Electricity Supply Resilience

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10 May 2023

SP ENERGY NETWORKS

The Changing Network Energy Landscape

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Decarbonisation

The demand and generation we need to accommodate on the **transmission** and **distribution** network is significantly increasing.

Decentralisation

The **ESO** & **DSO** is increasingly dependent on services from distribution-connected providers (DER) as their needs for services increase.

Digitalisation

Our **substations** and **assets** are becoming smarter and more digital – with **customers** also becoming more engaged through smart technology.

Net Zero means **transmission** and **distribution** networks need to think and act differently…

Facilitating Net Zero…

Double peak demand by 2050.

Five times distributed generation by 2050.

Five times B6 Scotland to England transfer by 2035.

Digitalisation >14,000 new LV monitoring devices

>120 GW Contracted Battery Applications

Climate Change is increasing severe weather events, as seen Winter 21/22

We will facilitate our customers transition to Net Zero through new technologies

But we must not compromise **Transmission** and **Distribution** resilience …

Managing System Resilience

Managing **System Resilience** is more complex than ever as greater levels of **generation**, **storage** and **LCTs** connect – requiring **advanced planning, design and dynamic network operation**.

Evolution in Transmission and Low Voltage Networks

- *Our Transmission network has ca. **5GW of renewable generation** currently connected and **delivers bulk transfer** to England & Wales.*
- *SPEN will connect **1.6m EVs** and **1m Heat Pumps** by **2030**, and we are installing widescale **LV monitoring** to measure **demand/voltage changes**.*

Flexibility & Active Network Management

- *We are now using **flexibility**[1] **contracts** to manage constraints at **>1,400 locations** in favour of conventional build solutions.*
- *We are deploying **22 Constraint Management Zones** with dynamic **Active Network Management.***

Significant Battery Connection Applications

- *122GW (~2x UK Peak Demand) are already contracted, **saturating** available **network capacity** with **>70% of GSPs** now constrained.*
- *Batteries **must connect where they are needed** to support constraints, not where they compromise security.*

We must maintain **security of supply** as networks become more dynamic.

1 – Where we contract with connected customers to increase/reduce their demand/generation at times of network congestion to ameliorate constraints.

Managing Network Resilience

Our **underlying network asset infrastructure** is becoming **more critical** than ever as we facilitate Net Zero – assets are **working harder than ever before** to provide vital societal benefit.

Network Asset Health

- *Typical network asset turnover is ~2% p.a. Meaning 98% of our assets age & deteriorate each year.*
- ***Despite this we are reducing deterioration by 5x[1] through risk-optimised investment.***

Network Physical Resilience

- ***We are developing improved industry resilience standards -*** *including for 'abnormal weather'[2].*
- *These standards improve resilience against* ***flooding, vegetation, and unauthorised entry.***

Electricity System Restoration

- *Recovery from a* ***full or partial loss*** *of the UK electricity system.*
- *Our* ***Distributed Re-Start*** *project is trialling the use of* ***DG*** *to recover the* ***Transmission system*** *from a Black Start event.*

Distributed ReStart

We are investing to increase Network resilience of our assets and supporting infrastructure

1 – Compared to ED1

2 – Through the Electricity Network Association we are reviewing the Severe Weather Resilience standards (ETR 132) following learning from recent Winters.

Managing **Emerging and External Threats**

In addition to increasing **challenges to System Resilience** and the increased **criticality of Network Resilience** – we must also manage **new and emerging threats.**

Climate Change

- *Our **Climate Resilience Strategy** has identified **longer vegetation growth seasons**, **greater flooding risk**, and **harsher operating temperatures**.*
- *We are using **satellite imaging** to **map climate impact** on assets to target resilience investment.*
- *Working with industry to develop **enhanced resilience specifications**.*

Severe Weather

- *Our **Storm Arwen** restoration times were half that of other affected DNOs. **98% of SPEN customers** were **on within 48 hours**.*
- *Storms are likely to occur more frequently with potentially **greater consequences**, as seen in Winter 21/22 (**7 major storms Nov-Feb**)*

Cyber Resilience

- *Greater digitalisation means **more reliance** on cyber infrastructure at Transmission and Distribution.*
- *We follow National Infrastructure Strategy (**NIS**) and National Cyber Security Centre (**NCSC**) Cyber Assessment Framework (**CAF**) guidance.*

We are investing >£4.4bn in RIIO-ED2 and RIIO-T2 to maintain and enhance grid resilience

Rural Community Resilience

Rural communities are often home to more vulnerable customers – who are increasingly reliant on electricity.

Electricity system resilience, Network operational resilience and community resilience should be considered holistically.

System Resilience - current guidance limits the use of secondary (N-1) supplies to rural communities. *We should be funded to provide alternative routes for power supply*

Operational contingency planning; *strategies to restore supplies quickly and manage emergencies centrally.*

Network Resilience and applying enhanced build standards. *We are helping to define more resilient industry requirements incl. for severe weather as a member of Electricity Network Association*

Communities should establish a dedicated community hub – town hall, church, school etc. *To co-ordinate; Generators / Battery banks Medicine, Hot food, Emergency resource coordination, water, phone charging etc.*

Communities can become isolated if access roads are blocked and/or communication masts lose power - this can also delay power restoration.

Phone masts need uninterruptable power supplies

Our operational resilience role extends to providing temporary power supplies. *We are evaluating large portable batteries as an alternative to conventional diesel generation*

Losing power in Net Zero means no heating, no transport, and no internet / communication.