

Impact of non-clinically driven inhaler initiation or switch on carbon (CO₂) emissions and healthcare costs for COPD patients using single inhaler triple therapy (SITT)

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Introduction - Why did we perform this research?

Background: Although <0.04% of global greenhouse gas emissions are attributed to pressurized metered dose inhalers (pMDIs), efforts to reduce CO₂e emissions from some health systems might lead to non-clinically driven initiation or switch to dry powder inhalers (DPIs) over pMDIs, which could have variable consequences.

Objective: This study aimed to quantify the CO₂e emissions and cost impact of non-clinically driven initiation or switching to DPIs within the single inhaler triple therapy (SITT) class for COPD patients in the UK, Sweden, and Denmark.

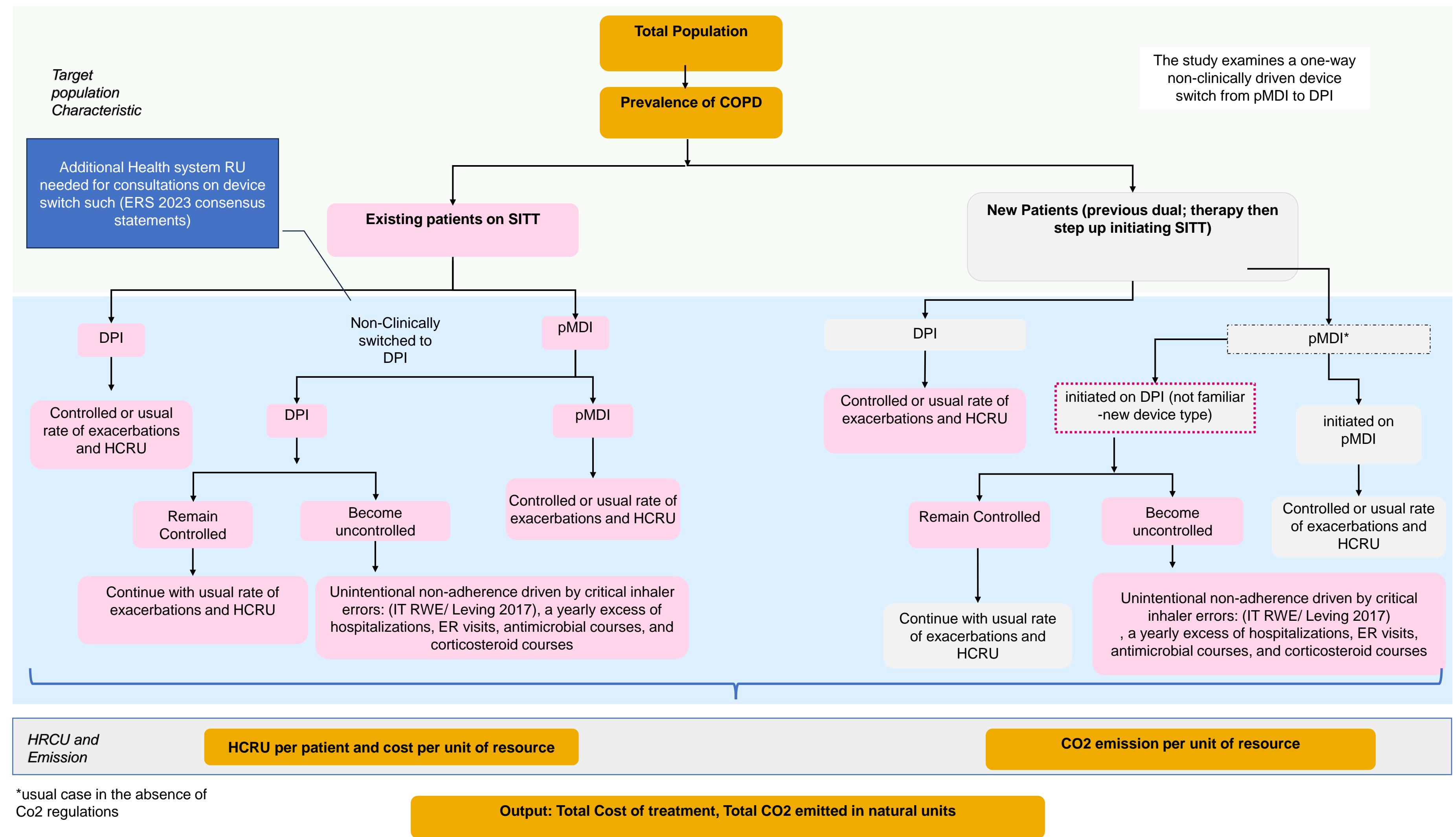
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Poster presented at ISPOR Europe, Glasgow, UK.

Methodology - How did we perform this research?

Approach: A targeted literature review informed a cost and CO₂e budget impact model. Sensitivity analyses explored parameter variations, and additional analysis examined the impact of introducing pMDIs with next-generation propellants (NGPs) from 2026. NGPs have 99.9% lower GWP than the initial propellant ^{1,2}. BREZTRI/TRIXEO with an NGP has a similar GHG footprint to DPIs ².

Key inputs included:

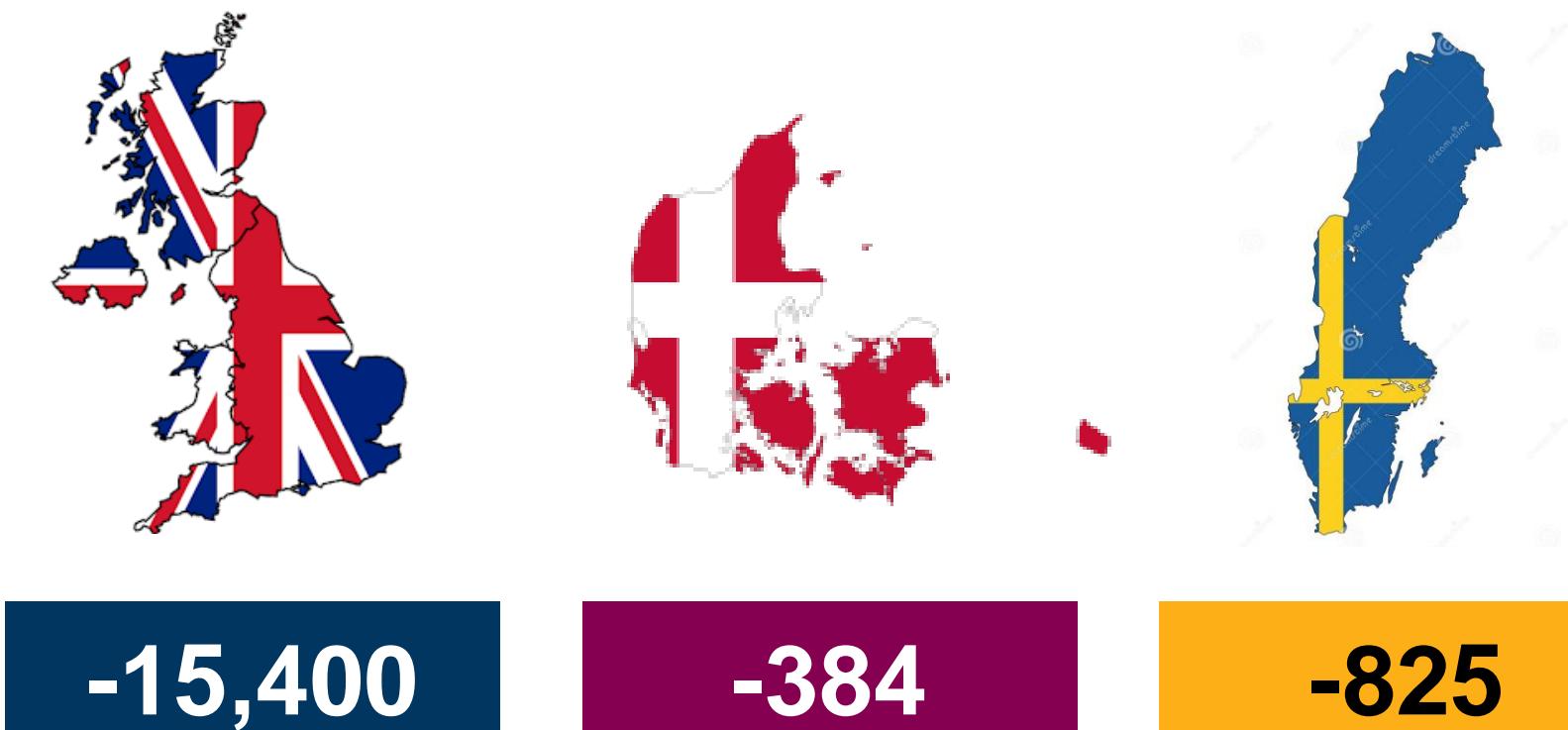
- Epidemiology:** COPD prevalence, incidence, and inhaler usage patterns
- Market share:** Distribution of pMDI vs DPI within the SITT class
- Clinical parameters:** Annual exacerbation rates for moderate to very severe COPD, and rates following non-clinically driven inhaler switches
- HCRU and costs:** Inhaler use, exacerbation-related hospitalizations, clinical visits, and non-medical costs (e.g., transport)
- CO₂e emissions:** CO₂e emissions were estimated using UK data (most detailed available), then adjusted for Sweden and Denmark using per capita Health Carbon Footprints



Results - What did we find?

Impact of Environmentally Driven Inhaler Policies (2024–2028):

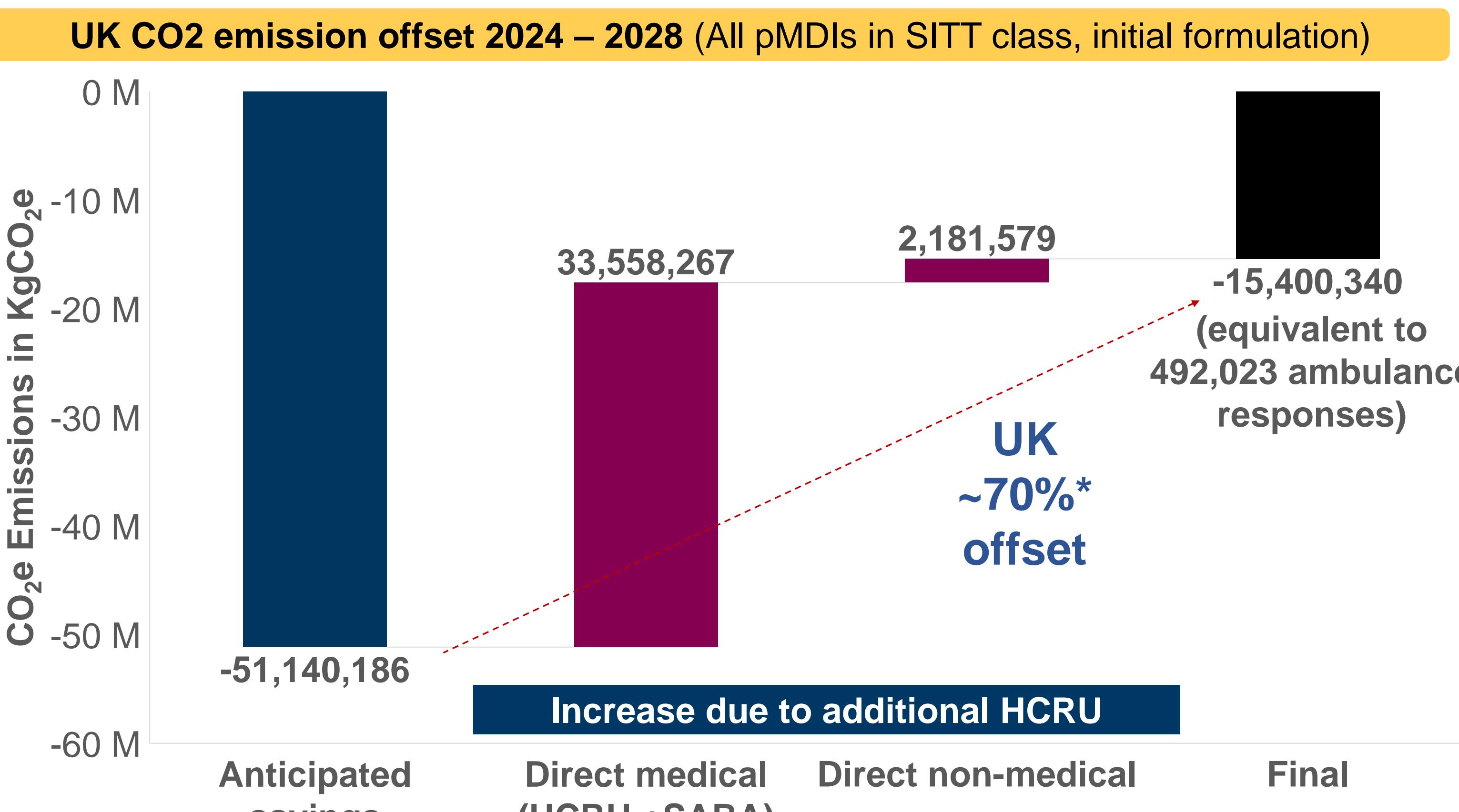
Projections of environmentally driven inhaler policies from 2024–2028 yielded lower than anticipated CO₂e savings (metric tonnes CO₂e):



However, these were accompanied by increased healthcare costs:



Higher CO₂e emissions related to COPD exacerbations offset approximately 64–70% of the anticipated inhaler-related savings

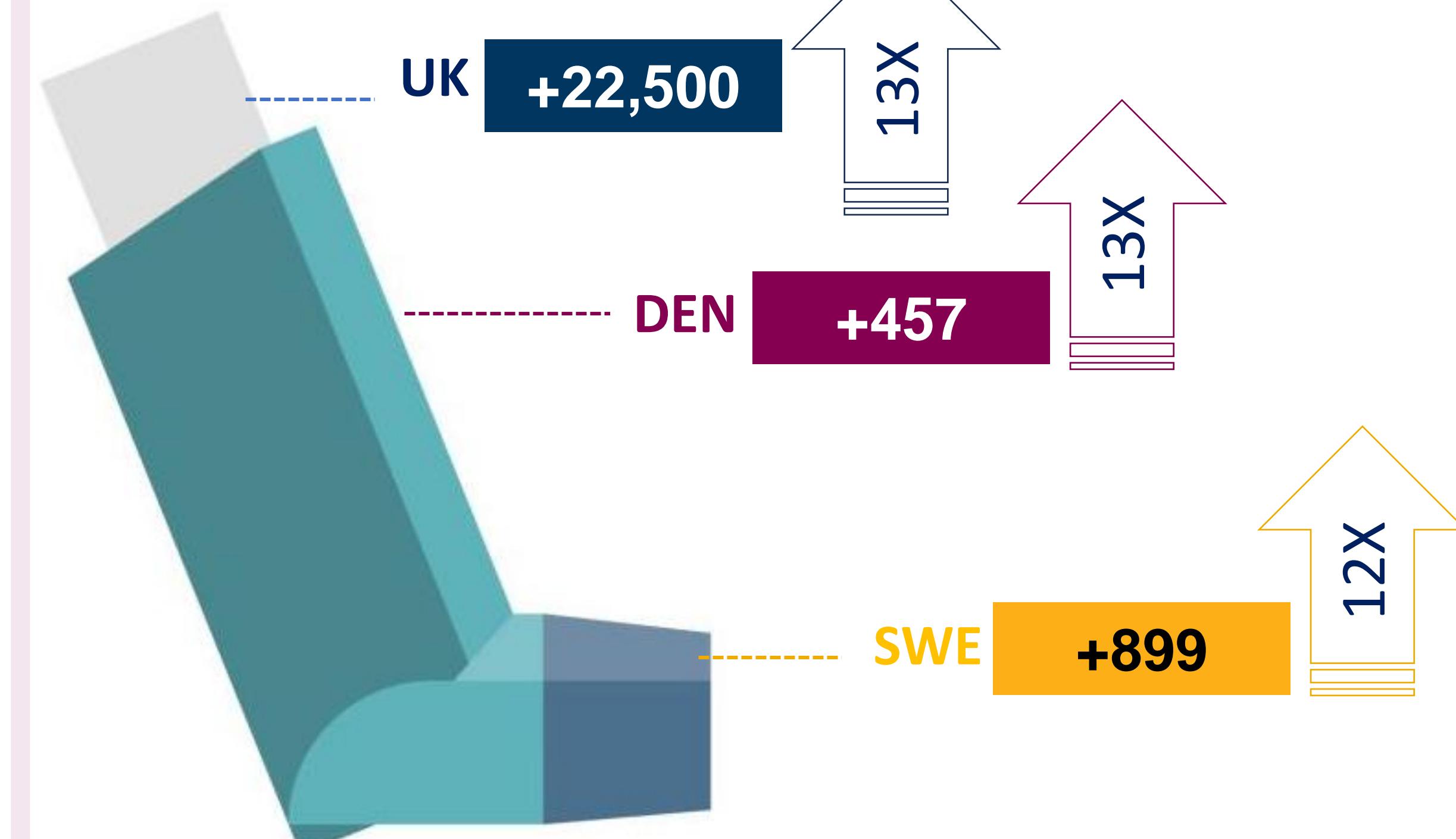


*Direct non-medical emissions refer to transportation to and from medical appointments

Scenario analysis examined the expected impact of introducing pMDIs with next-generation propellants (NGPs) from 2026 to 2028

Continuing these policies after the introduction of pMDIs with NGPs completely offset CO₂e savings and resulted in a 12 to 13-fold increase in total CO₂e emissions noting TRIXEO/BREZTRI with next-generation propellant became the first inhaled medicine worldwide to receive approval from EU and UK regulatory agencies in 2025.

Additional CO₂e generated with continued policy (metric tonnes CO₂e)

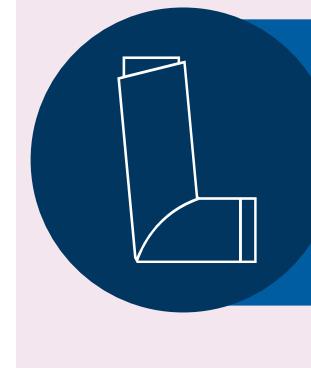


Corresponding increases in healthcare costs were also observed (2026–28)



How might this impact current clinical practice?

- Non-clinically driven SITT initiation or switching policies to DPIs may initially appear to offer CO₂e emission savings, but this leads to poorer clinical control and HCRU, which also largely offset any benefits on CO₂ emissions.
- Optimal COPD management through evidence-based guidelines and appropriate device selection is crucial to balance minimizing carbon footprint and HCRU with improving patient outcomes.



Prescribing policies and guidelines encouraging a DPI initiation or switch over pMDIs for environmental reasons should be promptly updated to account for pMDIs with NGP, which have similar GHG footprint to DPIs.

Abbreviations

CO₂e, Carbon Dioxide Equivalent; pMDI, Pressurized Metered-Dose Inhaler; NGP, Next-Generation Propellant; COPD, Chronic Obstructive Pulmonary Disease; DPI, Dry Powder Inhaler; SITT, Single-Inhaler Triple Therapy; HCRU, Healthcare Resource Utilization; UK, United Kingdom; SWE, Sweden; DK, Denmark; GHG, Greenhouse Gas; SABA, Short-Acting Beta-Agonists

References

1. Smith C, et al. The Earth's energy budget, climate feedbacks and climate sensitivity supplemental material. In: Masson-Delmotte V, et al. Climate change 2021: the physical science basis. 2021.

Available from: ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter07_SM.pdf (Accessed 16 January 2025); 2. Hargreaves C, et al. Oral presentation at BTS 2022 (Abstract S60).

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Disclosures

KP, MK, JM, DP, IR, JS, JB, DT are employees of and may hold stock or stock options in AstraZeneca

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