

# The Anesthetic Gas impact on Global Warming

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"Take urgent action to combat climate change and its impacts"

Goal 13; United Nations Environment Programme

## INTRODUCTION

Health care contributes to approximately 5% of the total global greenhouse gas emission (CO<sub>2</sub> equivalents) [1]. In The University Hospital of Copenhagen, 10% of the energy-related carbon footprint arise from anesthetic gases.

Using Global Warming Potential (GWP100 year) the carbon emission (CO<sub>2</sub>eq in kilo) of different gases can be compared.

The GWP is 144 kg CO<sub>2</sub>eq/kg for Sevoflurane® and 2720 CO<sub>2</sub>eq/kg for Desflurane® [1]. To mitigate the impact of fluranes, CONTRAfluran Anaesthetic Gas Capture System has recently been developed, which is a canister that captures and recirculates the patient exhaust.

## AIM

To undertake a cost-benefit analysis of implementing CONTRAfluran® to reduce the CO<sub>2</sub> emission linked to Sevoflurane® in The Department of Cardiothoracic Anesthesiology, Copenhagen.

## METHOD

A quantitative comparison of the manufacturer's promotional calculation and a quantitative comparative analysis for calculating the effect on annual gas consumption by implementing CONTRAfluran® in The Department of Cardiothoracic Anesthesiology.

## FACT BOX

The CONTRAfluran® Anaesthetic Gas Capture System is attached to the expired gas outlet valve of the respirator and contains adsorbent material intended to completely adsorb fluorinated halocarbon out of the expiration air from the patient being anesthetized with Sevoflurane® or Desflurane®.



## RESULTS

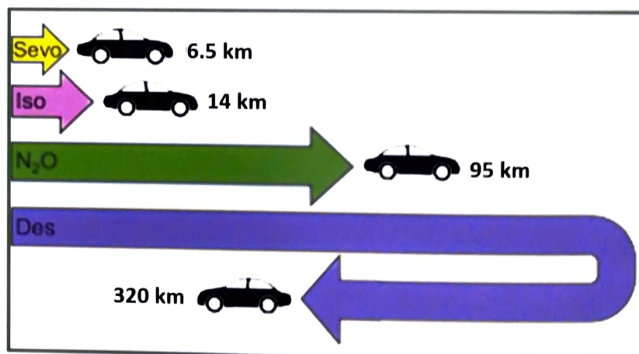
Using the manufacturer's case distribution of gasses, the CONTRAfluran® system would reduce the department's overall CO<sub>2</sub> footprint significantly, achieving a saving of 128.9 tonnes of CO<sub>2</sub>eq annually.

However, quantitative comparative analysis shows that the reduction would only be 19.5 tonnes of CO<sub>2</sub>eq annually. This is due to the department mainly using Sevoflurane®, which has a lower GWP than what is presented in the manufacturer's case.

## DISCUSSION

By implementing CONTRAfluran® in the department the CO<sub>2</sub> emission would be reduced by about 67% or 19.5 tonnes of CO<sub>2</sub>eq, which correspond to 136 kg Sevoflurane®.

To put this impact in perspective, this reduction is equivalent to nine flights Copenhagen-New York return.



A long-term perspective that keeps innovation in mind is crucial in considering ways to tackle climate change, and the medical field is no different from any other industry.

Innovations such as CONTRAfluran® Anaesthetic Gas Capture System could be game changers in achieving net-zero greenhouse gas emissions.

Alternatives to the global climate impacts of greenhouse gas emission and the potential economic expenses are needed.

Replacing anesthetic gas with total intravenous anesthesia or choosing a gas with low GWP could be relevant and easily accessible solutions.

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1. Andersen, M.P.S., O.J. Nielsen, and J.D. Sherman, The Global Warming Potentials for Anesthetic Gas Sevoflurane Need Significant Corrections. *Environmental Science & Technology*, 2021. 55(15): p. 10189-10191.



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