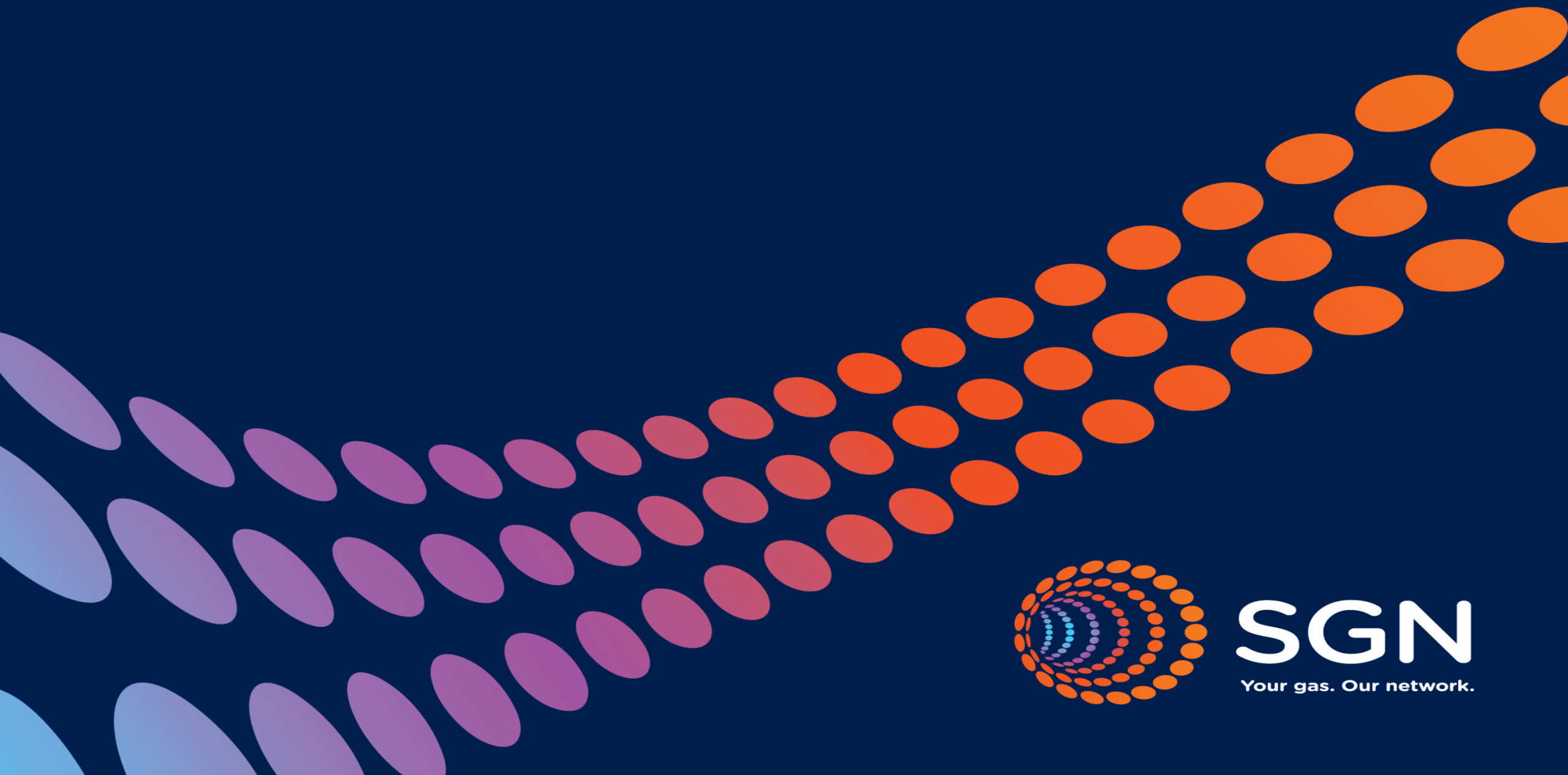
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The SGN Perspective

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Withdrawal of Wholesale Line Rental products

1. What is WLR
2. The UK Gas Industry
3. Where we use PSTN & ISDN
4. The scale of the challenge
5. What happens when it all goes wrong?

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Section 1

What is WLR

What is WLR?

- This is Openreach's project to modernise the UK's phone infrastructure
- Products using copper cables will be withdrawn by December 2025
- No new WLR products sold after 2023
- New digital IP technologies are taking their place
  - Fibre To The Premises
  - Fibre To The Cabinet (SOGEA & SOGFAST)
- 16 million lines and channels will need to move to alternative products
- Covid-19 has not affected Openreach's plans or timescales
- This will impact you

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What is WLR?

- The Gas transmission and distribution networks have evolved together over many years
- They are architected around the use of PSTN services to keep operational and safe
- There are no direct replacement products for many use cases
- The loss of the PSTN creates a commercial, compliance and safety risk to the UK gas system
- Collaborative Trials being carried out at Salisbury and Mildenhall
- Assess potential alternative technologies & providers
- Gas and Electricity working together on a industry wide challenge

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Section 2

The UK Gas Industry

National Transmission System

- Owned by National Grid
- 7,600 km pipelines
- 600 to 1200 mm diameter
- Mostly constructed late ‘60s to early ‘80s
- 25 compressor stations with 44 gas turbines
- 124 offtakes to Distribution Network Operators
- 71 direct offtakes to power stations and industrial users
- 2 LNG importation and storage sites

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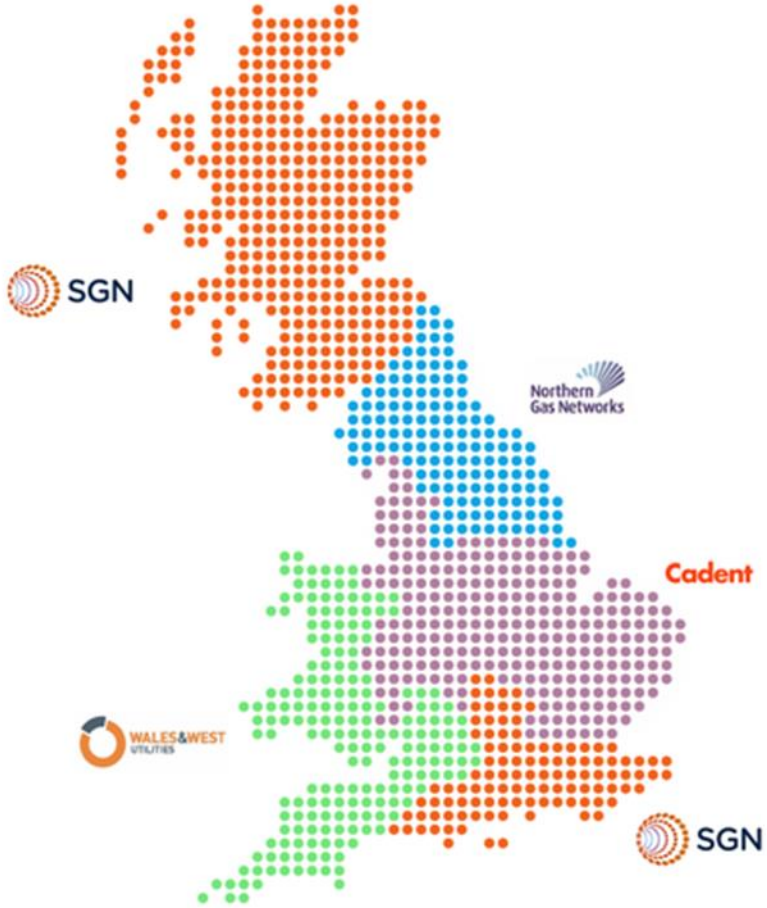
Distribution Networks

- Cadent
- SGN
- Wales & West Utilities
- Northern Gas Networks

Serving over **27 Million** Customers with gas, through >275,000Km of pipe



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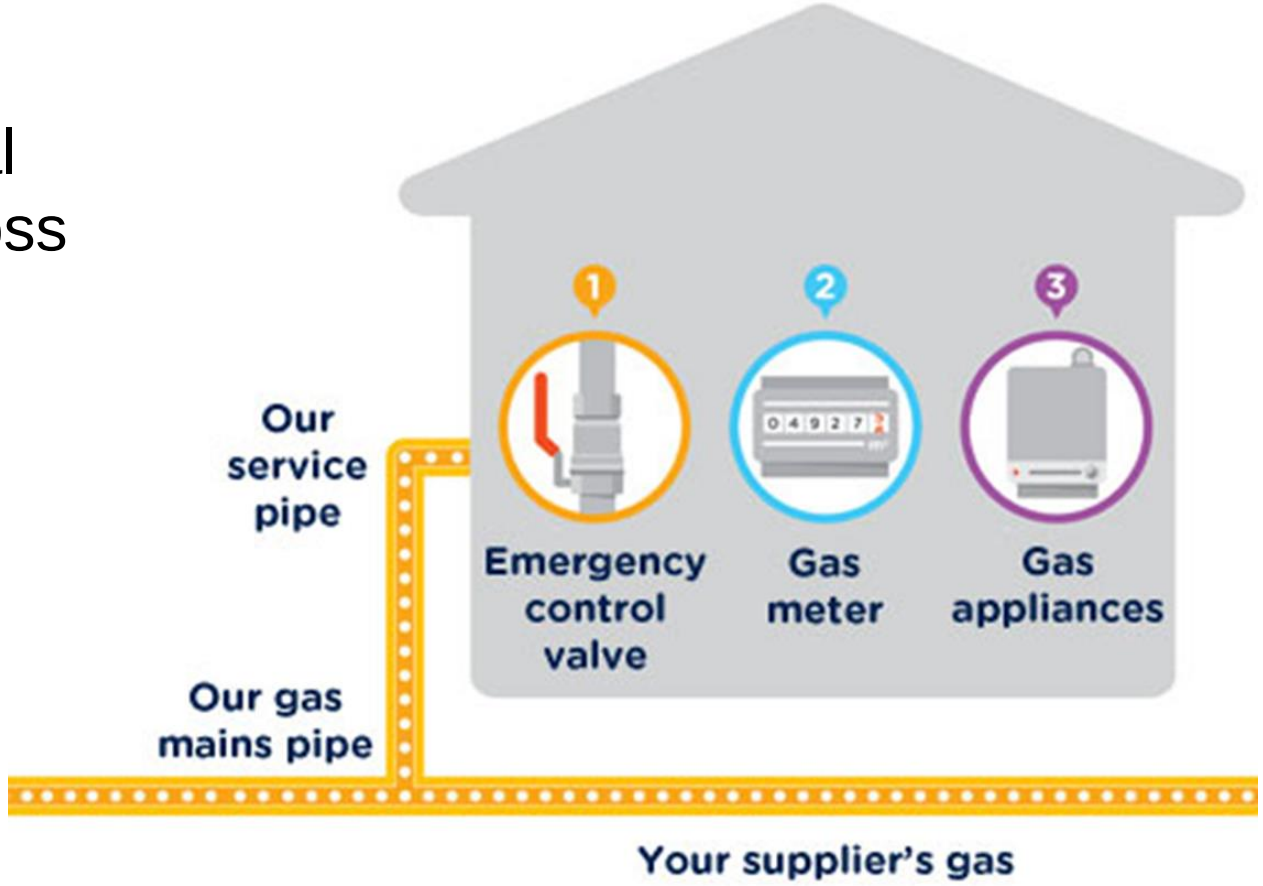
What do GDNs do?

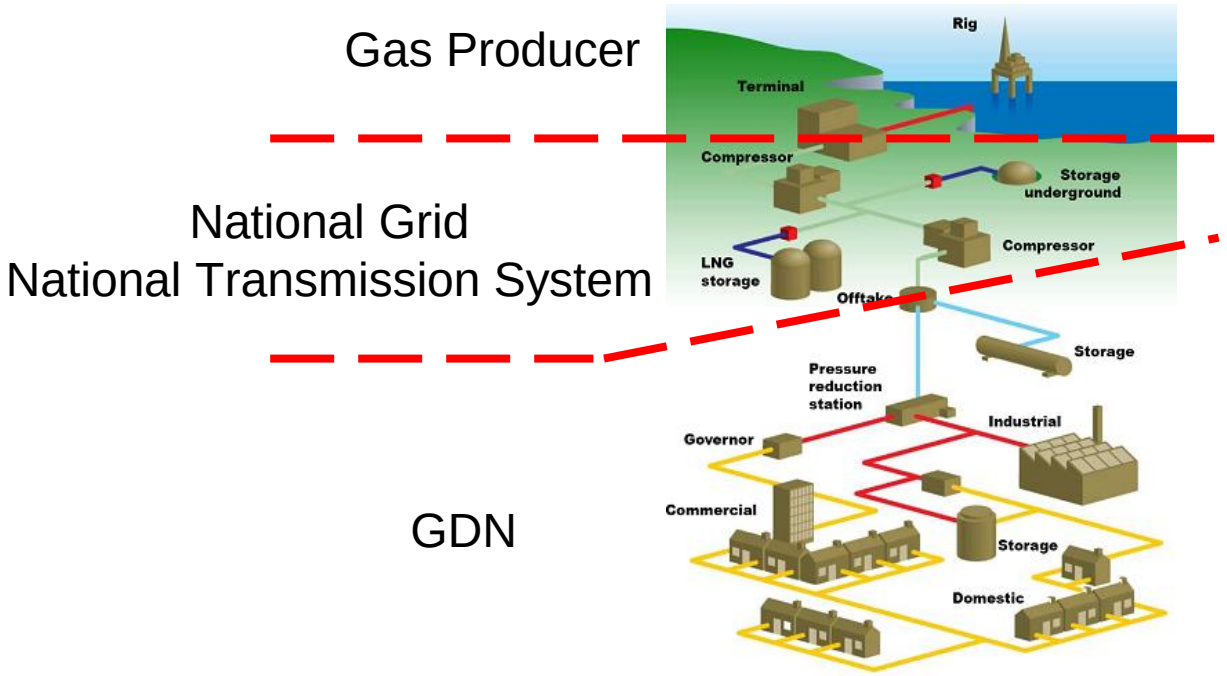
- We own and maintain the pipes that transports gas to residential and commercial properties across the UK up to the emergency control valve

- We Don’t
  - Own the gas
  - Own the meter
  - Service your appliances



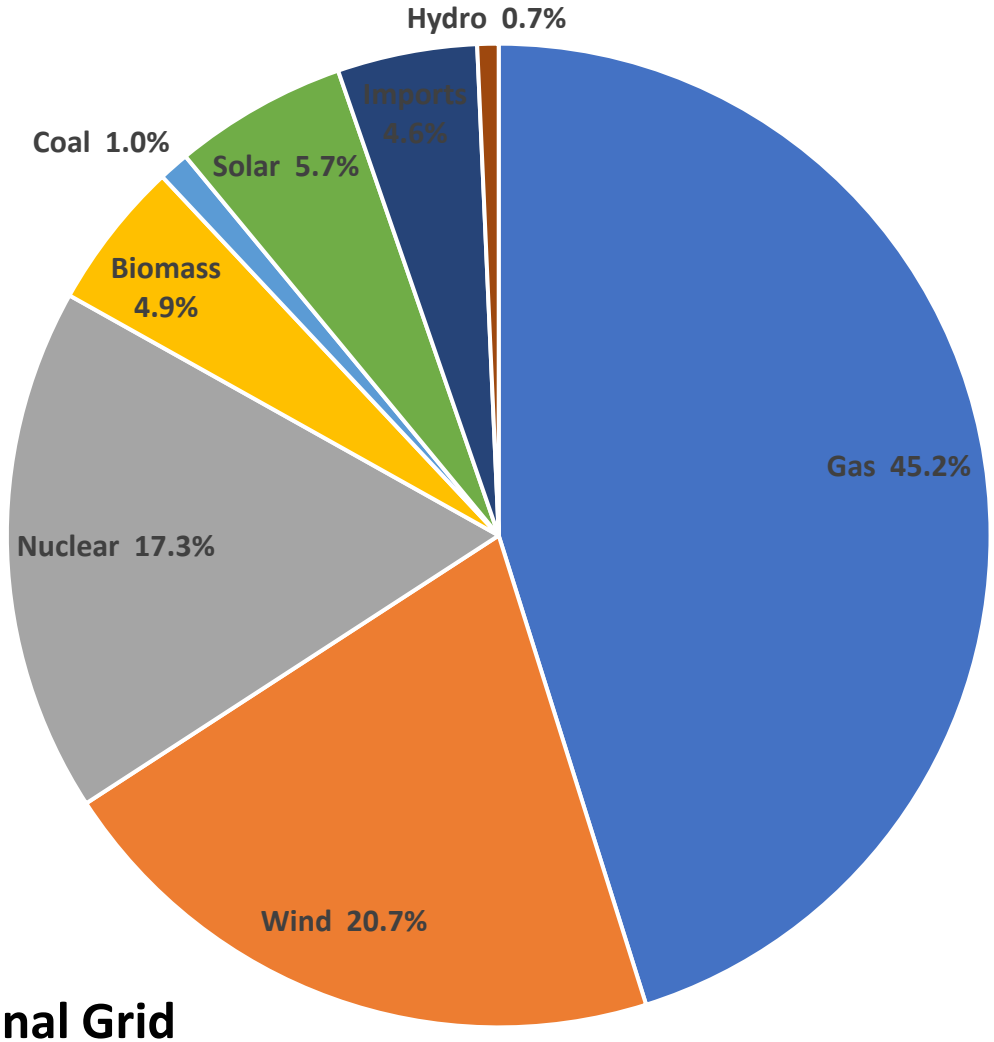
Where do GDNs sit in the process?

- We take gas from the transmission network and store it ready for consumption by consumers
- GDNs must forecast their off-take demand based on historical, environmental and other data that influences gas consumption
- Pressure is managed throughout the gas network by SCADA telemetry to meet demands
- GDNs must ensure that a minimum pressure is available in the low pressure network to avoid service interruption



Electricity by Source

- Gas is not just for cooking and heating your home
- 45% of UK electricity is generated from Gas
- A symbiotic relationship exists between the gas supply and electricity generation



National Grid
September 2020

Section 3

Where we use PSTN & ISDN

>7 bar Telemetry
Strategic gas supply system

- This is the system that delivers data into our SCADA application
- Needed so that we can control Offtakes
- Monitor high pressure systems for faults
- It connects the instrumentation on the (very) remote gas sites to the Control Centre
- Telemetry has slowly evolved over 50 years
- Consists of a mixture of various systems using different types of equipment
- Used to monitor gas quality into SGN's network – ensures that gas is safe to burn
- Vital part of the process used to generate gas bills – Calorific Value

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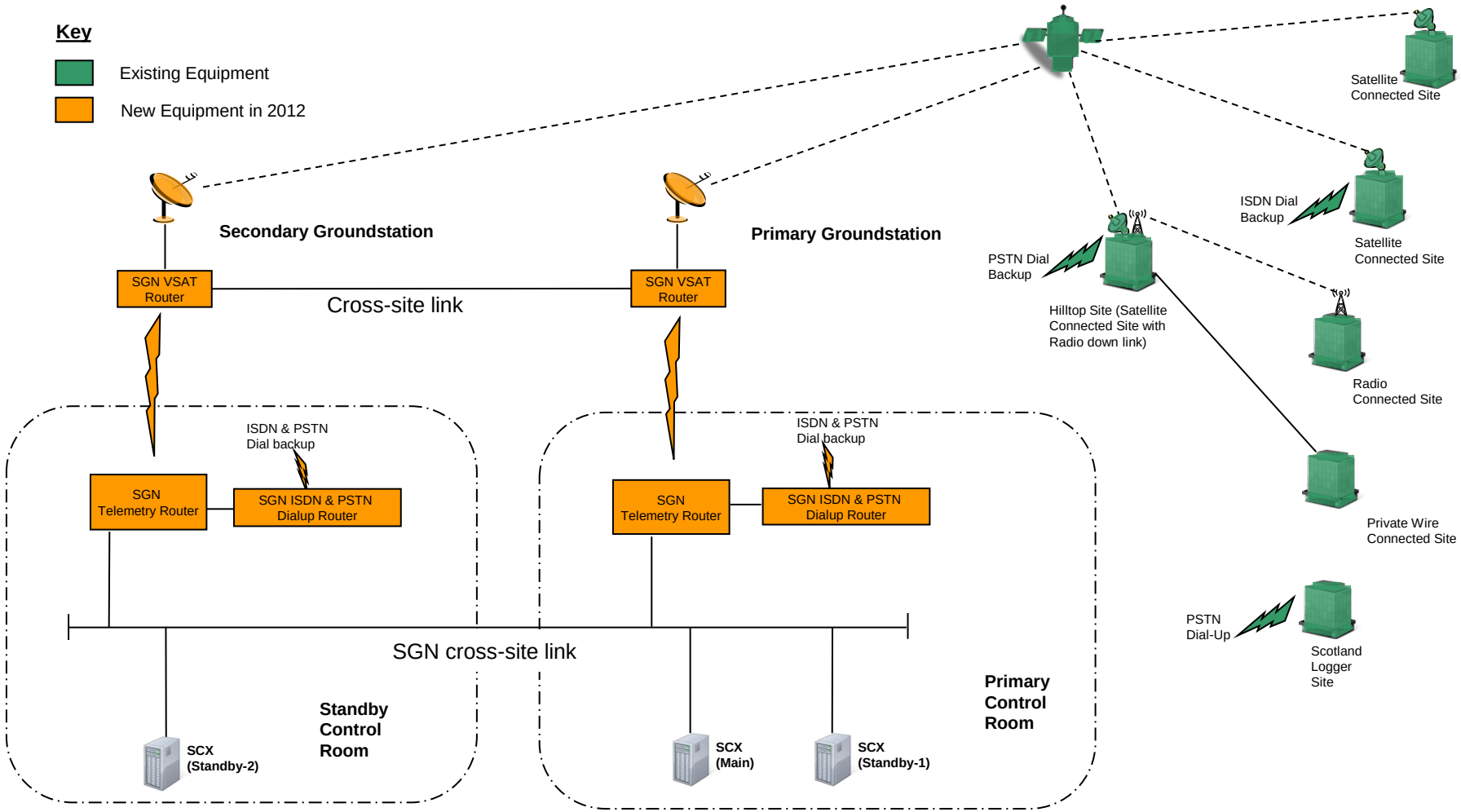
Telemetry


Key
Existing Equipment
New Equipment in 2012
Secondary Groundstation
Primary Groundstation
SGN VSAT Router
Cross-site link
SGN VSAT Router
Satellite Connected Site
ISDN Dial Backup
Satellite Connected Site
PSTN Dial Backup
Hilltop Site (Satellite Connected Site with Radio down link)
Radio Connected Site
ISDN & PSTN Dial backup
SGN Telemetry Router
SGN ISDN & PSTN Dialup Router
ISDN & PSTN Dial backup
SGN Telemetry Router
SGN ISDN & PSTN Dialup Router
Private Wire Connected Site
PSTN Dial-Up
Scotland Logger Site
SGN cross-site link
Standby Control Room
SCX (Standby-2)
SCX (Main)
SCX (Standby-1)
Primary Control Room

>7 bar Telemetry

- This is a typical example of a pressure reduction site
- It reduces pressure from 40 bar to around 2 bar
- There are around 600 of these in SGN
- Most have telemetry via UHF radio or VSAT

<7 bar Telemetry
Local gas supply system

- These are typical examples of our equipment on highway verges.
- They supply gas for delivery to houses, commercial and industrial premises.
- There are around 10,000 of these in SGN
- A large proportion have telemetry via PSTN circuits.

Section 4

The scale of the challenge

Gas telemetry challenges

- Presence of explosive gas, ATEX zone 1 & 2
- Limited availability of electricity at small gas sites
- Extensive use of batteries
- Planning restrictions for solar panels
- Remote nature of gas sites from telephone exchanges
- Physical size limitations
- Extensive sub-ground installs
- Environmental challenges of dust, dirt, water ingress
- Vandalism of conspicuous hardware like antennas and solar panels
- Relatively low concentration of sites
- Wide geographic footprint

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Gas telemetry challenges

- Our asset numbers are modest compared those of electricity industry but they are significant enough to require extensive time to upgrade.
- All changes will require engineering oversight, testing and validation. They will need to follow proper change control to ensure safety. Permits, licenses and planning may need to be acquired if civil works are required.
- Also all of the GDNs will be attempting to complete these works within the same constrained timescales. Drawing on the same small eco systems of suppliers able to perform this work.
- The WLR turn-off approach does not lend itself to a linear programme of work and will impact efficiency and ability for GDNs to hit the required Site-Per-Day conversion rates.

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The scale

• Offtakes	120
• Pressure Regulating Installations	2,400
• District Governors #	20,000
• Hilltops	60
• Low point monitoring #	5,000

- gas sites without mains power supply

NB. These numbers are UK-wide estimates

The challenges

- Hardware development
  - The specialist suppliers are still developing hardware
- Power Supplies
  - Not an issue on big gas sites
  - Huge problem on small road-side kiosks
- Finances
  - The GDNs are regulated by Ofgem
  - Our current regulatory period ends in March 2021
    - So no allowances were included when the period started in 2016
  - Our next regulatory period starts April 2021
    - Draft determination received and funding will be very tight in the next regulatory period.

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The WLR scale in numbers

- From the 1st October 2020 there were:
  - 1917 days until WLR switch off is completed
  - 1200 days until the published UK WLR ‘Stop Sell’
  - 271 days until Salisbury WLR service retirement
  - 117 additional exchange “Stop sells” announced across the UK

The WLR scale in numbers

- 14 Number of site conversations per day required between Oct 1st 2020 and December 31st 2025
- £7000 Estimated per site average migration cost
- £211,500,000* Total estimated migration cost of WLR on GDNs
- >31,500 Estimated man days of effort
- £200,000 – Quoted cost for an ISDN line for a Biogas facility in 2020
- Additional costs will ultimately be borne by the consumer

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Innovation, investigation and action

- GDNs are not passive in the challenge of WLR and continue to investigate pathways to alternative solutions:
  - Continued participation and support of STG activities
  - Creating forums for Openreach to inform and understand challenges
  - Salisbury Trials – GDNs working together with service providers with support from Openreach
  - Questioning service providers about WLR and challenging them for solutions
  - Running Proof of Concepts
  - Trialling new solutions and technologies
- Incumbent suppliers were unaware of WLR and are behind the curve in the delivery of post WLR products

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GDN WLR Challenges #1

The challenges of WLR are not unique to the Gas Distribution Network companies, but there are some constraints that separate us from our Utility friends.

- Gas Distribution GD2 budgets for the next five year pricing control have already been submitted. Draft determinations have been received. Final determinations won't be known until December 2020.
- The inherently explosive nature of gas demands specific controls and excludes the use of some products and technologies available to other utilities.
- Smaller gas facilities, of which there are 000's across the UK, do not have grid power and delivery of grid power is uneconomic or impossible.
- The remote nature of gas facilities hits the distance limitations of xDSL and SOGEA and makes fibre uneconomic.

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GDN WLR Challenges #2

- Removal of the 50vDC available from the PSTN forces reliance on batteries.
- A move to battery power with current WLR replacement technologies will increased the number of site visits to replace batteries.
- The results being increased operational cost, increased environmental impact and increased risk to worker safety.
- Cellular technologies are too power hungry to support the majority of telemetry solutions. Cellular is not considered a viable solution due to limited power resilience at cell towers.
    - SGN innovation testing has shown that batteries and solar panels struggle to satisfy the power requirements of cellular systems at district governors.

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Section 5

What happens when it all goes wrong?

Failure Scenarios

- We use SCADA systems to ensure the efficient and safe delivery of gas through the network.
- Gas Control centres communicate with remote gas facilities via telemetry networks.
- Potential outcomes of poor gas network management are
  - shrinkage (gas loss)
  - risk to supply (disconnections)
  - poor gas quality
  - risk to the environment
  - risk to life

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The End

Any questions ?

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