

National Green Theatres Programme

Prògram Nàiseanta Lannsaireachd Uaine

Decommission of Nitrous Oxide Manifolds – Opportunity for Change

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An opportunity to save across NHS Scotland:



6486
Tonnes of
CO₂e



TBC

1. Description of action

- 1.1 This action relates to a system change, whereby health boards are recommended to decommission their N₂O manifolds to eliminate issues with leaking pipe work.
- 1.2 [The Scottish Government Nitrous Oxide Mitigation Implementation Plan](#), first released in May 2022, outlines the process by which health boards should progress the decommissioning of nitrous oxide manifolds. Further guidance is provided within the [Anaesthetic Nitrous Oxide System Loss Mitigation and Management Technical Update](#), published in December 2022.
- 1.3 The recommendation made within these documents states that piped nitrous oxide should be removed from sites, with a lean supply being available via portable cylinders to clinical areas where it is still used.

2. Background

- 2.1 Nitrous Oxide is a potent greenhouse gas which remains stable in the atmosphere for up to 120 years. It is now the dominant ozone depleting substance globally, with a global warming potential 298 times that of carbon dioxide.
- 2.2 Clinical use of anaesthetic nitrous oxide across NHS Scotland (NHSS) is low, although it is still used within paediatrics, emergency caesarean sections and complex dental cases.
- 2.3 Nitrous oxide is typically supplied by a piped system within NHSS acute sites, and it is estimated across health boards that between 83 - 100% of piped nitrous oxide is lost before it reaches the patient.
- 2.4 As reported in the Scottish Government's Nitrous Oxide Mitigation Implementation Plan medical nitrous oxide conferred 28,274 tonnes in carbon equivalent emissions in 2018/19 within NHS Scotland (10,375 tCO₂e anaesthetic Nitrous Oxide and 17,899 tCO₂e Analgesic Nitrous Oxide (Entonox®)). The NHS Scotland Climate Emergency and Sustainability Strategy 2022-2026 sets out an aim of zero emissions of nitrous oxide by 2027. Given the current very high levels of nitrous oxide loss in the system the decommissioning of manifolds will be key to achieving this ambition.
- 2.5 By September 2022, 10 hospital sites had fully decommissioned piped nitrous oxide systems, with another 13 sites preparing for decommissioning.

- 2.6 Data supplied by NHS NSS and BOC show current usage of piped and portable nitrous oxide. Decommissioning of all nitrous oxide manifolds will achieve an anticipated carbon saving of 6486 tCO₂e (see Appendix 2).
- 2.7 Due to variance in pricing across cylinder sizes, accurate financial savings have yet to be calculated, savings will be inclusive of costs incurred for ongoing maintenance of the manifolds.

3. Who needs to be involved in this change locally?

- 3.1 In order to implement this action it is recommended that the following groups should be consulted and involved:
 - Anaesthetists
 - Theatre managers/staff
 - Estates and Facilities
 - Engineering leads
 - Procurement staff
 - Medical Gases Committee

4. Boundaries

- 4.1 The table below identifies the boundaries for this action:

In scope	Out of scope
<ul style="list-style-type: none"> • All piped anaesthetic nitrous oxide • All portable anaesthetic nitrous oxide 	<ul style="list-style-type: none"> • Analgesic Nitrous Oxide (Entonox®)

5. What is the change and how will it be implemented?

- 5.1 Health boards will decommission nitrous oxide (N₂O) manifolds and replace these where N₂O is still required with lean portable supply.

Implementation will be as laid out in the most up-to-date version of [The Scottish Government Nitrous Oxide Mitigation Implementation Plan](#), and accompanying [Anaesthetic Nitrous Oxide System Loss Mitigation and Management Technical Update](#).

6. What are the potential co-benefits of this change?

Outcome	Potential Benefits
Carbon Reduction	6486 tCO ₂ e
Cost Savings	Awaiting information to calculate board level saving opportunities
Patient Outcomes	Patient outcome not affected
Staff Experience	Minimised occupational health risk to porter teams as no longer moving cumbersome heavy cylinders.

7. Risks and Issues

7.1 As part of the development of this action risks and issues have been identified below:

Description of risk or issue	Mitigation / Action Plan
Risk of injury when moving portable cylinders of gas	Training for all staff who handle portable cylinders
Return of unused nitrous oxide gas to supplier as this will be vented	Stored on hospital sites until catalytic cracking technology or alternative sustainable solution is available

8. Implementation Guidance

- 8.1 The opportunity for change highlights the importance of implementing this action. This modification will help your site and NHS Scotland achieve net-zero emissions by 2040 as stated in NHS Scotland's Climate Emergency & Sustainability Strategy 2022-2026
- 8.2 Below the National Green Theatres Programme has provided guidance on how you can implement this change within your area. If you require any further information or guidance, please contact the National Green Theatres programme team on: cfsgreentheatres@gjnh.scot.nhs.uk

Local Sustainability or Green Theatre Group:

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| 1. | Review opportunity for change and validate what this means locally. |
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2.	Provides National Green Theatre Programme Team with validated information/local targets.
3.	Convene a discussion with the staff who need to implement it and those who are impacted by the action.
4.	Understand what the opportunity is for implementing the action locally: work already undertaken and challenges.
5.	Agree a local implementation plan.
6.	Implement local plan.
7.	Provide data as per measurement plan.
8.	Monitor implementation of action.

Appendix 1 – Measurement plan

Name of Measure (,carbon, cost, staff experience and patient outcome)	Type of measure (Outcome, Process, Balancing)	Concept being measured?	Where is the data available from?	Who is collecting the data?	Frequency of collection
Carbon	Outcome	Decrease in tCO ₂ e resulting from the decommissioning of piped nitrous oxide manifolds	Health Boards/Scottish Government	Health Board engineering leads	Initial survey per Board with follow up at quarterly intervals if manifold confirmed in use at primary survey.
Cost	Process	Financial savings resulting from less use of nitrous oxide	Health Boards/Scottish Government	Procurement	Monthly

Appendix 2 – Potential Carbon Savings

The following figures are sourced from BOC and NHS NSS usage data.

Financial Year	Piped Nitrous Oxide (tCO ₂ e)	Portable Nitrous Oxide (tCO ₂ e)	Grand Total (tCO ₂ e)
2018 – 2019	9586	789	10375
2019 – 2020	9385	790	10175
2020 – 2021	7764	392	8156
2021 - 2022	6717	733	7451
2022 - 2023	6486	988	7474