

## The project's aim

To minimise medical Nitrous Oxide emissions by 2026 within NHS Scotland

1. By reducing system loss through leaks.
2. Reducing waste through poor stock management.
3. Introducing where needed a proportionate supply aligned to clinical need.



## Healthcare's carbon footprint

World 4.4% UK 5.4%



## Why worry about nitrous oxide (N<sub>2</sub>O)?

- Potent greenhouse gas
- Deleterious ozone substance
- Atmospheric life 115 years
- >320,000 tCO<sub>2</sub>e per year in UK
- Occupational pollutant



23,000

single trips annually

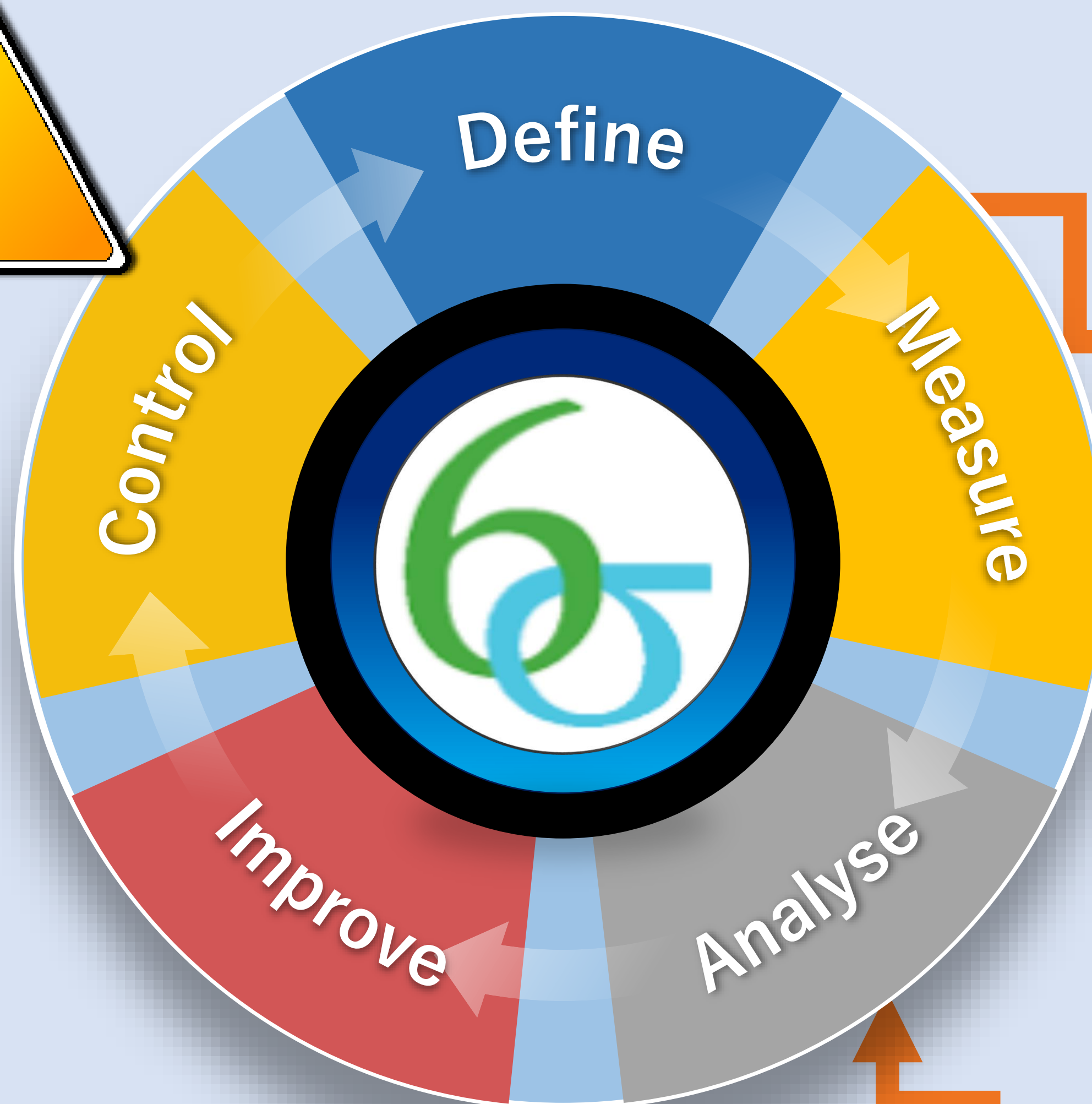
- is the carbon equivalent of medical N<sub>2</sub>O (2023)



# NIX THE NITROUS

*"It is not necessary to change. Survival is not mandatory."*

WE Deming



## Why do we need to act now?

The NHS is one of the largest contributors of greenhouse gas emissions, making up approximately 40% of UK public sector emissions per annum



## The project

Repeated improvement outcomes have verified that:

1. Anaesthetic Nitrous Oxide piped systems should not be routinely introduced into new theatre complexes.
2. NHS sites that purchase Nitrous Oxide products must establish a multidisciplinary project group to minimise loss and waste of this agent and will:
  - Remove redundant supply.
  - Reduce surplus supply.
  - Repair semi-permanent and permanent junctions.
  - Revise mitigation plan quarterly, biannually or annually.

## Nitrous Oxide and Entonox explained



Nitrous Oxide is an ozone depleting substance and potent greenhouse gas with a 100-year global warming potential of 298 times that of carbon dioxide.

It's used in general anaesthesia and for pain relief in combination with oxygen under the brand name Entonox, commonly known as "gas and air". Nitrous Oxide emissions are largely caused by leaks from piped medical gas systems.

Unlike N<sub>2</sub>O for general anaesthesia, Entonox continues to be used for pain relief. NHS Scotland aims to ensure it remains available while also minimising loss of this gas escaping into the atmosphere.

Entonox accounted for 17,851 tCO<sub>2</sub>e in 2022/23, making it the largest source of anaesthetic and analgesic gas CO<sub>2</sub>e emissions in NHS Scotland. Since September 2023, a quality improvement programme has ensued and emissions have fallen to 16,597 tCO<sub>2</sub>e.

## Using Lean Six Sigma DMAIC Cycle

Incorporate lean tools:

- ▶ Decision Tree Analysis
- ▶ Process Mapping

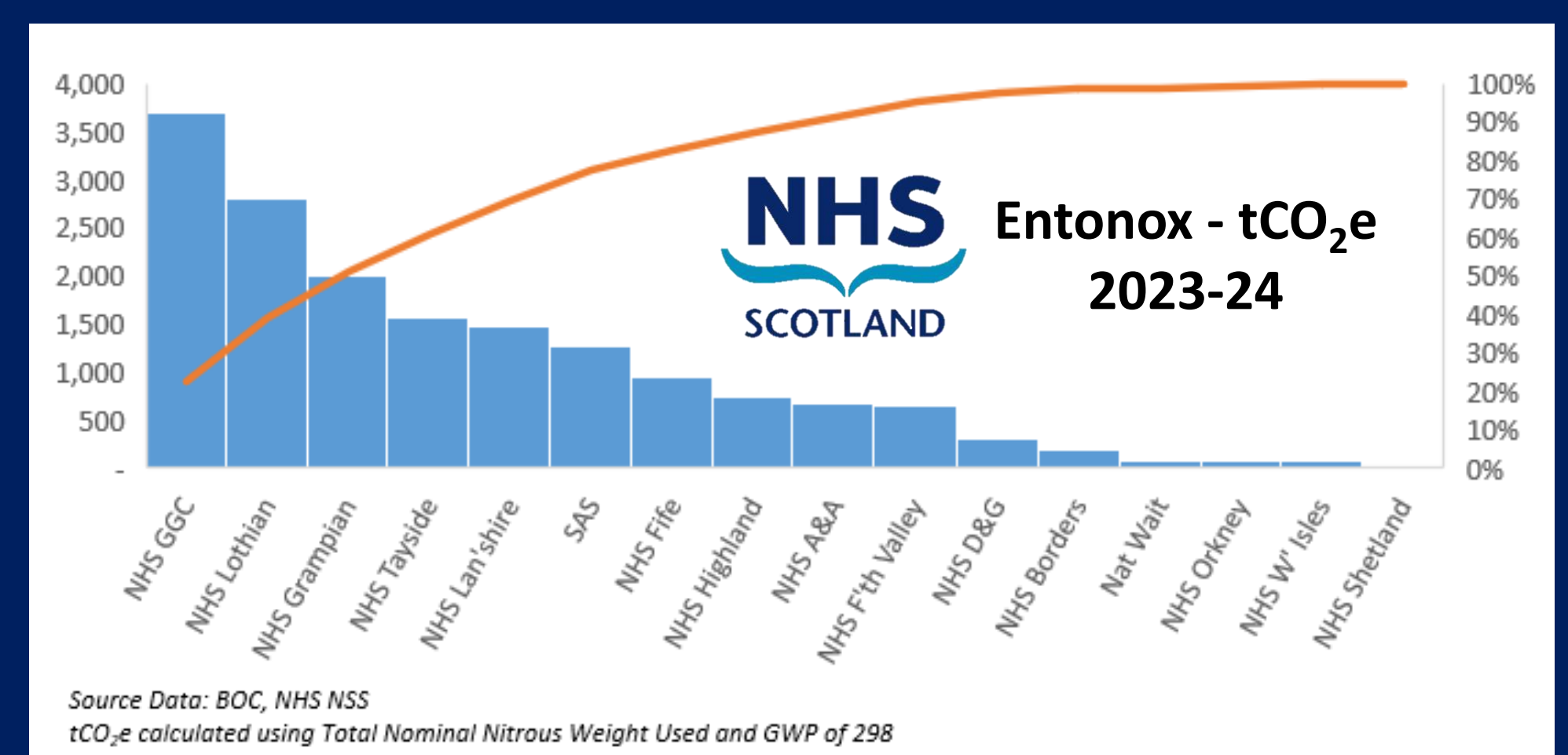
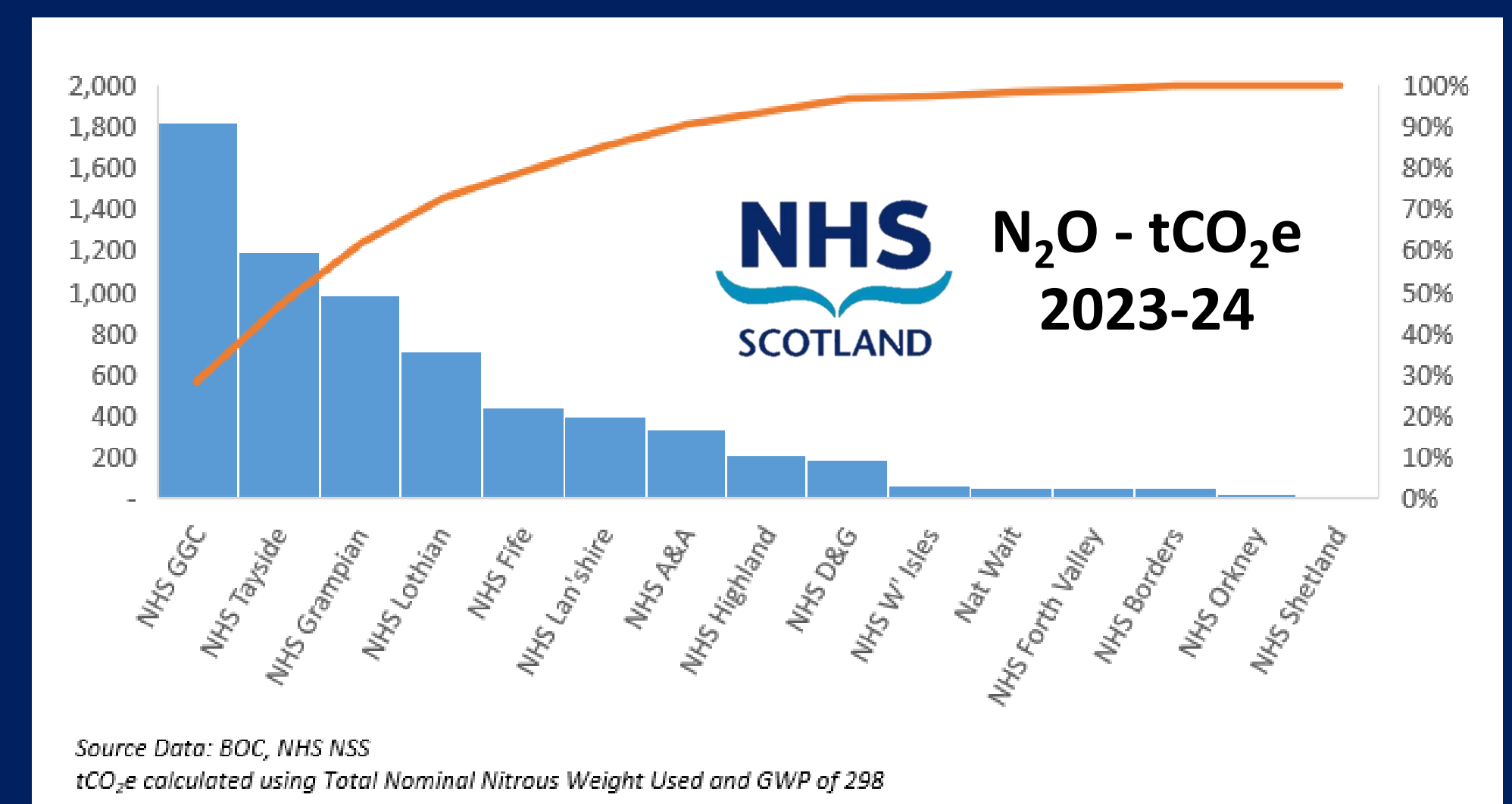
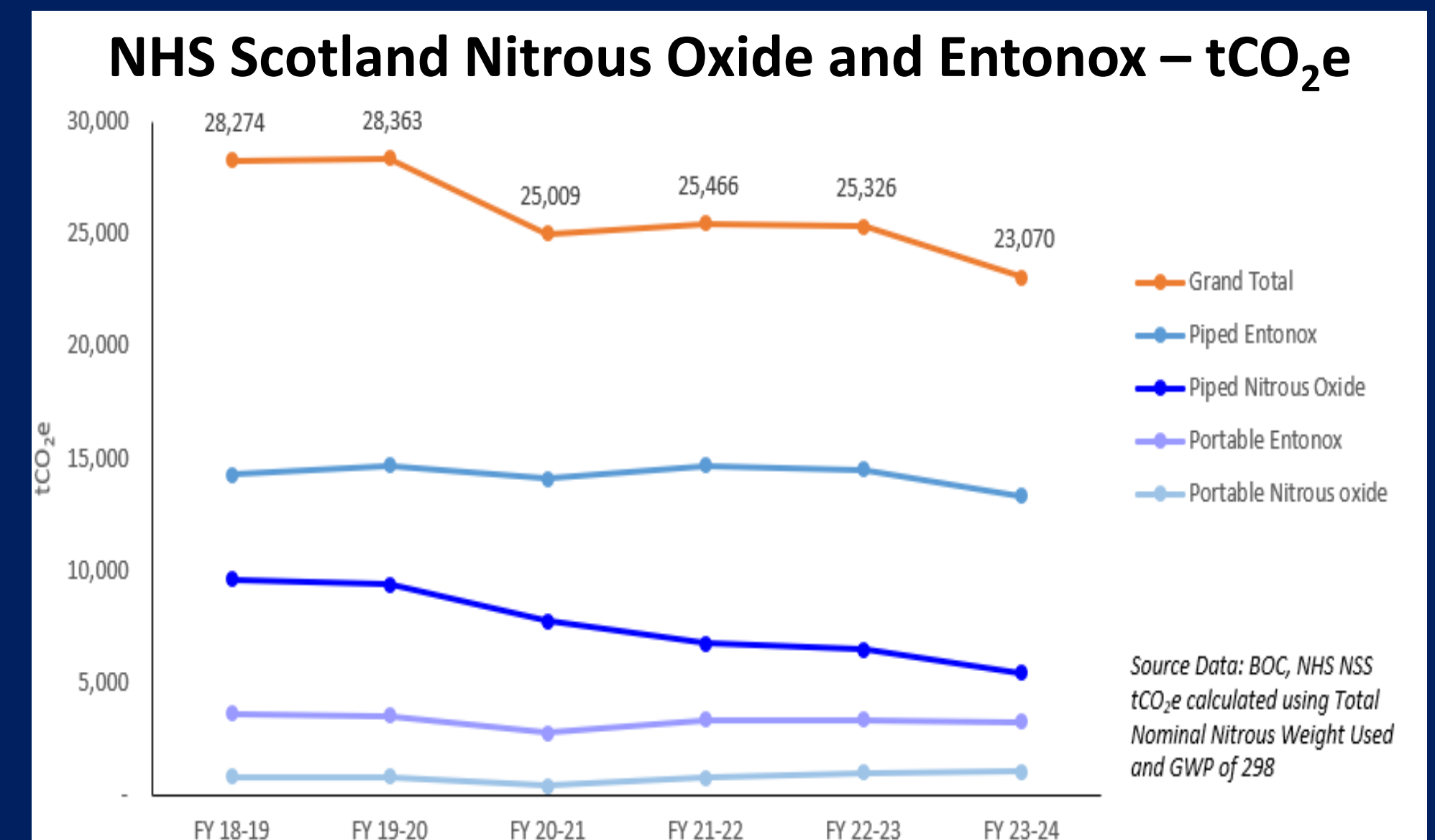
## Developing a local Nitrous Oxide project

## Results/outcomes

Annual emissions for anaesthetic N<sub>2</sub>O have fallen by 3,884 tCO<sub>2</sub>e - a 37% reduction against the 2018/19 baseline

By Spring 2024: 35 N<sub>2</sub>O piped systems in NHS Scotland were decommissioned or minimised. 12 systems were scheduled for decommissioning. 2 high-emitting hospitals have not submitted N<sub>2</sub>O minimisation plans.

## The rise and fall of NHS Scotland Nitrous Oxide and Entonox emissions



## Read more:



- ▶ [www.youtube.com/watch?v=OreKYfF0d8s](https://www.youtube.com/watch?v=OreKYfF0d8s)
- ▶ [www.publications.scot.nhs.uk/files/dc20230825entonox.pdf](https://www.publications.scot.nhs.uk/files/dc20230825entonox.pdf)

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