National Grid Electricity Distribution
Distributed Generation Owner/Operator Forum

Wednesday 1 March
11:00 – 13:00

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regen
transforming energy

Agenda

Independent chairs: Bruce Bardsley, Energy Analyst, Regen

11:00	**Welcome & Introduction** Bruce Bardsley, Regen
11:10	**Update on NGED outages & constraints** **Generation Portal update** Danielle Greedy, Control Support Engineer, NGED
11:25	**Use and monitoring of SF6 within NGED** Geoff Budd, Policy Engineer, NGED
11:45	**Break**
11:55	**Accelerated Loss of Mains Change Programme update** **Access SCR update** Andrew Akani, Primary system design manager, NGED
12:20	**The Ofgem Curtailment Incentive** Joe Davey, DSO Energy Management Centre Engineer, NGED
12:50	**Feedback & Wrap up** Bruce Bardsley, Regen
13:00	**Event End**

Distributed Generation Owner Operator Forum

A regular forum aimed at owner and operators of MW scale generation connected to NGED's network.

An opportunity for DG owner and operators to engage with NGED, contribute towards improved processes and tackle arising issues.

Has been active for 6 years, NGED were one of the first, others now exist for other DNOs.

Topics covered recently:

- Generation Portal and scheduling of works
- Development of Flexible Power services
- The Accelerated Loss of Mains Change Program

Website with past forums:

https://yourpowerfuture.nationalgrid.co.uk/our-engagement-groups/connection-customer-engagement/distributed-generation-owner-operator-forum

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Distributed Generator Owner / Operator Form

1st March 2023

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National Grid Electricity Transmission Outages 2023

All NGET planned outages now in the plan for April 2023 – March 2024.

This includes any outages on the 400/275kV system & some 132kV outages.

Any generator sites that are affected by a transmission system outages will now be able to view these outages on the NGED DG Portal.

National Grid Electricity Distribution Outages 2023

Conventional Outage Season (end of March – end of October).

Current Number of Planned Outages per License Area;

- South West – 680
  South Wales – 549
  East Midlands – 989
  West Midlands – 607

As of 23rd February 2023, we've had 29 customer requested generation site outages for the current outage season.

This has enabled our engineers / technicians to check if any other work is due at these sites / associated circuits and combine these works.

WPD / NGED Email Address Update

All WPD email addresses have now been closed down.

Future queries should be sent to the below email addresses;

South West & Wales	nged.swestwalesgen@nationalgrid.co.uk
East Midlands	nged.eastmidgen@nationalgrid.co.uk
West Midlands	nged.westmidgen@nationalgrid.co.uk

Emails will be picked up by NGED Control Shift Assistants who will deal with it themselves or pass on to relevant person(s).

Any outage specific queries should go to the person responsible for undertaking the works. Their email address will be attached to the outage notification / available to view on the DG Portal under Planned Outage.

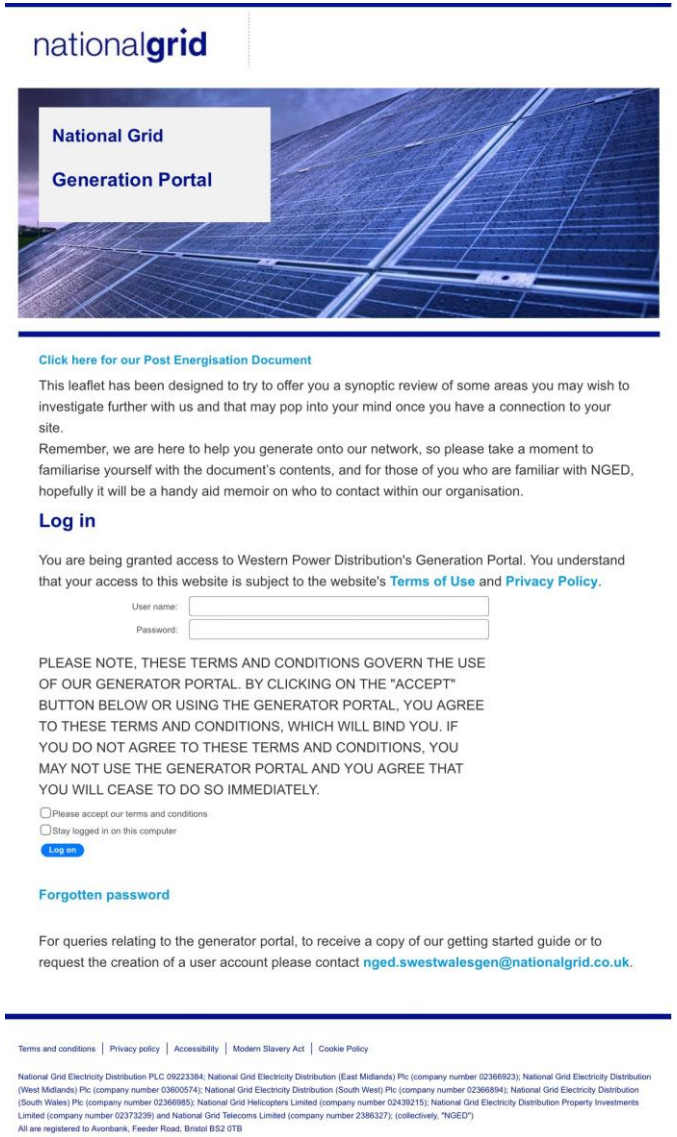
NGED Distributed Generation Portal Updates

Rebranded to NGED in late 2022.

Website:
www.generation.nationalgrid.co.uk

All user account details remain the same.

Any portal related queries to be sent to;
nged.swestwalesgen@nationalgrid.co.uk



NGED DG Portal Update

- Currently portal built on a platform that will no longer be supported from January 2024.
- NGED's web developers planning to start rebuild on new platform from May 2023 with testing to begin October 2023.
- Work is underway to look at incorporating 11kV outages in the new portal.
- Any suggestions to improve / add to the portal welcomed.

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Electricity Distribution

USE OF SF_6 WITHIN NGED (National Grid Electricity Distribution)

Geoff Budd, Policy, Avonbank

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SF_6 Regulations

Sulphur hexaflouride ($SF_{6)}$ has a very high global warming potential:1kg equivalent to 22800kg carbon dioxide

It can be used in electrical switchgear and other equipment as an insulator and arc extinguishing medium. SF_6 gas is an inert, non toxic (except when exposed to an electrical arc), colourless gas which is heavier than air and will not support life at high concentrations.

It's use and availability are controlled by:

- **Fluorinated Gas (FGAS) regulations (2022)**
- **ENA G69 (Guidance on working with Insulation and Interruption Gas (IIG) and gas mixtures in high voltage switchgear of rated voltage up to and including 145 kV)**

NGED is accredited via DEFRA to handle SF_6 and train in its handling

Only Staff with specific written SF_6 authorisations may handle or use SF_6

Obligation under FGAS and G69 for NGED to account for all SF_6 holdings/usage/losses/reporting and to keep leaks to an absolute minimum

Annual declarations to OFGEM/DEFRA of SF_6 amounts held on our network (including in spare), SF_6 lost leading to topping up events, amounts held in cylinders and SF_6 lost from scrapped assets

How SF_6 is used in switchgear

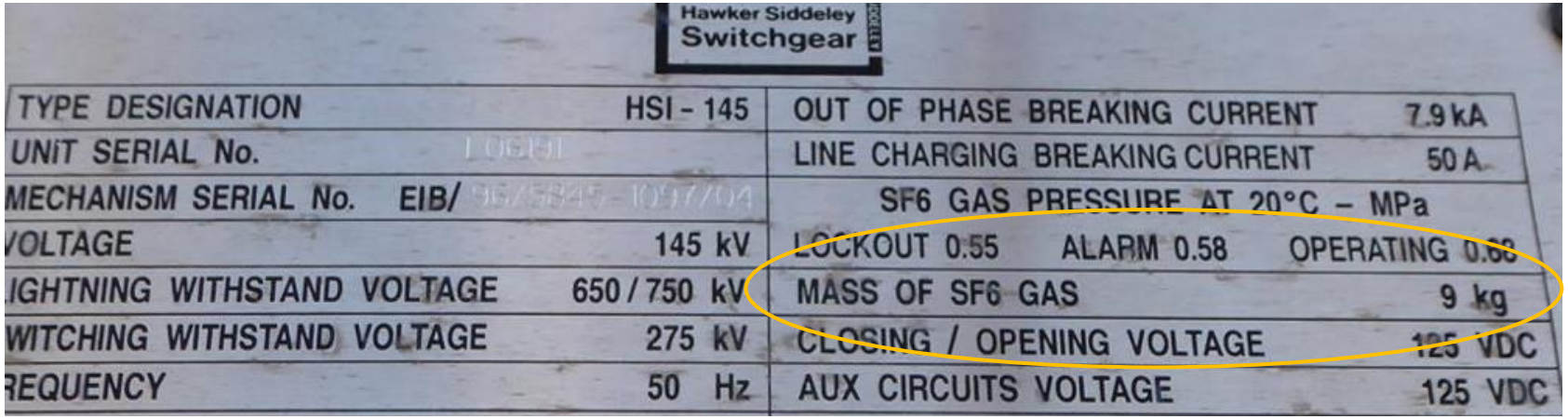
SF_6 has been used as an insulant and to quench electrical arcs in switchgear since late 1960's

Modern SF_6 switchgear should have a warning triangle

that the equipment contains SF6:

After about 2000, the quantity of SF6 within the switchgear

is also indicated on the manufacturer's name-plate

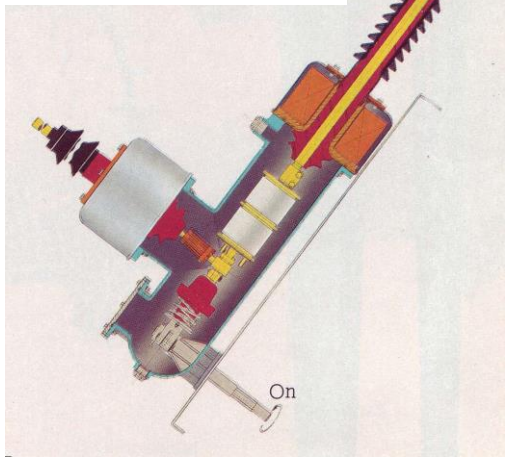


SF_6 in Electrical Switchgear

SF_6 is used either the break the electrical arc or as a main insulant in conjunction with a vacuum bottle which actually breaks the arc. In this case, the SF_6 is used to increase clearances within the switchgear and increase impulse level.

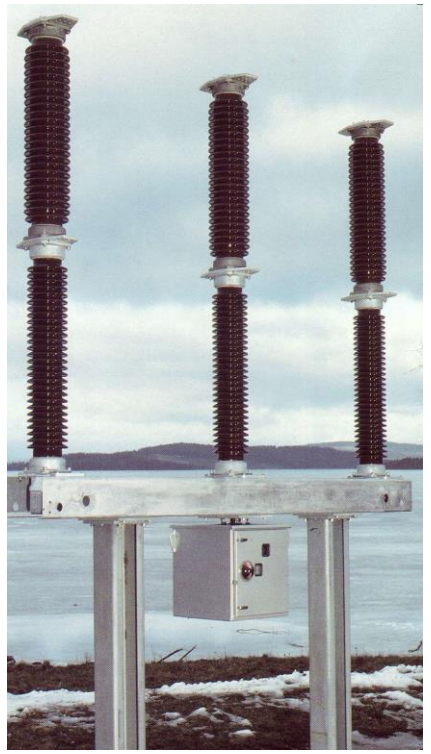
11kV Ring Main Unit (RMU

33kV outdoor Circuit Breaker



132 Dead Tank Circuit Breaker

132 Live Tank Circuit Breaker



SF_6 can come in a range of cylinders types and sizes depending on age and manufacturer and whether the SF_6 is new or recovered & to be disposed of

New SF_6 cylinders should be stored separately from used SF_6 and both should be stored upright in a well ventilated room or cage

Cylinders are marked with

- Serial number
- TARE (empty) weight
- Size etc.

Typical SF_6 cylinder colouring | Recovery

SF6 leaks – are generally detected by:

Drop in pressure on gauge (usually found during switching or at regular substation inspections)(Care needs to be taken as to whether the gauge is temperature compensated)

Low gas alarm via SCADA system

Smell of rotten eggs on entering switch room (if SF_6 has seen an arc and is contaminated) - exit switch room

SF_6 leaks can be detected by

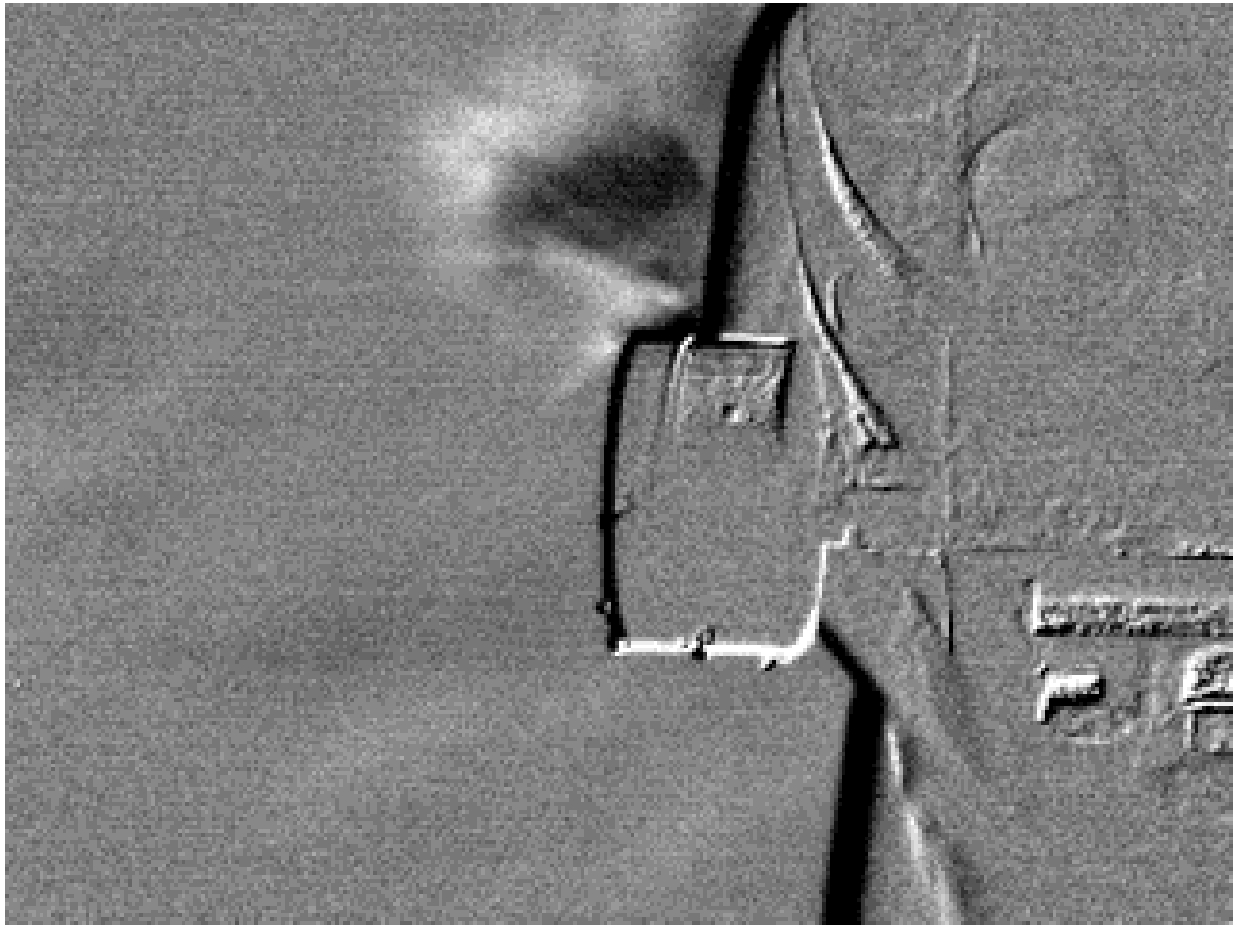
(subject to electrical clearances or switchgear being de-energised)

- Leak detection (Soapy) solution

  (ideally to BSEN14291)
- Using a fluorinated gas or SF_6 sniffer
- Using a FLIR GL306 IR camera tuned to detecting SF_6 that can ‘see’ SF_6 leaking (May not require an outage)

The target is to locate a leak and have a plan to repair/replace ASAP after the first leak is detected

Video of leaking SF_6 gas from a GEC FL1 switchgear gauge via FLIR GF306



Data points collected associated with SF_6

Monthly snapshots of total SF_6 on the network by DNO area including spare/storage items and SF_6 held in cylinders

Monthly accrual of SF_6 used to top-up any leaking switchgear

Monthly accrual of SF_6 remaining in scrapped assets to calculate amount of SF_6 lost

Data collected on switchgear that have required one or more top-ups and amount gas leaked to ensure that the worst offenders are replaced/repaired accordingly

Active identification of switchgear that leak the most SF_6 with a view to rapid repair/replacement

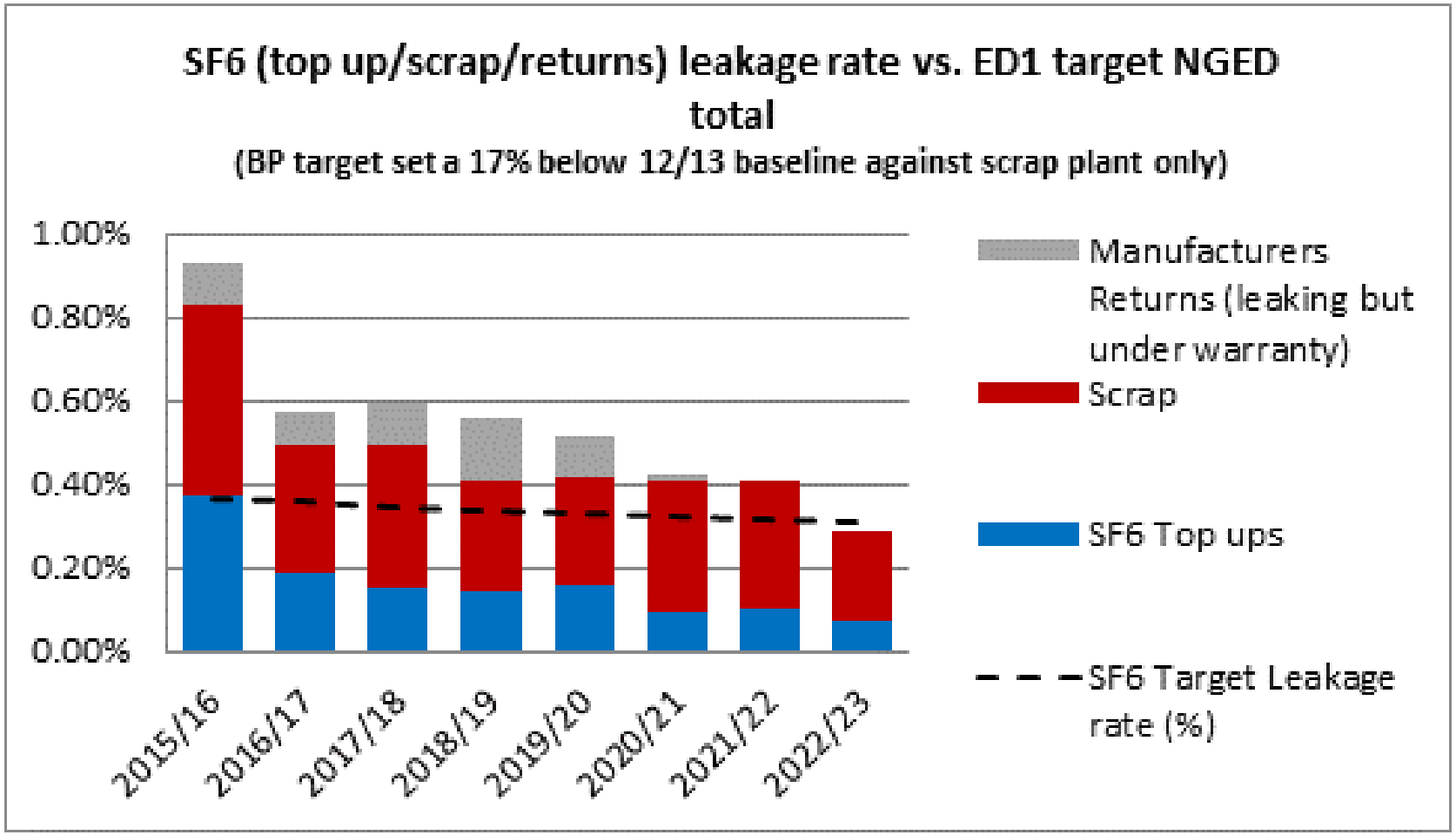
NGED stated SF_6 Targets:

NGED have a commitment to reduce the number of SF_6 gas leaks on their system to an absolute minimum. In RIIO ED1 (up to April 2023) it was undertaken to reduce system gas leaks by 17%

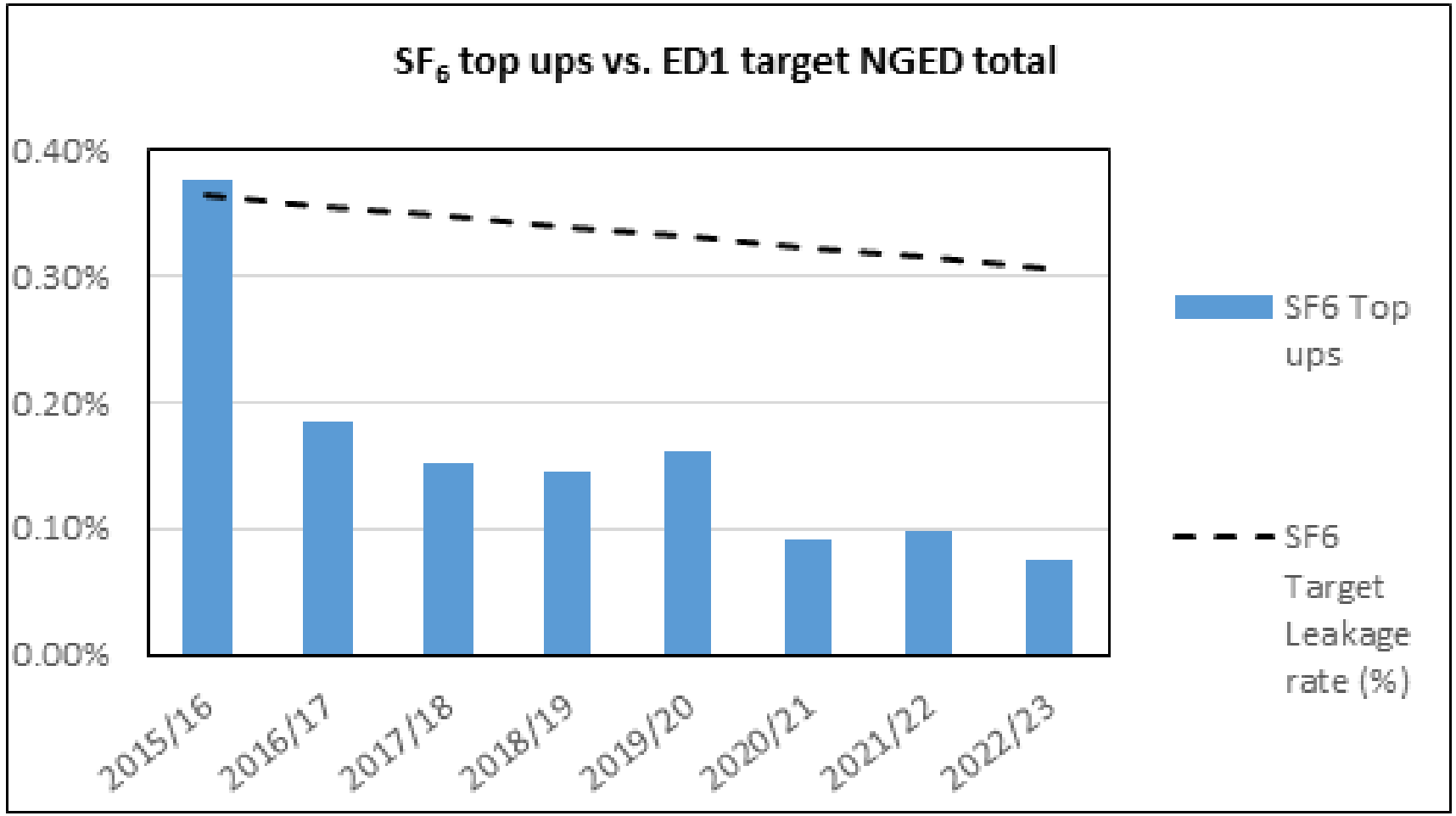
(Below 12/13 baseline for scrapped plant only)

In RIIO ED2 – seeks to significantly reduce our impact on climate change by delivering a 20% reduction in SF_6 losses and drive industry partners to develop technological alternatives to reduce overall volumes of SF_6 on the system.

NGED SF_6 emissions track record to date



NGED SF_6 emissions track record to date (Cont.)



NGED SF_6 *Policy*

- **Only specifically trained NGED staff shall top-up/recover SF_6**
- **All SF_6 assets shall be correctly recorded in the asset data base**
- **All top-ups and changes in SF_6 cylinder contents shall be updated in a timely manner**
- **All SF_6 assets scrapped shall have an asset identification label attached (with the asset database unique identifier) and a scrap certificate obtained stating amount of remaining SF_6 extracted**
- **Assets decommissioned due to SF_6 leaks can be degassed ASAP to reduce further leaks of SF_6 to the atmosphere**
- **SF_6 leaks shall be investigated and repaired/assets replaced ASAP**
- **A "Three leaks and repair/replace" methodology is expected to be implemented (except GIS)**

NGED SF_6 *Policy (Cont.)*

Emphasis on detecting leaks on newer assets (within guarantee period) and taking action to fix via manufacturer and reduce further leaks by degassing until repair where possible

Third party assets shall only be topped up using a SF_6 cylinder specifically purchased for that purpose. NGED SF_6 stocks cannot be used. Third parties are reminded that it is their responsibility to declare any/all SF_6 leaks on their equipment to DEFRA or the responsible bodies

Remember

DEFRA have the power to fine companies for the intentional release of SF_6 to the atmosphere

Future of SF_6

DEFRA and EU are currently formulating future control to limit and phase out SF_6 and other greenhouse gases

It is expected that future supply of SF_6 could be severely restricted and there are proposals to ban installation of new SF_6 switchgear after the following dates:

Ban Date of new SF_6 equipment	Voltage
1st January 2026	Medium voltage switchgear for primary and secondary distribution up to 24kV*
1st January 2030	switchgear from 24kV up to 52kV*
1st January 2028	switchgear from 52kV up to 145kV*

(Subject to the development of SF_6 free switchgear by manufacturers)

Some SF_6 free switchgear alternatives use 'technical air' or 'exotic' gases that themselves might have a global warming potential

Future of SF_6 (Cont.)

SF_6 switchgear/containers might be required to have accurate leak detection systems to notify of any leaks

It is possible that spares for SF_6 equipment might be restricted after the ban installation dates for new equipment

Future SF_6 top-ups/regassing may be only possible from used/recycled gas

It is expected that SF_6 may remain on the network for many years as it is replaced at the end of life.

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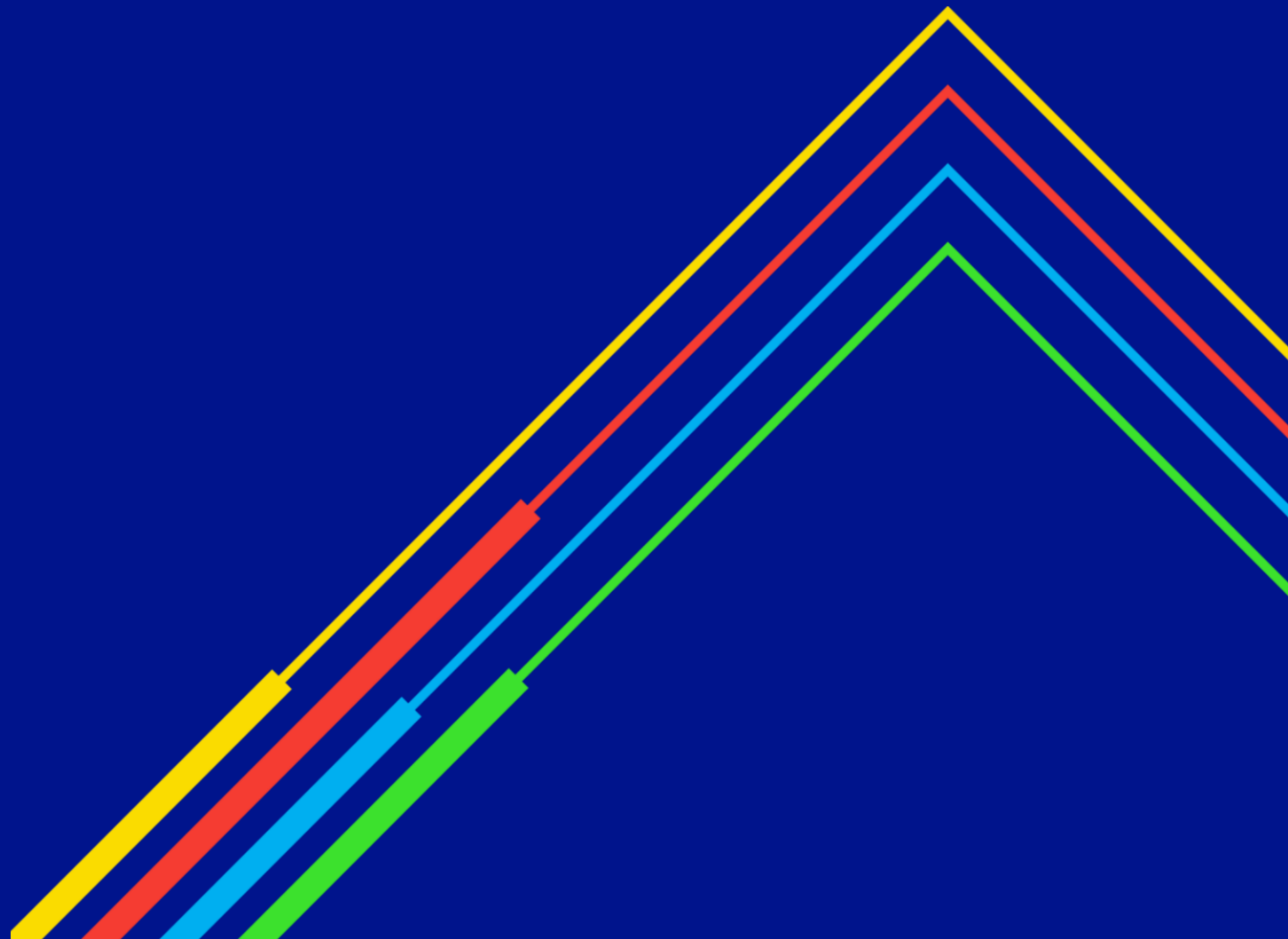
Break



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Accelerated Loss of Mains Change Programme update

Andrew Akani
Primary System Design Manager
1st March 2023

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ALoMCP Background

- G59/3-3 published on 1 Feb 2018 to include new LOM settings:
  - Removed Vector Shift as Loss of Mains protection.
  - Increased ROCOF settings to 1Hz/s, 500ms time delay.
  - **Retrospective for existing sites, implementation by 31st Aug 2022.**
  - Non-Domestic generators greater than 16A/phase (3.68kW single phase, 11.04kW three phase).
- Inverters may contain G59 settings
  - These settings also need to either be changed or disabled
  - ENA guidance on inverters https://www.ena-eng.org/ALoMCP/mankb

ALoMCP Background

- The ALoMCP is a joint initiative with the NGESO, Energy Networks Association, distribution network operators and independent distribution network operators.
- The ALoMCP offered funding to non-domestic distributed generators that were connected before 1 February 2018 to upgrade their hardware to improve network resilience, and support wider initiatives helping meet the UK's net zero targets.
- Grants were available through quarterly application windows to help accelerate compliance.
- **10th May 2022** was the final application deadline for funding through the programme (registration portal) and for owners to take advantage of financial support to carry out the work.

Compliance Outside ALoMCP

- There maybe sites that didn't participate through the programme either due to already having achieved compliance in the past or simply choosing not to receive funding. **These Customers MUST still notify the programme of their compliance:**
  - Customers can also contact ALoMCP mailbox to notify us of any G59/3 compliance outside of the programme.
- 1,484 sites (2.59GW) declared Compliance Outside of the Programme declared so far
- Evidence requirements to confirm compliance consist of:
  - Completed Compliance Declaration Form provided by DNO
  - G59/3 Test sheets for all generation that shows the compliant settings, or
  - Manufacturer Data sheet/Picture of device model (to confirm compliance at inverters).

Enforcement Strategy – Timeline and Thresholds

- Programme has to date achieved 90% compliance and substantial reductions in Vector Shift and RoCoF risks.
- £44m p.a. savings have been delivered so far.
- ESO have confirmed that the savings reported relate to progress delivered to date and does not include the additional impact from enforcing compliance at the 400 remaining sites above 1MW.

Significant Achievements to Date

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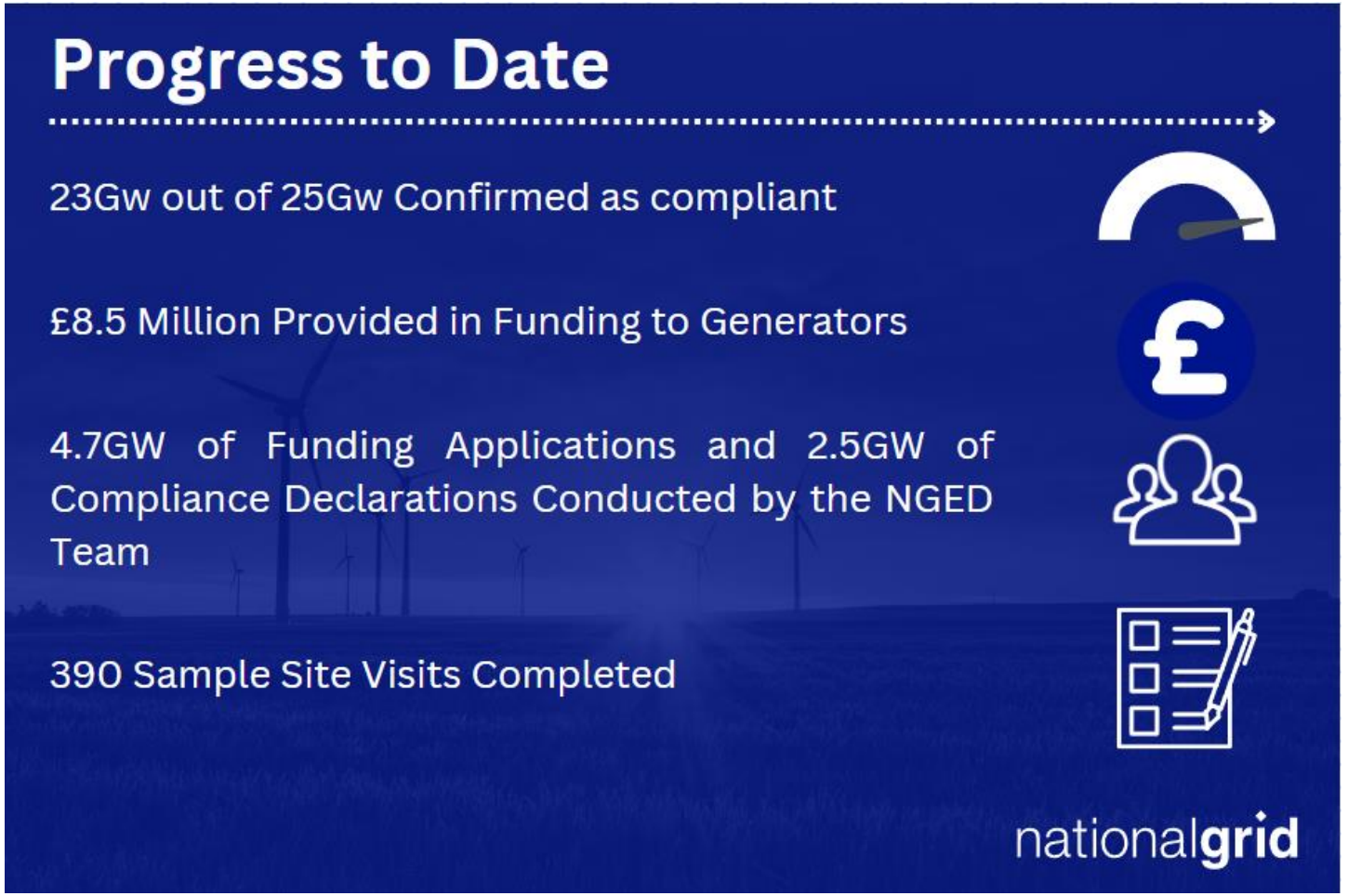
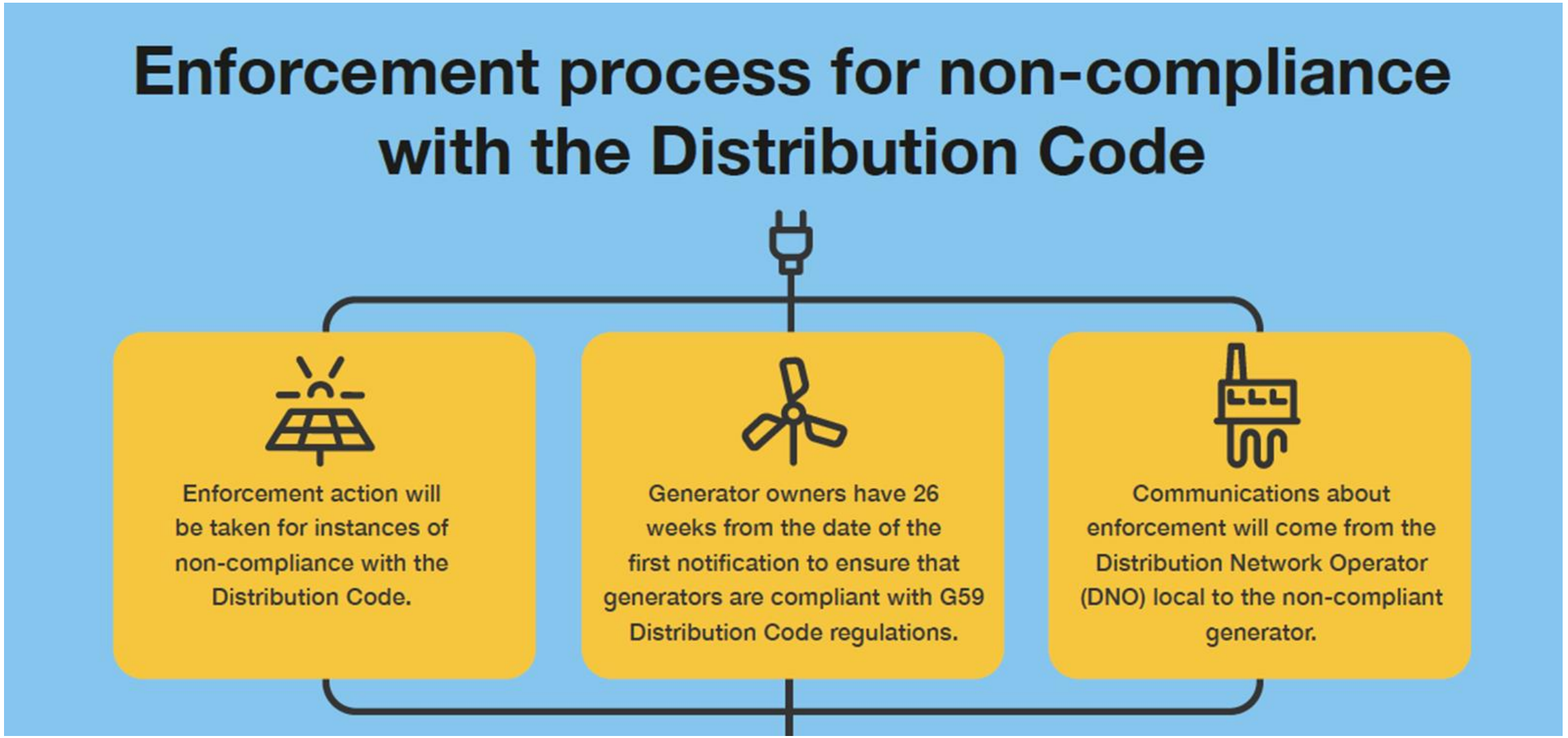
- **7.2GW Compliant**
- **278MW Outstanding**



What if I am not compliant, or declare compliance?

- Compliance with the Loss of Mains regulations is **not optional**.
- The changes are **mandatory**.
- Generators that are not compliant after the deadline will not be tolerated due to the inherent risk that they pose to Great Britain's power supply and communities.
- Those not compliant from **1st September 2022** will be subject to an **enforcement process** that could result in the de-energisation of the sites.

Enforcement measures for non-compliance



Enforcement measures for non-compliance

Enforcement Strategy – Timeline and Thresholds

- First phase of enforcement activity began in quarter 4 2022, pursuing all remaining sites with a capacity of greater than or equal to 1,000kW.
- A second phase of enforcement activity begins in quarter 2 2023, pursuing all remaining sites with a capacity of greater than or equal to 500kW.
- A third phase of enforcement activity begins in quarter 4 2023, pursuing all remaining sites with a capacity greater than or equal to 200kW.
- DNOs to continue liaising with ESO on the timing and scope of further enforcement activity, reflecting the cost of implementation and system risk reduction, and to make a recommendation on further action in spring 2023.

ALoMCP Contact Details

- NGED ALoMCP Contact details:
  - Email: ALOMCP@nationalgrid.co.uk
  - Telephone: 0800 0328880

- Please feel free to contact us with any queries.

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Access Significant Code Review (SCR) update

Andrew Akani
Primary System Design Manager
1st March 2023

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Access SCR Overview

Distribution Network Connection Charges

- There will be different connection charging depths for Demand and Generation Connections, subject to the application of a High Cost Threshold.
- For Demand schemes, Distribution Network Operator (DNO) fully funds reinforcement and recovers through Distribution Use of System (DUoS).
- For Generation schemes, customer only contributes to reinforcement at the same voltage level as Point of Connection.
- The following High Cost Cap values will apply:
  - Generation will be set at £200/kW
  - Demand will be introduced and set at £1720/kVA

SCR Connection boundary reforms

Distribution Network Connection Charges

	Extension assets	Reinforcement assets at connection voltage	Reinforcement assets at connection voltage +1
Current arrangements	Connecting customer pays 100%	Connecting customer pays a proportion of the reinforcement costs	Connecting customer pays a proportion of the reinforcement costs
New arrangements (Demand)	Connecting customer pays 100%	Fully funded by the DNO via DUoS	Fully funded by the DNO via DUoS
New arrangements (Generation)	Connecting customer pays 100%	Connecting customer pays a proportion of the reinforcement costs	Fully funded by the DNO via DUoS

SCR Access rights

Non-Firm Access Arrangements

- Curtailment Definitions:
  - To be defined as ‘any action taken by the network operator to restrict the conditions of a connection in response to a constraint on the distribution system’
  - Excludes customer interruptions from faults
  - Excludes interruptions resulting from the transmission network

Curtailment Limits

- DNOs will set the curtailment limits and include this in the connection offer
- The process should be as simple as possible
- The processes implemented must be common to all DNOs and be repeatable
- The Limits will be included in both their Curtailable Connection offer and connection agreement
- Customers subject to Curtailment will receive regular reporting on the levels of curtailment

What does this mean for you?

- Where Reinforcement to the network is required, a Curtailable offer could be made.
- Within a Curtailable offer we will detail all the Curtailment Information.
- Curtailment end dates will be the date Curtailment ends for your connection.
- Exceeded Curtailment Prices will be provided.

(f) Curtailment Information:

(i) Non-Curtailable Import Capacity:	[xxx] kVA
(ii) Non-Curtailable Export Capacity:	[xxx] kVA
(iii) Curtailable Import Capacity:	[xxx] kVA
(iv) Curtailable Export Capacity:	[xxx] kVA
(v) Curtailment End Date: DD/MM/YYYY]	[[N/A]
(vi) Import Curtailment Limit:	[hours]
(vii) Export Curtailment Limit:	[hours]

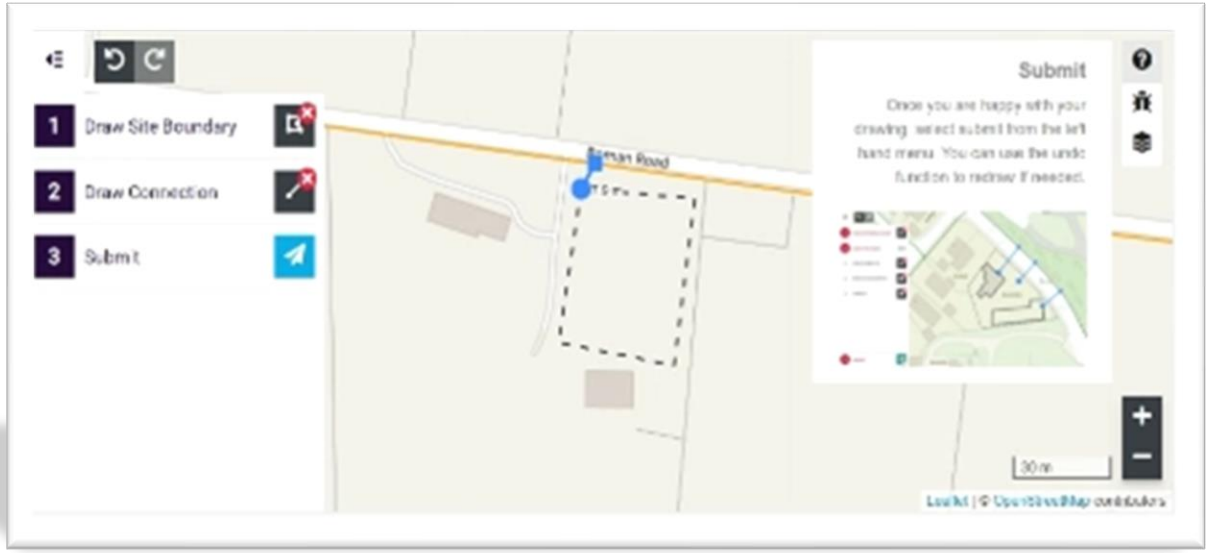
(viii) Exceeded Import Curtailment Price (subject to change): [£/MVAh]

(ix) Exceeded Export Curtailment Price (subject to change): [£/MVAh]

Speculative Development - What does this mean for you?

- Change to the definition of ‘speculative’ development.
- Implementation of a new scoring matrix.
- Applications are to be scored against the new matrix to be determined if they are speculative.
- Speculative Developments fully fund reinforcement costs.

Subject to Ofgem’s approval



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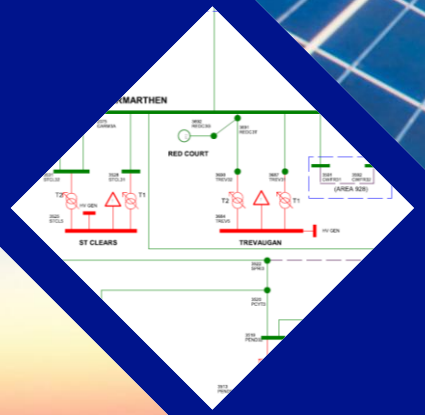
Curtailment Management

Joe Davey



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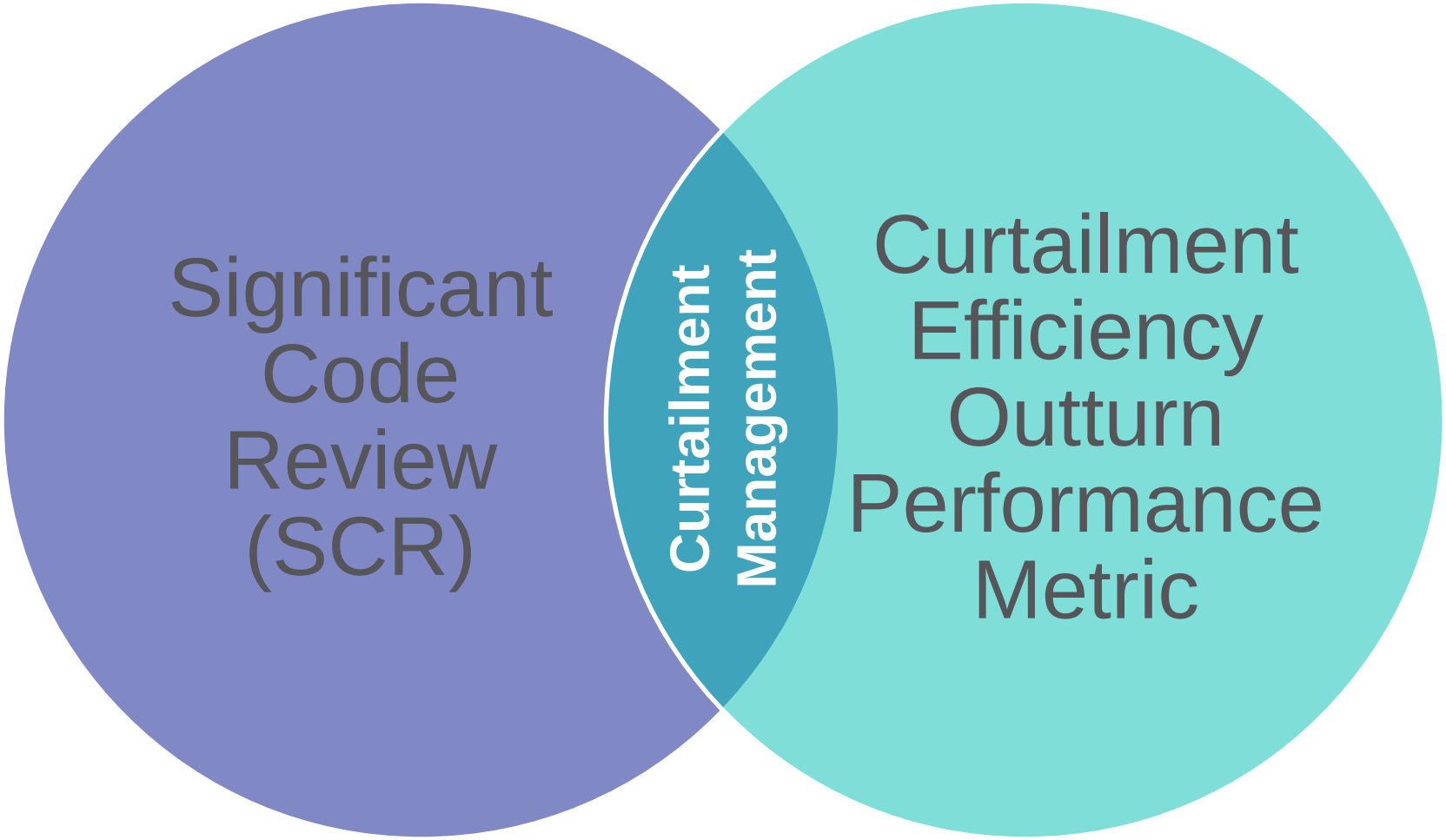
Winter 23/24 Season

SCR Vs Curtailment Incentive



SCR Vs Curtailment Incentive

	Significant Code Review (SCR)	Curtailment Efficiency Outturn Performance Metric
Applies to	Connection applications submitted post SCR implementation	All connected sites with curtailment
Performance Target	Calculated as part of connection agreement	Set by Ofgem based on previous performance
Performance Reporting	Per connection on a 12 month rolling basis	Annual submission as part of Regulatory Reporting Pack (RRP)
Implementation	• 1st April 2023 all new curtailable connection applications will have a curtailment limit set • Once post SCR sites are energised the DSO will need to manage curtailment within these limits	• 1st April 2023 requirement to record all curtailment • 1st April 2024 target for curtailment set, DSO will need to manage curtailment within these limits

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NGED Updates

New Market Gateway for procurement of Flexibility Services has been launched:

https://marketgateway.nationalgrid.co.uk/

New details of where NGED will be procuring flexibility services for Winter 23/24:

https://connecteddata.nationalgrid.co.uk/dataset/constraint-management-zone-cmz-tranche-7a

Upcoming Forums

In Person (Bristol) - Wednesday 24 May - 13:30 – 16:00 Register Here

Online - 16th August, 11:00 – 13:00 Register Here

In Person (Bristol) - 22nd November, 1:30pm - 4pm Register Here