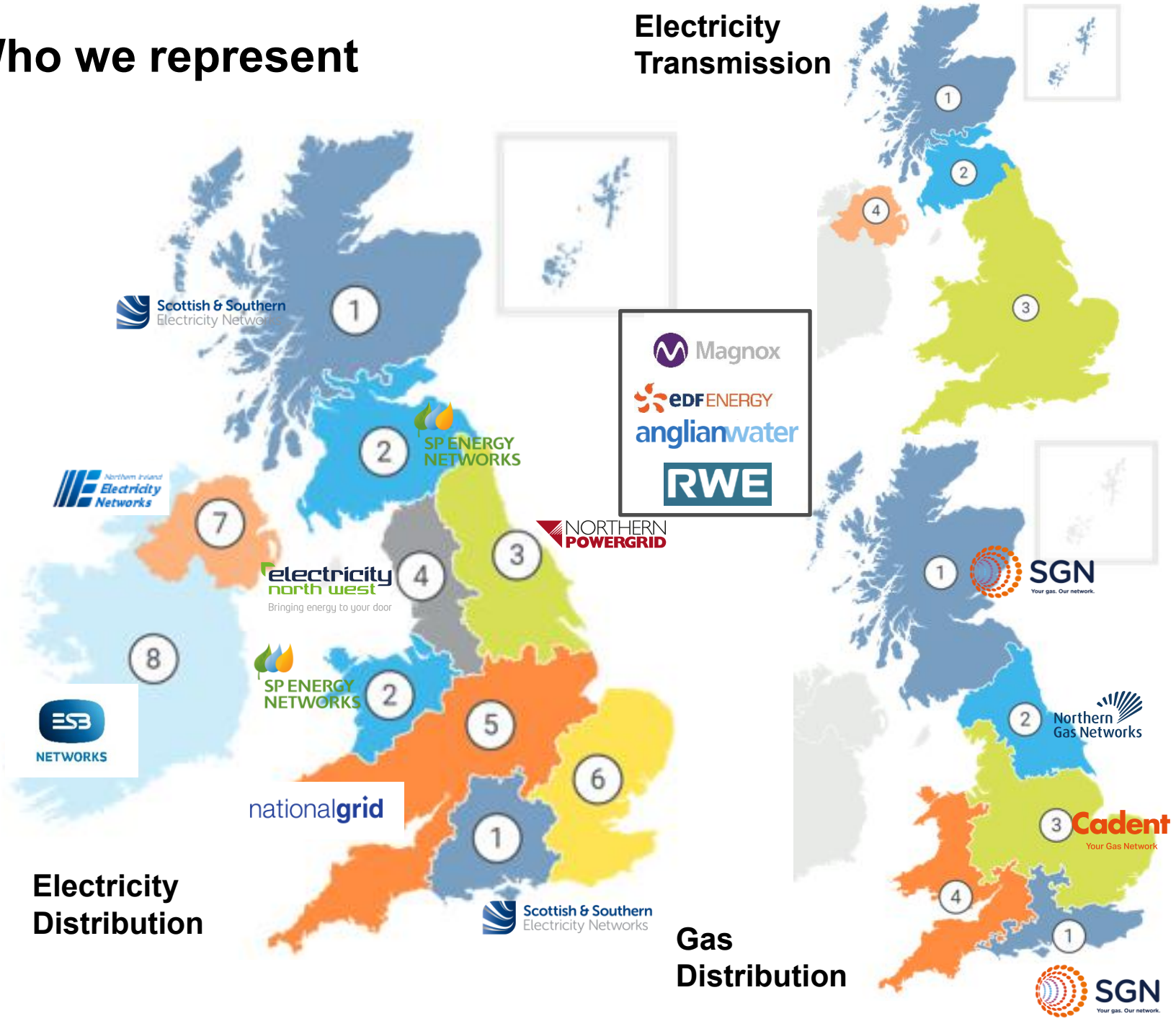
UKSPF: Enhanced Operational Telecommunications (OT) and the Energy Transition

The Energy Transition & Spectrum Access

joint radio company

jrc

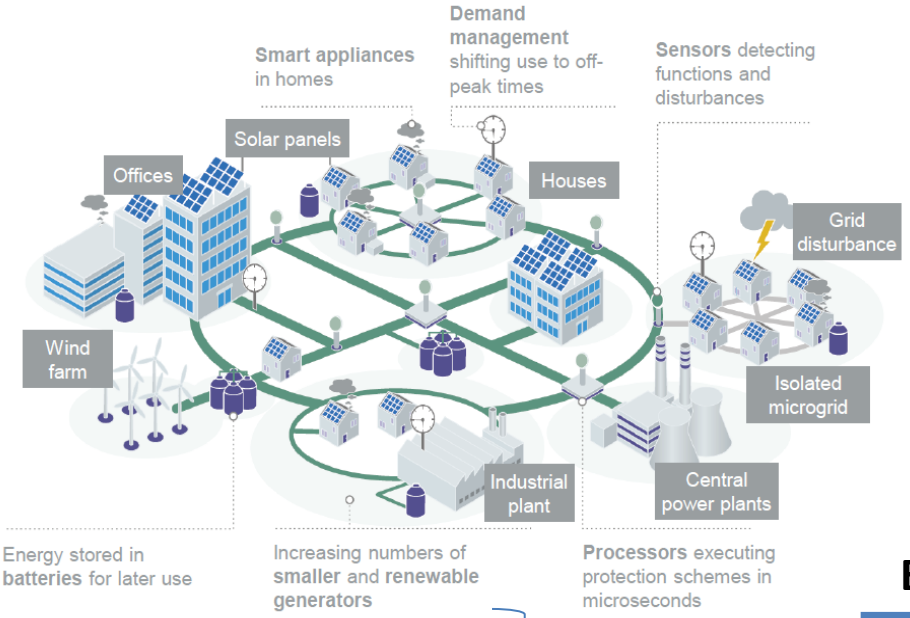
Who we represent



The Role of Enhanced Operational Control,

Enabling the Net Zero Transition

"Active" – Dynamic



Transmission
DERs
Prosumer

} Smart Grid

- Limited Large generation – Extensive Local Generation + Storage
- Focus on balancing demand and availability through the transition to embedded generation and alternative gases

Increased Visibility & Control

- Facilitate Demand Side Response at scale
- Deliver increased embedded generation
- Key enabler of Electricity System Restoration
- Avoid unnecessary passive investment
- Allows operators to exploit the invested capital
- Facilitates fault response and improves resilience to weather events
- Subject to increased resilience

E3C Storm Arwen Report

R4	Energy Network Operators should continue to engage with DCMS and Ofcom to secure the utility spectrum so that the energy sector can develop its own resilient data / voice networks in the future	STTG	31 Dec. 2023

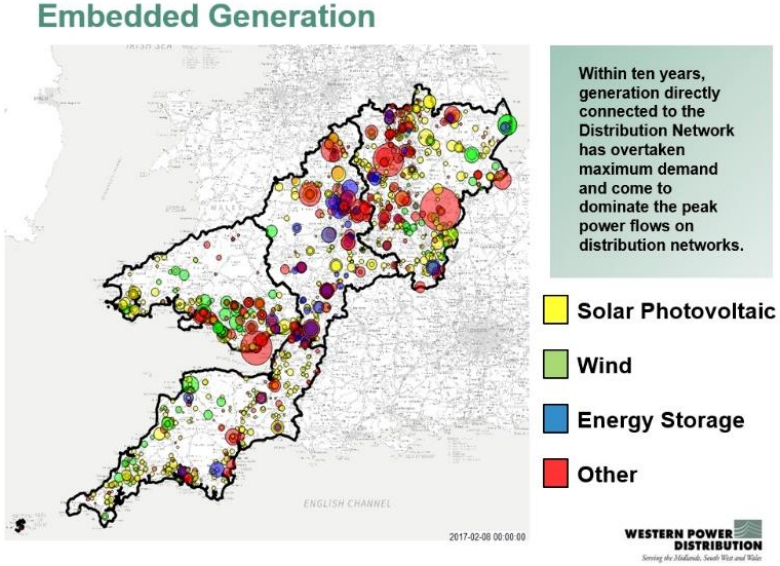
What are the challenges to the UK energy system?

UK energy system, demands and risks are rapidly changing

- Distributed generation largely replacing centralised baseload

> *"Managing a network with 10% renewables is very different to 90%"*

- Forecasted four-fold increase in electricity demand:
  - EVs and heat
  - Transition to hydrogen
- Increased frequency of adverse weather events
- Elevated risk of cyber attack



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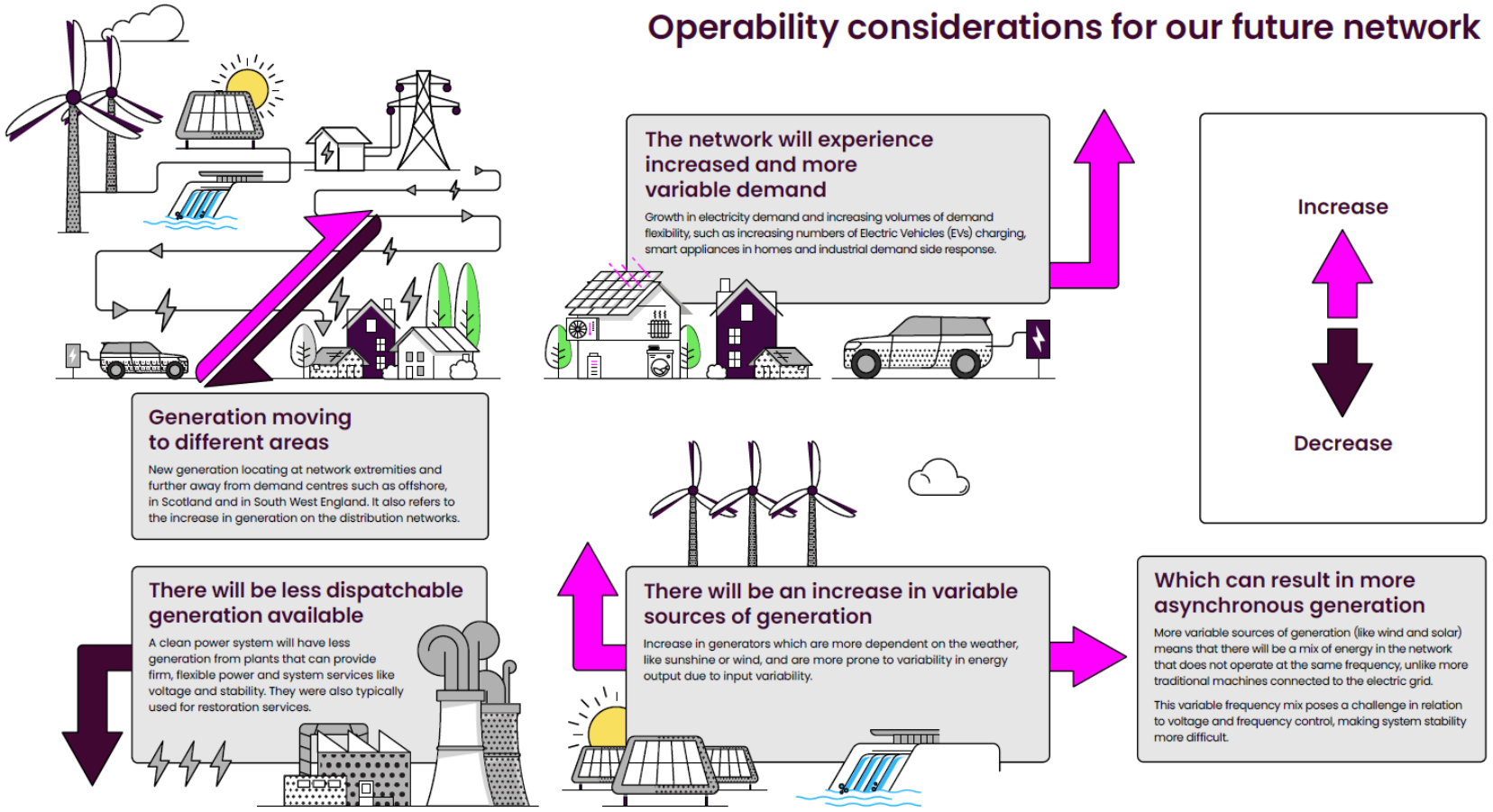
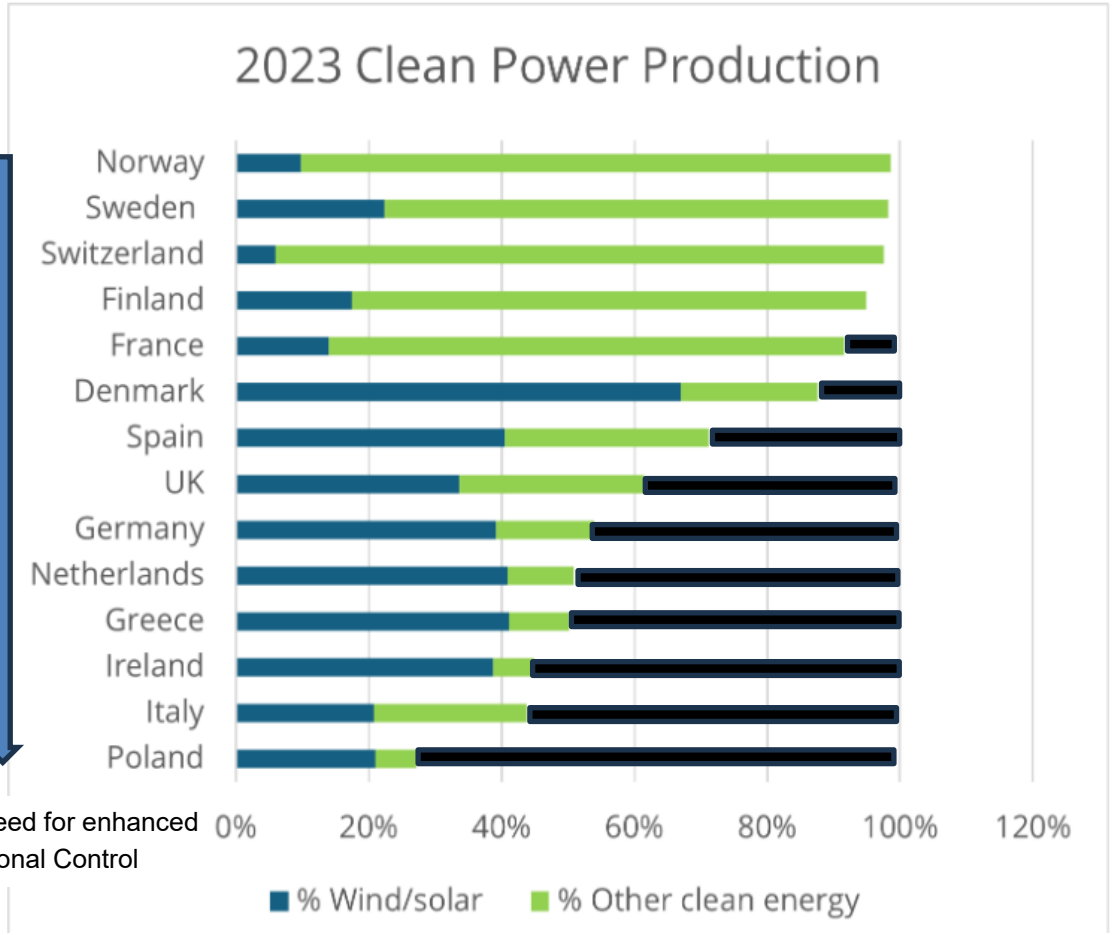
Clean Power 2030 – The System Operability Challenge



Clean Power 2030 Plan = Renewable Energy

Increasing the need for Enhanced Operational Control

Figure 4: Clean power as % of electricity production (2023) and change from 2022[1]



Country	% Change (22-23)
Norway	0%
Sweden	0%
Switzerland	0%
Finland	6%
France	4%
Denmark	6%
Spain	8%
UK	5%
Germany	3%
Netherlands	7%
Greece	7%
Ireland	6%
Italy	8%
Poland	6%

Increasing need for enhanced Operational Control

https://www.r-e-a.net/wp-content/uploads/2024/11/REA-ETRI-2024-full.pdf

What are the benefits of a smarter energy system?

Reduced costs, enhanced resilience, and minimised carbon emissions

- Increased system visibility and control will:
  - Facilitate Demand Side Response at scale
  - Deliver increased embedded generation
  - Key enabler of Electricity System Restoration
  - Avoid unnecessary passive investment
  - Allows operators to exploit invested capital
  - Facilitates fault response and improves resilience to weather events
  - Increased overall system resilience and efficiency
- Benefits to UK networks, Government and consumers
  - Estimated £12.7 billion saving to UK PLC, while accelerating growth of the low carbon economy
- Enhanced operational communications will be essential to delivering a smarter, lower cost, more resilient, decarbonised energy system

Policy Developments: Ofcom's CFI – November 2023 Update

Focus on sub1-GHz options

Our discussions with government indicate that it is committed to supporting a system that is fit for the future needs of the smart grid. Before making a decision on how to move forward, it is looking at the costs of all options to ensure value for money for energy consumers.

We continue to work closely with government to support its net zero goals.

We received 36 responses to our call for input (one confidential) from stakeholders representing the energy and water sectors, infrastructure providers, public bodies, equipment manufacturers, mobile network operators, and incumbent spectrum users from the PMSE and business radio communities.

- *Stakeholders widely supported a **focus on sub 1 GHz** candidate bands **which facilitate early deployment.***
- *The bands favoured by respondents if spectrum was required in the next few years were the **400 MHz and 700 MHz bands in Northern Ireland**, and the **700 MHz band in Great Britain.***

We will provide a further update on our next steps in due course, including any plans to consult on specific proposals should access to new spectrum be required to support a private network. We are continuing work to confirm the suitability of these bands for use by the utilities sector. In light of information provided in CFI responses, we also intend to further consider the longer-term trends relating to the use of the 450 MHz band in the UK, taking account of the requirements of existing and potential future users.

Policy Developments – NIC Report, Key Relevant Observations

Report published 18 October 2023, [report here](#).

- **Smart Systems and Lower Costs;** *Smart systems will be essential to meet targets for energy decarbonisation enabling the energy sector to reduce the costs of the network through the emergence of a smaller grid, and allowing smart grids to balance electricity supply and demand in real time as far more assets are connected.*
- **Digitising Infrastructure;** *The potential benefits of digitising infrastructure sectors are substantial but delivering the necessary digital infrastructure will take significant time and investment to achieve.*
- **Benefits of Sharing;** *The government should consider the potential for different sectors to share telecoms infrastructure. If dedicated networks are required – for example due to the need for higher resilience requirements – there may be significant benefits from infrastructure sectors sharing networks, including reduced costs and more efficient use of spectrum.*
- **Government Responsibilities;** *It is essential that responsibilities within government are clear. Departments with responsibilities for each infrastructure sector should determine the connectivity and resilience needs of those sectors and work with their sectors to ensure those needs are met. The department responsible for digital infrastructure (currently the Department for Science, Innovation and Technology) has a clear role to join up these policies and to consider opportunities for infrastructure sharing across sectors.*

***Recommendation 27**: Government should identify the specific telecommunications needs of the energy, water and transport sectors and **ensure that infrastructure is delivered to meet these by, at the latest, 2030 for the energy and water sectors** and 2035 for the road and rail sectors. **Strategies for how this will be achieved must be set out by the end of 2025 for energy and water** and by the end of 2026 for road and rail, including:*

- *the most cost-effective network deployment models, and the extent to which infrastructure can be shared between different sectors*
- *a spectrum authorisation approach that ensures access to adequate spectrum, whether dedicated national bands or shared spectrum for infrastructure users*
- *clear responsibilities within government for delivering telecoms strategies*
- *consideration of whether dedicated networks and spectrum or upgrades to existing networks can meet specific public policy goals, including consistent and reliable rail passenger connectivity.*

Policy Developments – NIC Report, Electricity Distribution Networks (Feb '25) *here*

Digitalisation will be key to enabling 'smarter' networks

- Digitalisation of the network will be key to enabling flexibility, including that required for Clean Power 2030. A smart energy system will be able to respond to real time communications. With greater digital capability and more monitoring of the networks' condition, system operators can understand and plan their systems more accurately. They should also be able to respond more quickly to changes in network conditions or signals from the wider electricity system – in some cases automatically. Enhancing networks' digital capability will therefore be a key part of the distribution system operators' role.

Recommendation 1 – Government should introduce measures to maximise the use of flexibility across the electricity system, working with the National Energy System Operator and Ofgem to deliver the Low Carbon Flexibility Roadmap by the end of 2025.

This should cover the role of flexibility and digitalisation across all parts of the electricity system, including:

- *working with Ofgem to updating the smart meter rollout plan by the end of 2025, including measures to fix smart meters not currently operating in smart mode*
- *implementing the smart appliance mandate for heat pumps in 2026*
- *working with Ofgem and Elexon to deliver market-wide half hourly settlement by 2027 without further delay*
- *supporting industry to improve flexible asset registration.*

Policy Developments – NIC Report, Electricity Distribution Networks (Feb '25) *here*

Maintaining security of supply will remain a key objective

The security of supply standard for distribution networks is set out in Engineering Recommendation P2/8. This sets out the level of redundancy required for different sized groups of demand.

Better monitoring, greater digital network capability and smart device integration all have the potential to help manage the network and efficiently maintain security of supply. By managing the network more effectively, existing network infrastructure can be more efficiently utilised, reducing the need for further investment.

Recommendation 2 – Government and Ofgem should review security of supply standards for distribution networks to ensure that they are designed for future loads and vulnerable customers are protected.

As part of business planning for the next price control:

- *Ofgem should require distribution network operators to identify 'no regrets' activities that would improve security of supply*
- *government and Ofgem should work with distribution network operators to agree the detailed work required to review security of supply standards and how this will be undertaken.*

The full review of security of supply standards should then be completed by the end of 2028.

NESO Energy Sector Digitalisation Plan.

link here

GAP

Resilient operational telecommunications for energy

Problem statement	As Great Britain's energy system increasingly relies on distributed flexibility, it becomes more dependent on telecommunications systems that facilitate communication between system operators, flexibility providers and distributed energy resources / remote network assets.

Operational telecommunication requirements for a clean power system are changing and therefore telecommunication methods need to have sufficient power autonomy to ensure system integrity.

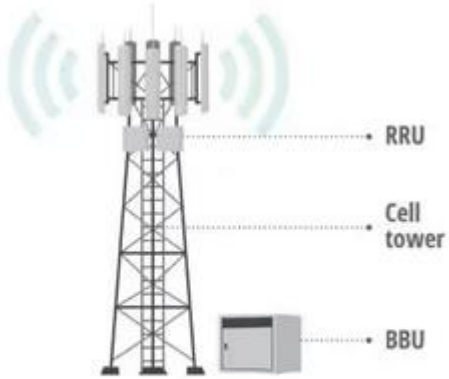
Furthermore, operational communications resilience will become increasingly essential in the context of supporting monitoring of assets at the low voltage level (electric vehicles and heat pumps for instance) and embedded generation.

Ofcom Telecoms Resilience Guidance Consultation, link here

Proposed Power autonomy of Fixed Networks + CFI for Mobile Ran Power Autonomy

Fixed Networks, (Openreach and Virgin Media)

- Power Autonomy of Openreach street cabinets, 4hrs as manufactured;
  - Not subject to maintenance regime so will deteriorate over time
  - Not temperature controlled hence performance is subject to ambient weather conditions
  - When electricity supply to the cabinet fails the connected house will also be off power



Note: RRU = remote radio unit; BBU = baseband unit
Source: Deloitte analysis.
Deloitte Insights | deloitte.com/insights

CFI Mobile Radio Access Network

- Limited existing power autonomy present
- Range of constraints to the deployment of power autonomy to Mobile Sites
  - Physical capacity / space
  - Lack of structural capability, tower or rooftop.
  - Security / Theft / Vandalism
- Ofcom analysis suggests 1hr power autonomy to a subset of Mobile Sites would cost **£0.9 – 1.8bn.**

***Ofcom** recognise that the costs of doing so are likely to be substantial, over £1 billion across the industry for 1 hour backup. These significant indicative costs mean we cannot necessarily conclude that to recommend such a measure in our proposed guidance would be proportionate at this time.*

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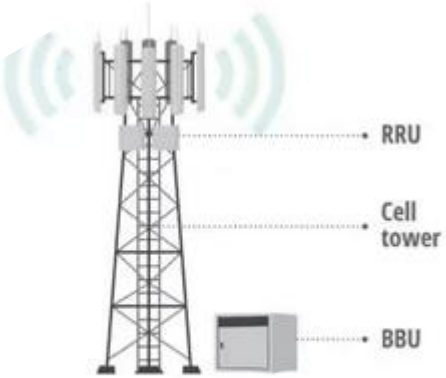
Iberia Peninsular Event
During April's blackout mobile phone operators' batteries provided coverage for a very limited and differing amount of time depending on the operators

CFI Mobile Radio A

- Limited
- Ra of power autonomy



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The OT needs of the Energy Network Operators

Dedicated Spectrum Access for Enhanced Operational Telecommunications

**** "The cost of deploying a Private Radio Frequency network is significantly less than that of a commercial mobile network alternative, whilst the cost of a private fibre network (or public / private hybrid) is uneconomic."***

Independently Reported by Gemserve, Nov. 2021

Economic rationale for enabling Smart Grid functionality of the UK energy system via a Private Radio Frequency-based enhanced Operational Communications Solution

- Secure
- Reliable
- Resilient to power failure
- Full geographical coverage
- Scalable over time
- Adaptable
- Cost effective*

Enabling 'Net-Zero'
Transition from Fossil Fuels to Renewables & Hydrogen