

Establishing Ireland's Healthcare Greenhouse Gas Baseline: Key Findings, Implications, and Future Directions

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As climate change accelerates towards catastrophic thresholds, healthcare faces a dual responsibility: protecting population health while minimising its environmental footprint. The scale of action required is unprecedented. Healthcare contributes an estimated 4.4% of global greenhouse gas emissions (GHGe).¹ At COP26 in 2021, 50 countries committed to developing climate-resilient health systems, and 14, including Ireland, pledged to become net-zero health services by 2050.² Yet, scalable, replicable approaches to measuring healthcare GHGe and translating this into action remain limited.

Recognising that effective management requires measurement, the Health Service Executive (HSE), Ireland's public healthcare service, commissioned its first comprehensive GHGe inventory and decarbonisation roadmap in 2025.^{3,4} Using Health Care Without Harm (HCWH) methodologies⁵ to estimate direct emissions (Scope 1), indirect emissions from purchased electricity (Scope 2), and supply-chain-related emissions (Scope 3) from 2019 as the baseline year.³

Using a hybrid model combining activity data and emissions factors, it was estimated that HSE-operated services in 2019 generated 881.9 kilotonnes CO₂ equivalents (ktCO₂e).³ Scope 1 and 2 accounted for 29% of GHGe, while Scope 3 contributed 71%.³ Without intervention, health-sector emissions are projected to increase by approximately 90% by 2050.⁴ These projections should also be interpreted in light of broader demographic and system pressures, including population ageing, increasing multimorbidity, and expansion of advanced

diagnostics and therapeutics, all of which may further increase emissions unless addressed within a sustainability framework.

These estimates reflect Ireland's complex system. Alongside HSE-delivered care, a substantial share of healthcare activity occurs in the private sector, as well as in primary care and publicly funded, operationally independent tertiary, quaternary, and community services. Since this inventory only includes HSE-operated services,³ it should be viewed as a baseline for part of the system rather than a full account of national health-sector emissions.

Even within HSE-operated services, data gaps are evident. For instance, the absence of staff-commuting data required reliance on older national data, which may not accurately reflect current travel behaviours, especially in the context of expanded remote working and housing-related commuting pressures.³ Addressing these limitations will require a whole-system approach to emissions accounting that extends beyond publicly delivered care.

Consequently, the current inventory should be regarded as an underestimate. For context, Ireland's total emissions in 2019 were approximately 59.7 million tonnes of CO₂e.⁶ Applying HCWH's estimate that 4.4% of national GHGe are attributable to healthcare,¹ this indicates healthcare GHGe of approximately 2,630 kt CO₂e per year, far exceeding the 881.9 kt CO₂e in this inventory.

It is also important to recognise that GHGe represent only one dimension of healthcare's environmental footprint. Other effects include air pollution, ozone-depleting substances, ecotoxicity, acidification, eutrophication, and biodiversity loss. Integrating these indicators into baseline accounting would better align decarbonisation with broader ecosystem protection and avoid unintended trade-offs that undermine climate, nature, and health co-benefits.

Three operational lessons emerge from this process. First, developing robust GHGe inventories is resource-intensive, requiring multidisciplinary expertise, high-quality data, and sustained investment. Current data gaps include staff mobility patterns and staff knowledge and attitudes regarding climate change and sustainable healthcare; these areas require regular, standardised measurement. Dedicated personnel are critical not only for data collection and analysis, but also to implement sustainable healthcare interventions.³

Second, if all interventions considered in the decarbonisation roadmap were fully implemented, the HSE's emissions could fall by 75% relative to the business-as-usual projection by 2050.⁴ This would represent major progress, but additional efforts would still be required to reach net-zero by 2050.⁴ Making inventories useful to policymakers and frontline staff will require real-time, accessible centralised GHGe monitoring from facility through to regional and national levels. Translation into clinical practice requires pragmatic examples: embedding preventive care, reducing low-value interventions, supporting patient

self-management, and adopting lower-impact technologies in line with established sustainable healthcare principles.⁷

Third, Scope 3 emissions dominate and therefore demand strategic focus. In the HSE inventory, purchased goods and services contributed 40% of total emissions and pharmaceuticals alone contributed 19% of total emissions.³ Modelled interventions in sustainable procurement and greener models of healthcare could deliver cumulative savings of 6,467 ktCO₂e and 2,408 ktCO₂e, respectively, by 2050.⁴ Supply-chain decarbonisation must become a core strategy and manufacturers must play their part through mandatory GHGe disclosures and reductions. Such measures can inform procurement, health technology assessment, clinical guidelines, and policy, helping to align clinical and sustainability objectives.⁸

Compared with systems such as the United Kingdom's National Health Service (NHS) which has progressed this agenda over many years, the HSE remains at an earlier stage. Nonetheless, the roadmap demonstrates that with sustained commitment, the HSE can make meaningful progress and stands to learn from international experience.

Overall, while the current inventory underestimates total health-sector emissions, it provides an actionable baseline for immediate progress. Next steps should prioritise Scope 3 emissions, with stronger supply-chain transparency and shared accountability for emissions reporting and reduction. Addressing this challenge requires leveraging the sector's economic weight. The strategic deployment of healthcare spending offers a far more powerful lever to shift national emissions trajectories than direct operational cuts alone. Equally important is mobilising the hundreds of thousands of people employed in Irish healthcare, whose collective daily actions and advocacy can drive systemic change. Sustained workforce investment, including dedicated staff, continuing professional development, and the integration of sustainability into undergraduate and postgraduate curricula, is therefore essential to equip this vast workforce to deliver low-carbon, high-value care at scale.

Finally, while health-sector decarbonisation is essential, more than 95% of total GHGe arise outside healthcare.^{1,9} The HSE is legally obliged under the Health Act 2004 to use resources "in the most beneficial, effective and efficient manner to improve, promote and protect the health and welfare of the public".¹⁰ This statutory duty unequivocally extends to addressing the climate crisis, the greatest population health threat of the 21st century. Action on public health determinants offers a dual benefit: interventions promoting clean air, active commuting, and plant-rich diets reduce emissions while directly preventing illness. Delivering this requires the health sector to apply the same evidence-based approaches used to curb other health-damaging industries, including advocacy for a meaningful, internationally agreed roadmap to phase out fossil fuels.

With its long track record in regulating harmful commercial interests and broad societal reach, the health-sector has both the authority and the obligation to drive climate and biodiversity action beyond its own operations. By measuring and reducing health-sector GHGe and broader environmental harms, the health-sector can strengthen credibility and influence in supporting societal efforts towards a healthier, sustainable and more equitable future.

Declarations of Conflicts of Interest:

None declared.

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