

## **Written evidence submitted by the Department for Business, Energy and Industrial Strategy (GRD0027)**

### **What are the current capacity issues facing the National Grid?**

Great Britain's electricity network is made up of the transmission network and distribution network. National Grid Electricity Transmission owns and operates the transmission network in Wales, and Western Power Distribution and Scottish Power Energy Networks own and operate the distribution networks.

Ofgem, the independent energy regulator, regulates these privately-owned network companies to ensure their networks can provide support necessary to meet demand in their network regions. They are incentivised to do so by Ofgem's price control for network companies.

In order to decarbonise the power system by 2035 (subject to security of supply) and meet net zero by 2050, we must switch fully to renewable and low-carbon generation; at the same time, we expect a doubling of electricity demand as sectors such as transport and heating switch to electricity as an energy source in place of fossil fuels. Electricity networks are key enablers for this transition. These companies and the associated regulatory framework have a significant challenge in adapting to cater for future demand, as renewable generation and electrification increases.

### **How are the constraints on Wales' grid likely to be exacerbated as demand for renewable energy surges?**

Most of Wales' transmission network is focused around the north and the south of the country, surrounding larger settlements and industrial areas. As more renewable generation joins the network in Wales, so capacity will have to increase to connect the generation to the grid, to transport it around the country and to other demand centres in Great Britain.

We welcome the engagement that National Grid Electricity Transmission and National Grid Electricity System Operator has had with Welsh stakeholders to help address potential capacity challenges that may arise on the electricity transmission network in Wales.

In order that the transformation of the electricity network takes place efficiently and in a way that keeps disruption and costs to consumers as low as possible, it will be important to take a strategic and coordinated approach to planning of the electricity network. To address this, Ofgem is currently conducting the Electricity Transmission Network Planning Review (ETNPR), which is looking to introduce a more holistic planning approach for onshore and offshore networks, identify strategic investment opportunities and encourage innovative solutions developed by third parties.

### **How can Wales unlock the grid and ensure that it is ready for future demand?**

Electricity network companies are responsible for the delivery and maintenance of their electricity network and are regulated by Ofgem to do so in a cost-efficient way in the interest of consumers. Ofgem does this through the RIIO price control.<sup>1</sup>

RIIO is designed to enable and encourage networks to build strategically ahead of need to cater to anticipated demand on the network.

To deliver the extra capacity required for net zero, electricity network infrastructure must be deliverable to reasonable timescales. The planning and consenting regime needs to facilitate this. For the transmission network, we are refocusing the process on the need for critical network infrastructure to meet net zero whilst balancing the needs of the environment and communities. We are also considering whether current processes at distribution level are sufficiently timely and cost-effective to enable efficient rollout of electricity infrastructure, and consequently whether any amendments are needed.

It is important that network companies work closely with all levels of Government in Wales to help ensure that the networks support future energy needs and that networks are factored into local energy planning. All network companies produce future energy scenarios for their areas based on extensive stakeholder engagement. An example of this is Western Power Distribution's Net Zero South Wales project.<sup>2</sup> This analysis produced a set of joint electricity and gas Net Zero 2050 scenarios covering Western Power Distribution and Wales & West Utilities' regions in South Wales, and explored a range of possible futures for the electricity and gas distribution networks. These scenarios then inform network company investment plans and requests for funding from Ofgem through the RIIO process.<sup>3</sup>

The Distribution Network Operators (DNOs) operating in Wales also offer flexible connections to their networks. This allows more renewable generation to connect faster and at lower cost in return for connection customers accepting that under certain network conditions they may be constrained from the network.

In addition to actions by the network companies themselves, Government and Ofgem have consulted on the creation of the **Future System Operator** which will provide the necessary strategic planning across our electricity and gas networks, ensuring optimal investment in the system infrastructure.<sup>4</sup>

## **What can be done to incentivise investment in grid flexibility, in particular**

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<sup>1</sup> RIIO stands for Revenue = Incentives + Innovation + Outputs

<sup>2</sup> <https://www.westernpower.co.uk/net-zero-south-wales-project>

<sup>3</sup> The analysis produced a set of joint electricity and gas Net Zero 2050 scenarios covering WPD and Wales & West Utilities' shared distribution network region in South Wales, and explores a range of

<sup>4</sup> Depending on the date of submission, we may have published our consultation response.

## **vehicle to grid technology and ‘smart’ charging?**

In July 2021, Government and Ofgem jointly published the Smart Systems and Flexibility Plan. The Plan outlines a range of actions to reform flexibility markets, remove barriers and increase participation of flexibility providers. This will ensure flexibility technologies are properly valued for the services they provide to the system - including as a cost-effective alternative to conventional network reinforcement.

Government and Ofgem will work with the System Operator and Distribution Network Operators (DNOs) to deliver open, transparent, accessible and efficient markets, and increase co-ordination across transmission and distribution networks. This will facilitate routes to market and revenue streams for low carbon flexibility providers. In particular, we expect DNOs to support the growth of local markets and encourage the use of local flexibility as alternatives to network reinforcement.

Alongside this, Government will continue to support innovation and engage with industry to help facilitate more opportunities for low carbon flexibility to provide additional network capacity and participate in network management services. For example, electricity storage can act as a source of demand to alleviate constraints, deferring or avoiding the need for costly network build. In addition, smart technologies providing Demand Side Response (DSR) can shift consumer load away from peak periods of network constraints, resulting in less expensive and carbon intensive generation and network capacity to meet periods of high demand.

### *Smart Charging*

The UK Government has made into law the Electric Vehicle (Smart Charge Point) Regulations 2021. These regulations will require all charge points sold in Great Britain for charging cars and vans privately (either in a domestic or workplace setting) to have smart capability, as well as other device level requirements, such as ability to respond to external demand side response signals and meet cybersecurity standards. We aim to consult in 2022 on further measures necessary to unlock the potential of smart charging – and flexibility from other consumer devices, such as heat pumps – in a way that protects both consumers and the energy system. By raising the capabilities of the devices they sell, these regulations will incentivise the domestic charge point industry to invest in their consumer offers for smart charging and in their offers for grid flexibility services for network operators.

Some distribution networks, like UK Power Networks, are also undertaking innovation projects to understand how energy suppliers and other market operators can effectively offer flexibility services to the grid.

### *Vehicle to grid technology*

Vehicle-to-Grid, also known as Vehicle-to-X (V2X, where X could represent the home,

a building or the grid), is an emerging technology enabling the export of energy from an Electric Vehicle battery. The UK is a leader in such bi-directional Electric Vehicle charging with trials involving hundreds of vehicles, but the technology is not yet at mass deployment.

Studies suggest that in future V2X could offer substantial amounts of flexibility to the Great Britain electricity system. One estimate of Vehicle-to-Grid (V2G) from the National Grid Future Energy Scenarios (2021) suggests that by 2050, V2G could offer between 8-39 GW of flexible load (representing 7 – 17 % of total flexibility in the modelling scenarios).

To incentivise businesses to investigate this technology, the UK has funded innovation projects that have positioned us as a world-leader in this field: a £30m funding programme launched in 2017 by BEIS and the Office for Zero Emission Vehicles (OZEV) has supported a diverse range of V2G innovation projects, including the largest demonstration of V2G in homes. The two Welsh DNOs were not directly involved in this programme; however Western Power Distribution has gained experience in a separate "Electric Nation" V2G project which includes consumers in South Wales, funded through the Network Innovation Allowance as part of the RIIO price control.

In July 2021, BEIS published a Call for Evidence on the "Role of Vehicle-to-X energy technologies in a Net Zero energy system", seeking views on the potential role of V2X, and the barriers preventing this. The Call for Evidence closed in October and feedback from it will help inform Government's next steps to facilitate this source of flexibility. BEIS intend to publish a response this year.

Following the V2G innovation programme and the V2X Call for Evidence, a new £11.4m V2X innovation programme has been launched for applications on 24 March. This will involve development and demonstration of technologies and business models to address key challenges to the wider rollout of V2X, including the current high cost as compared to one-directional charging, the limited range of compatible vehicles, and the lack of viable business models for a wide range of consumers. The first phase will begin in September 2022, and the programme will run until 2025.

### **What should be done to ensure that the grid, particularly in rural areas, can cope with the extra demand that will be generated from the transition to electric vehicles?**

We recognise that the nature of electricity distribution networks in rural areas can make connections more challenging, for example distance from substations and available network capacity can mean higher connection costs and longer connection timescales.

Whilst the final determinations have not yet been published, the RIIO-ED2 price control (2023 – 2028) is expected to incentivise Distribution Network Operators

(DNOs) to model future demand and invest in their networks ahead of need to meet this demand. This includes forecasting the uptake of EVs by households and businesses. DNOs are expected to have greater flexibility to invest in rural areas through dynamic Uncertainty Mechanisms, which will allow them to respond to less predictable growth.

DNOs will also be planning strategic reinforcements for areas off the gas grid, in anticipation of the uptake of heat pumps to replace oil boilers. As these areas are rurally located, synergies are likely to arise in network preparedness for heat pumps and EVs. In addition, Ofgem incentivises the DNOs to continually improve their connection processes, which will benefit rural customers.

As part of its Access and Forward-Looking Charges Review, Ofgem has published a minded-to position proposing to significantly reduce some of the costs for customers making new connections to the distribution network.<sup>5</sup> This would mean a larger proportion of the cost of new or upgraded connections being socialised across all billpayers in a DNO's region. This may be particularly helpful for rural businesses with EV fleets looking to ramp up on-site charging capacity, who would otherwise have to pay for costly reinforcements associated with their connection.

### **What level of anticipatory investment in grid capacity is required by the UK Government in order to ensure that Wales can deliver its decarbonisation roadmap?**

Network regulation, including agreeing anticipatory investment in the network is the responsibility of Ofgem, as the independent economic energy regulator. Ofgem uses the RIIO price control framework to incentivise electricity network companies to invest in their networks so that there is sufficient network capacity to allow for generation and demand on that network. Anticipatory investment will play a key role in ensuring network readiness for Net Zero, as all potential paths to Net Zero are factored into such investment, allowing for future flexibility to achieve our 2050 goal.

When business planning, network companies set out investment forecasts that are based on their predicted network needs. Ofgem will evaluate and agree baseline spend, as well as providing conditional funding in the form of Uncertainty Mechanisms (UMs) which can be relied on throughout the price control period. UMs allow for strategic interventions when the case for investment becomes stronger. For example, Ofgem have provided a 'Net Zero Re-opener' UM in the RIIO Electricity Transmission 2 (T2) price control which runs between 2021 and 2026. The net zero-reopener enables Ofgem to reset allowances and other elements of RIIO in order to align the price control with net zero targets, for example changes in Government policy, the role of network companies, or where technological or market developments occur, and it may be necessary to make adjustments. A similar mechanism is being proposed by Ofgem for the upcoming Electricity Distribution (ED2) price control to run between 2023 and 2028.

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<sup>5</sup> Final decision may be published before this brief has been submitted.

We are supportive of Ofgem in their work to ensure electricity networks across Great Britain, including in Wales, are ready to meet net zero. Ofgem and the UK Government meet regularly to discuss how the price control fits into the wider net zero policy space. For example, Secretary of State Kwarteng (when in his former role of Minister of State for Business, Energy and Clean Growth) wrote to Jonathan Brearley, CEO of Ofgem, in October 2020 outlining Government's overall priorities for the future of the electricity system. This includes a statement of support for appropriate anticipatory investment within the price control processes.

The Government's forthcoming Energy Security Strategy will highlight the drive for energy independence that complements our net zero ambitions and how that will directly impact our grid and networks, specifically an increase in the speed of delivery for renewable and nuclear generation.

The Government also intends to consult on a Strategy and Policy Statement for Ofgem in the coming months. This document will set out the Government's strategic priorities for energy policy; the outcomes the Government seeks to achieve; and give clarity on the roles of Government, Ofgem and other parties which are collectively responsible for delivering these goals. Ofgem will retain its independence, but the Strategy and Policy Statement is intended to create a framework for Ofgem's decision making that allows the regulator to protect consumers and achieve net zero. This is necessary given the transformation that will be required to meet the demands of a decarbonised power sector, to increase capacity as electrification increases demand, and to direct investment appropriately to meet these needs.

### **How can the UK Government, the Welsh Government and Ofgem work together to improve grid capacity?**

Government recognises and will support the significant renewable energy generation opportunities available in Wales. Whilst recognising that Ofgem is responsible for network regulation, we would encourage the Welsh Government to work with the UK Government and Ofgem to help improve grid capacity in Wales and across Great Britain to pave the way for net zero. An example of where this is already happening is the Net Zero Advisory Group where Ofgem, the UK Government, Devolved Administrations, and a few other key stakeholders work together to ensure greater coordination in consideration of decarbonisation pathways, including on electric vehicles, electrification of heat, coordination of offshore transmission, innovation and financing of anticipatory investment in networks to enable these changes.

Another example of cooperation is the Government and Ofgem's Offshore Transmission Network Review. This review is examining how offshore wind and electricity interconnectors can be connected to the transmission grid in a more coordinated way to enable the increase in offshore wind deployment while reducing costs for consumers and minimising impacts on local communities and the

environment. The review has brought together stakeholders involved in the timing, siting, design, and delivery of offshore wind, including the Welsh Government who are a key partner of the review.

One key outcome of the review includes the Holistic Network Design (HND). This is being produced by the National Grid Electricity System Operator to help coordinate the delivery of the onshore and offshore grid infrastructure for projects within the Round 4 Offshore leasing process which includes projects off the coast of Wales. The HND will be published in June, and we are expecting a series of decisions and announcements in the second half of 2022 as the review shifts to begin implementing the necessary reforms. The HND will also include an initial design accounting for the expected Celtic Sea volumes. A further iteration to the HND will likely be needed to incorporate the outcome of the Celtic Sea leasing round once known.

Government continues to engage with Ofgem, transmission and distribution network operators to ensure that Great Britain policy supports the crucial role of electricity networks in power sector decarbonisation and the wider net zero transition.

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