

Adverse events should be reported. Reporting forms and information can be found at www.mhra.gov.uk/yellowcard

Adverse events should also be reported to Orion Pharma (UK) Ltd on 01635 520300

Prescribing information is available in this meeting.



Life Cycle Assessment & Carbon Footprint of inhalers

Dr Alex Wilkinson

Respiratory Consultant

East and North Herts NHS Trust, Stevenage UK

NHS England and NHS Improvement



British
Thoracic
Society



COIs / credentials

- Member of NHSE/I inhaler experts working group
- Former BTS lead on sustainable respiratory care
- Nominee for UN MCTOC
- Unpaid contributions on carbon footprint of care with GSK, AZ, and Orion
- Views expressed here are my own

GLOBAL WARMING POTENTIAL

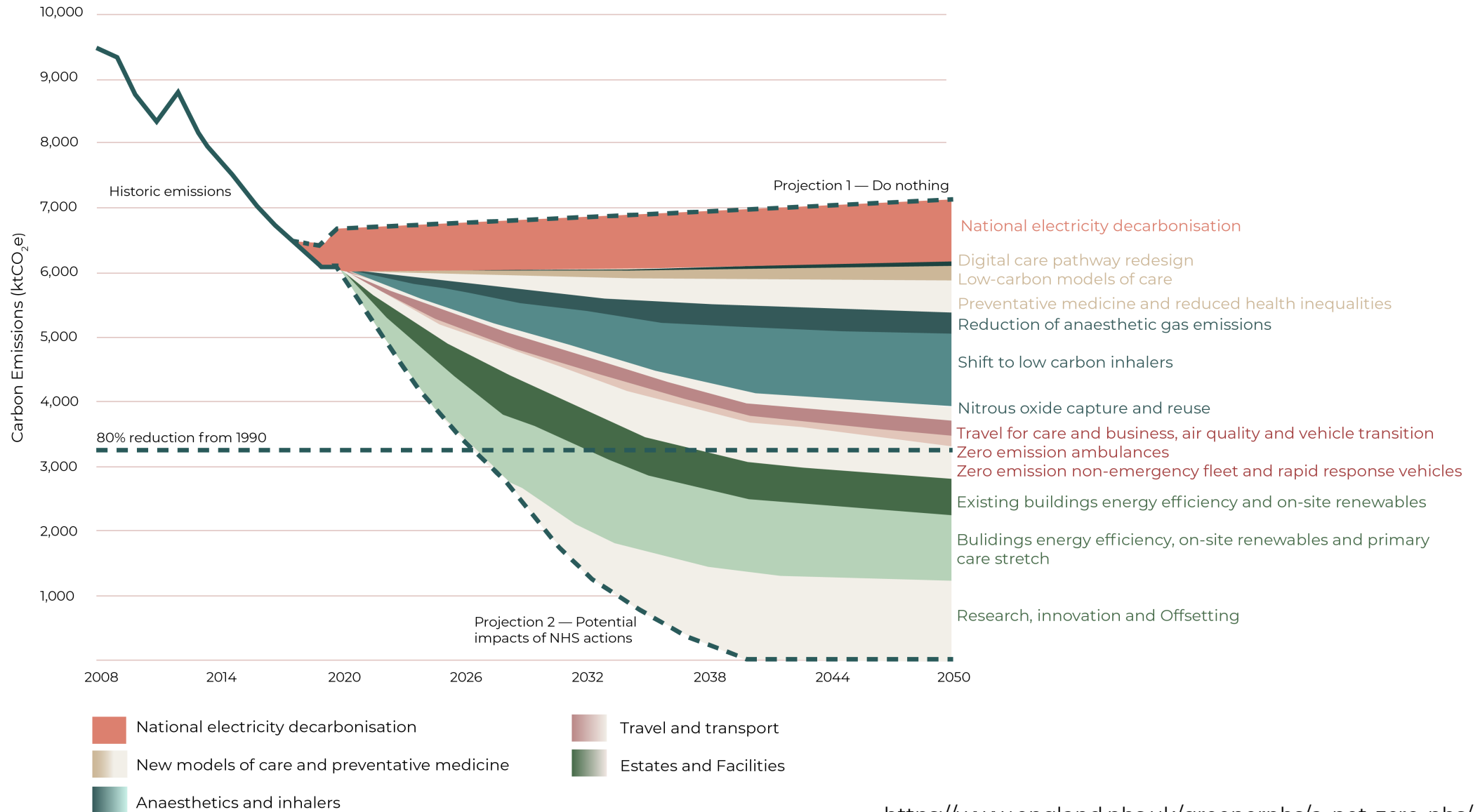
...or how powerful a greenhouse gas is relative to CO₂

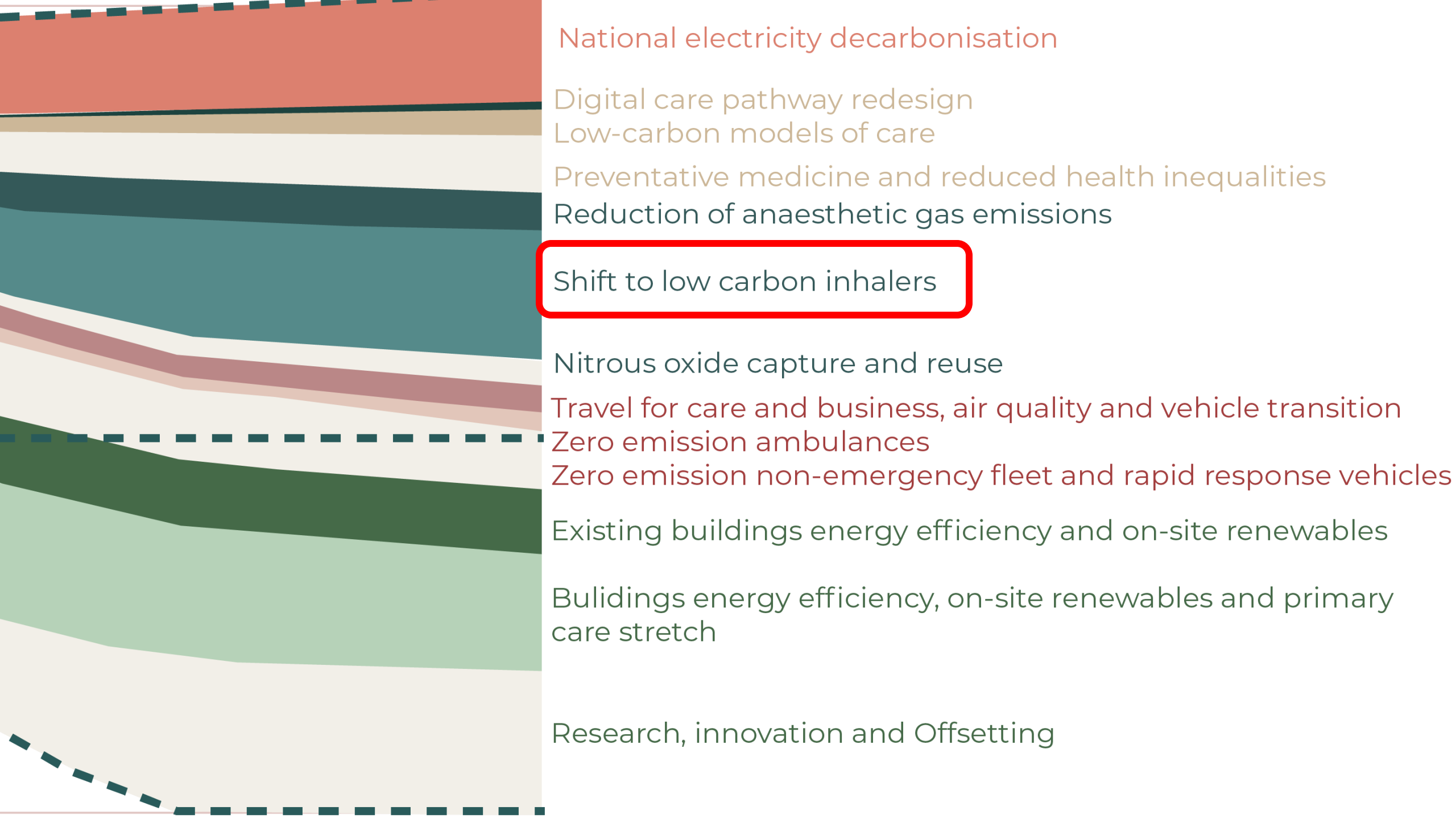
Name	Global warming potential AR5
HFO-1234ze	<1
CO ₂ carbon dioxide	1
CH ₄ Methane	21
HFA152a	138
HFA-134a	1,300
HFA-227ea	3,350
CFC-11	4,660
CFC-12	10,200

In current use

Previous CFC inhalers

PATHWAY TO NET ZERO FOR THE NHS CARBON FOOTPRINT SCOPE





National electricity decarbonisation

Digital care pathway redesign

Low-carbon models of care

Preventative medicine and reduced health inequalities

Reduction of anaesthetic gas emissions

Shift to low carbon inhalers

Nitrous oxide capture and reuse

Travel for care and business, air quality and vehicle transition

Zero emission ambulances

Zero emission non-emergency fleet and rapid response vehicles

Existing buildings energy efficiency and on-site renewables

Bulidings energy efficiency, on-site renewables and primary care stretch

Research, innovation and Offsetting

LIFE CYCLE ANALYSES

WHAT MAKES UP THE CO₂E?

- MDIs – propellant

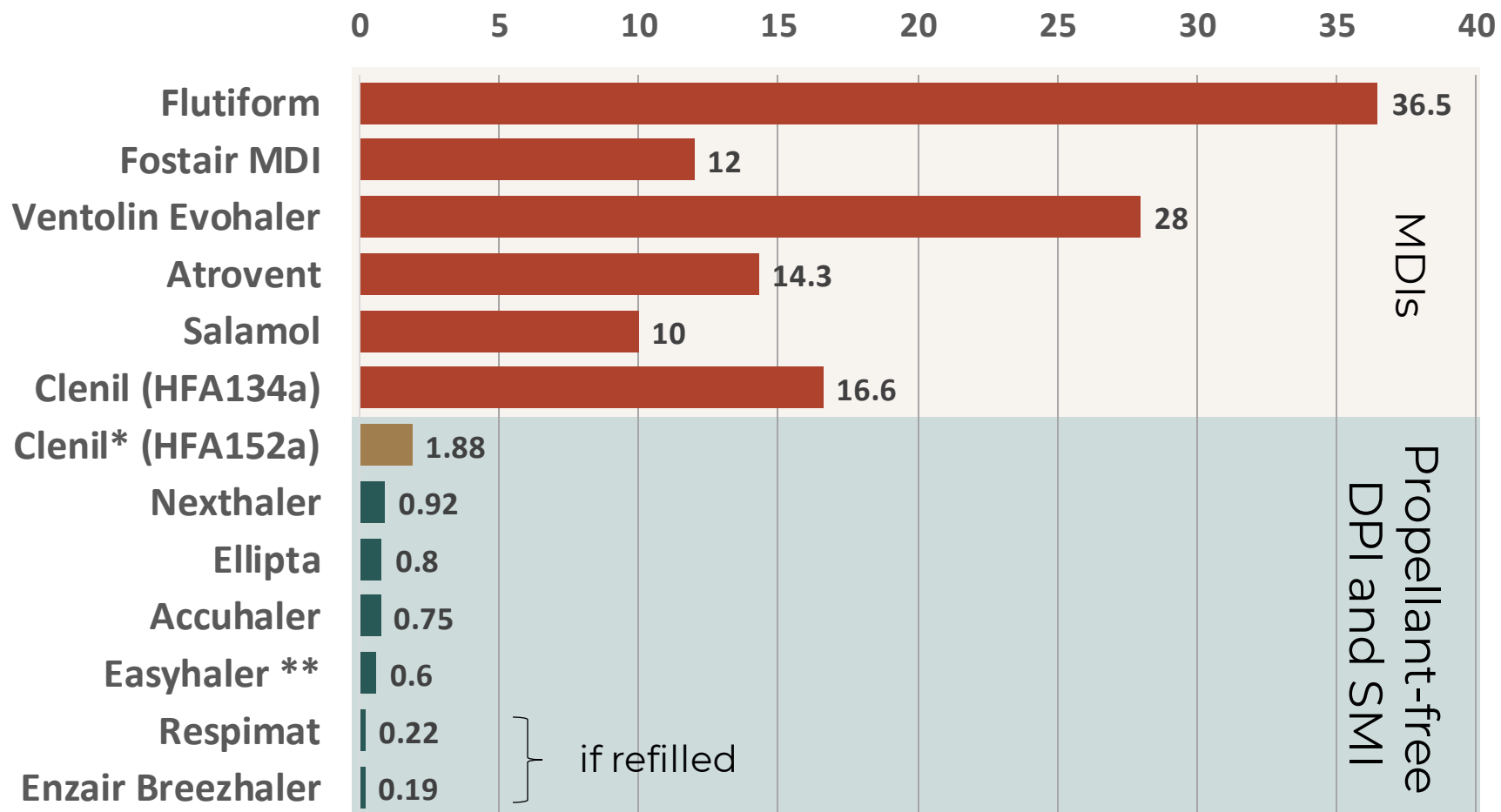
Reference	% of CO ₂ e due to propellant release in manufacture, use or end of life
Jeswani et al.	98%
Panigone et al.	94%
Janson et al.	96%
Goulet et al.	98%

Carbon footprint is roughly equal to amount of propellant x GWP

- DPIs – mixed picture
 - Energy/water use
 - Packaging
 - Raw materials
 - API
 - distribution

Jeswani HK, Azapagic A. Life cycle environmental impacts of inhalers. *J Clean Prod.* 2019;237:117733. Panigone S, Sandri F, Ferri R, Volpato A, Nudo E, Nicolini G. Environmental impact of inhalers for respiratory diseases: decreasing the carbon footprint while preserving patient-tailored treatment. *BMJ Open Respir Res.* 2020;7(1):e000571. Janson C, Henderson R, Löfdahl M, Hedberg M, Sharma R, Wilkinson AJK. Carbon footprint impact of the choice of inhalers for asthma and COPD. *Thorax.* 2020;75(1):82 LP-84. Goulet B, Olson L, Mayer B. A Comparative Life Cycle Assessment between a Metered Dose Inhaler and Electric Nebulizer. *Sustainability* 2017; 9: 1725.

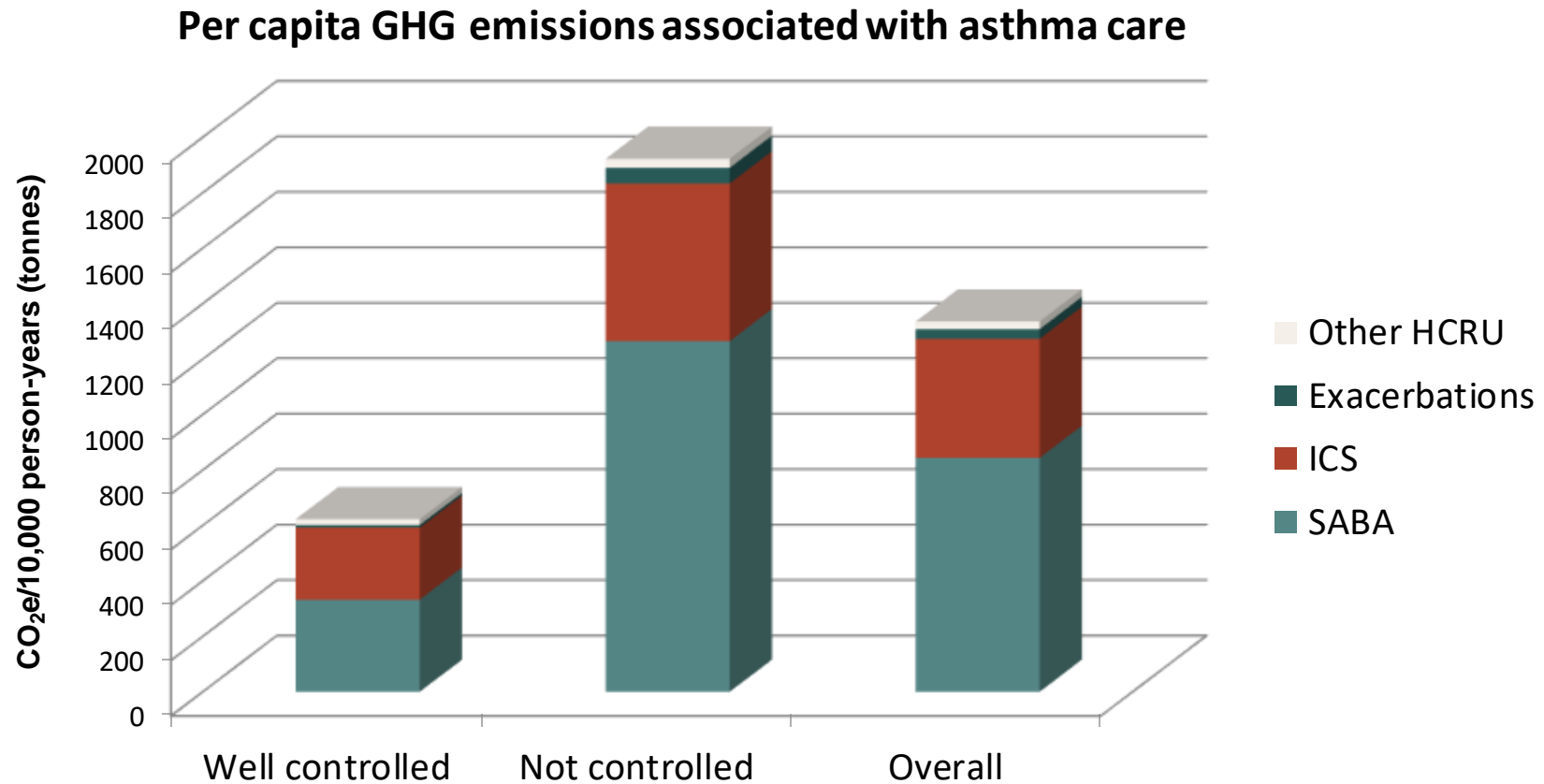
CARBON FOOTPRINT PER INHALER (OR PER MONTH) (KG CO2E)



* Potential inhaler under development
 **Easyhaler is certified carbon neutral globally using carbon offsets

Wilkinson AJK et al. BMJ Open. 2019;9(10):e028763. Jeswani HK et al. Journal of Cleaner Production. 2019;237:117733. Panigone S et al. BMJ Open Respir Res. 2020;7(1):e000571. Carbon life cycle assessment report for Orion Corporation, Orion Pharma. Executive summary. Carbon Footprint Ltd 2021. Available at: Orion.fi. Fulford, B et al. Sustainability 2021;13:6657. Janson C et al. Thorax. 2020;75(1):82-84. Hänsel M et al. Adv Ther. 2019;36(9):2487-2492.

WHAT ABOUT OVERALL CARE OF ASTHMA?



Greenhouse gas emissions associated with asthma care in the UK: results from SABINA CARBON

Alexander Wilkinson, Ekaterina Maslova, Christer Janson, Vasanth Radhakrishnan, Jennifer K Quint, Nigel Budgen, Trung N Tran, John P Bell, Andrew Menzies-Gow European Respiratory Journal Sep 2021, 58 (suppl 65) OA76; DOI: 10.1183/13993003.congress-2021.OA76

GLOBAL WARMING POTENTIAL

...or how powerful a greenhouse gas is relative to CO₂

Name	Global warming potential AR5
HFO-1234ze	<1
CO ₂ carbon dioxide	1
CH ₄ Methane	21
HFA152a	138
HFA-134a	1,300
HFA-227ea	3,350
CFC-11	4,660
CFC-12	10,200

In current use

Previous CFC inhalers

CONCLUSIONS

We have reliable, industry-standard life cycle analysis data on inhalers

MDIs have a large carbon footprint due to their propellants

MDIs are major contributors to the carbon footprint of respiratory care

Non-propellant inhalers have far smaller carbon footprints