Electricity Transmission

Contribution of SF_6 Alternatives to National Grid's Net Zero Ambitions

Mark Waldron
Technical Leader

nationalgrid

NG Responsible Business Charter; The Environment

Introduction | Our commitments | Our ambitions

We will enable a fair and affordable transition to a clean energy economy, and reduce our own emissions.

Climate change is the defining challenge of this generation. The decisions we take now will influence the future of our planet and life on earth. We must make significant changes to curb harmful emissions.

Introduction | Our commitments | Our ambitions

- Accelerate our net zero target wherever possible
- Eliminate all SF6 gas from our assets by 2050
- Further reduce our Scope 3 emissions
- CO_2 ESO zero-carbon by 2025

Introduction | Our commitments | Our ambitions

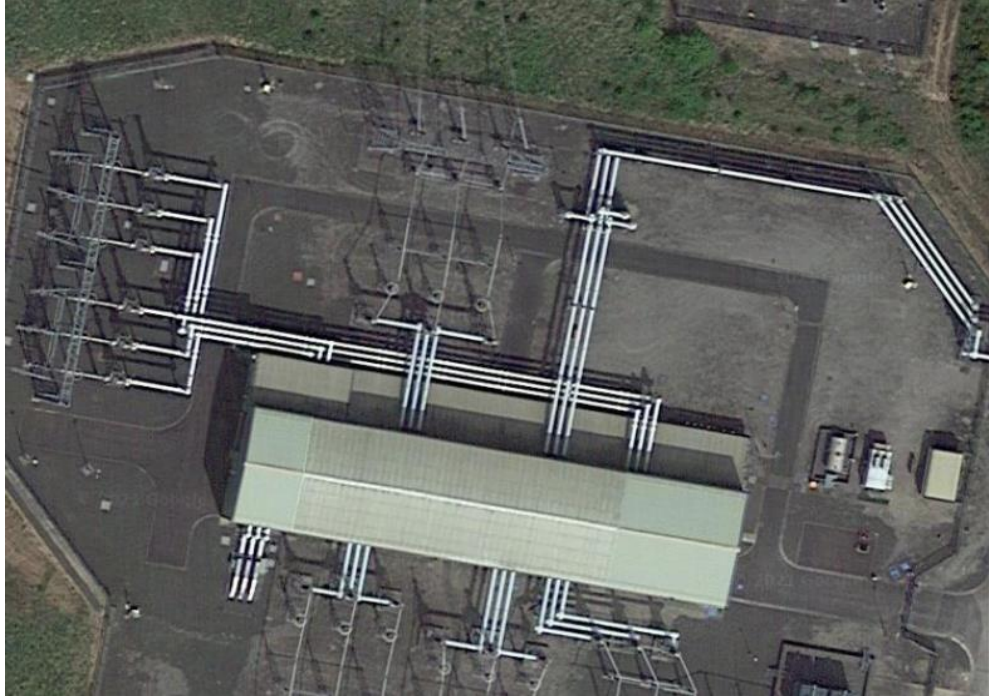
- 2050 = Net Zero
- CO_2 Scope 3 GHG emissions < 20%
- Reduce SF6 emissions by 50%
- 100% electric
- Reduce energy consumption by 20%
- Improve natural environment by 10%

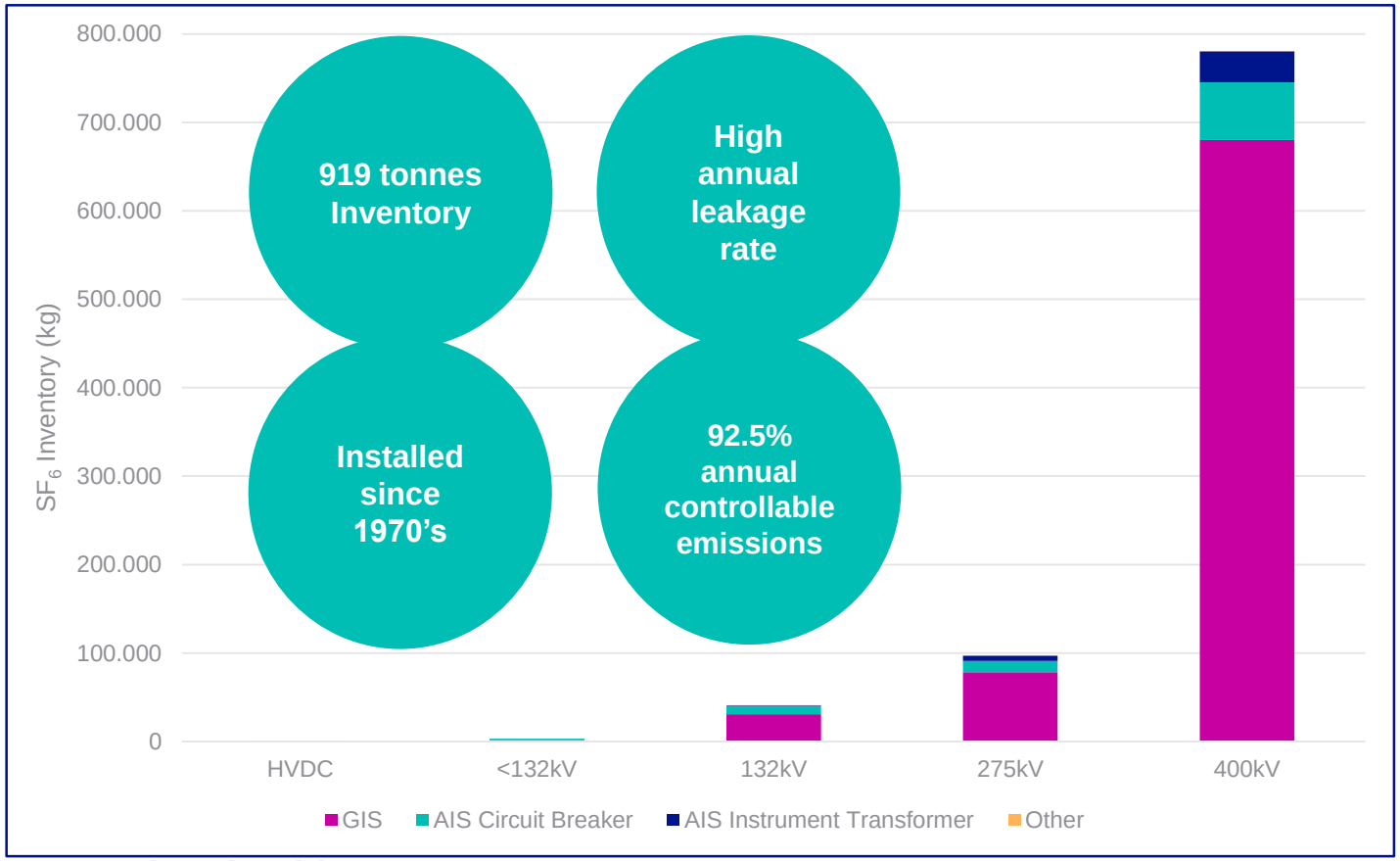
Read more by clicking on the boxes above

- Business air travel – zero carbon emissions

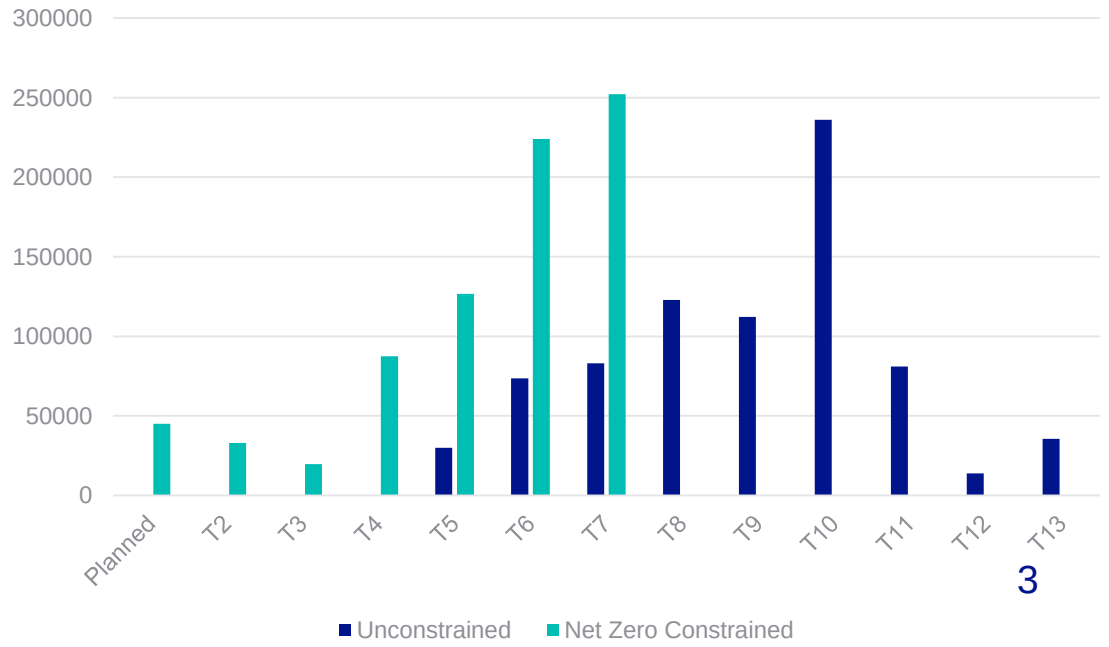
SF_6 in NGET; Scale of the Issue

- Largest inventory in Europe
- High leakage rate
- Critical to environmental commitments & net-zero
- Large quantities of outdoor GIB prone to leakage
- Major component of controllable emissions





Indicative SF_6 Inventory removal profile



Stakeholders, Legislation & Regulation

- Global & local responses to climate change; varying approaches but strong alignment
- When and How (and at what cost?), rather than Why and If
- Increasingly restrictive/punitive legislation
- National/regional penalties for SF_6 emissions, moving towards SF_6 bans
- Specific, binding emission reduction targets
- Supported development of SF_6-free solutions
- Industry engagement to ensure solutions are realistic, deliverable & timely
  - Progress over perfection; achieving Net Zero targets may need viable solutions now
  - Focus purely on GWP is unhelpful; total carbon impact; define boundaries
  - Consider sustainability more widely; LCA (standardised?)
- Legislation directly linked to societal “willingness-to-pay”; keep all stakeholders engaged to ensure plans are proportionate & supported

Portfolio Approach to Delivery

- **Emission reduction and inventory reduction at optimum timing and cost**
- **Right intervention(s), right time, right cost through asset lifetime**
  - **Prevention; Enhanced asset care early in lifetime to reduce future emissions**
  - **Repair; Targeted interventions to address existing leaks**
  - **Refurbishment; Strategic intervention to address present and forecast emissions**
  - **Conversion (retro-fill) ; Reduce inventory (+ future emissions), retaining assets**
  - **Replacement; Eliminate SF_6 inventory & emissions**

SF_6-free Technology & Utility Risk Management

- **Competing technologies with strengths & weaknesses**
- GWP, total carbon/environmental impact, ambient temperature range, cost, scalability, gas re-combination/consumption under arcing, availability timescales . . . .
- **EHS investigations**
- By-product characterisation and management
- Future environmental challenges (f-gases, GWP)
- **Technical investigations**
- Deeper understanding of fundamental breakdown processes and electrical performance
- Diagnosis, prediction & mitigation of future problems
- **Operating lifetime expectations**
- Ageing, degradation, reliability, diagnostics, asset care
- **Practical aspects**
- Diversity of solutions (enduring?), market coverage/timing (275kV in UK)
- Gas management requirements, tools, processes

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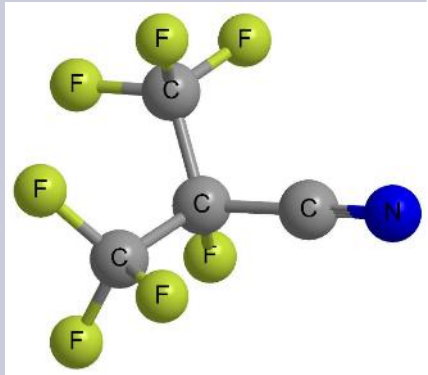
Key Technologies

C4-Fluoronitrile +

Natural gases

(N_2, CO_2 ,O_2)

GWP > 1

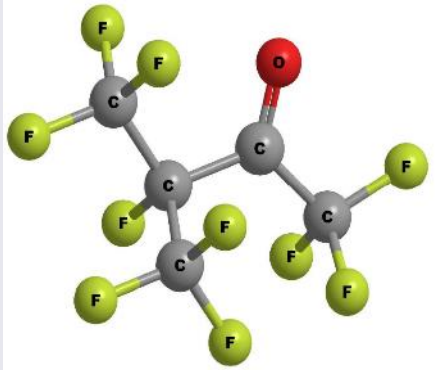


C5-Fluoroketone +

Natural gases

(N_2, CO_2, O_2)

Negligible GWP



Vacuum

Air

Negligible GWP