongside the publication of the NDP, the Network Headroom Report is published annually, which publishes expected headroom per substation out to 2050.

26.0 In the South Gloucestershire area, the following Extra High Voltage (EHV) constraints were identified in NGED's NDP 2022:

- Future constraints at Chipping Sodbury Bulk Supply Point (BSP) have been identified, the proposed solution for which is to build a new BSP adjacent to Iron Acton GSP to pick up demand from the Chipping Sodbury 33kV network.
- Future constraints at Cowhorn Primary substation (North of Keynsham) have been identified, the proposed solution for which was to replace the transformers on site with two larger transformers that are able to support the demand.

These two schemes should be complete by 2028.

27.0 In addition to the above, a new primary substation is being built in Filton Airfield to support the Filton Airfield developments. This will also de-load some of the surrounding primaries.

28.0 Future network requirements in terms of new circuits as a result of the strategic investment process in the areas covered by South Gloucestershire's new local plan

[5] National Grid – Network Capacity Map Application
[6] National Grid Network Development Plan

are yet to be determined; however, the NGED's website publishes all planning consultations on overhead lines planning applications as they arise[7].

29.0 Although pylons and substations can technically be moved to allow for development, the legal and engineering challenges can be extreme and are often prohibitive due to cost. National Grid has published guidance for development near high voltage lines, which should be followed. Development near overhead lines_0.pdf (nationalgrid.com)

30.0 NGED also operates connection surgeries for new development sites which can be organised through the website or via contacting nged.newsupplies@nationalgrid.co.uk.

31.0 The impacts of future growth on the network will be confirmed in the final Infrastructure Delivery Plan (IDP) post Reg 19 of the plan, but it is not anticipated that any of the scenarios will have major implications for our network.

[7] National Grid Electricity Distribution – Planning Consultations on overhead lines