

# Introduction of faecal calprotectin testing into the UK inflammatory bowel disease diagnostic pathway reduces environmental burden



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## 01 BACKGROUND

- Inflammatory bowel diseases (IBD), such as Crohn's disease and ulcerative colitis, are chronic inflammatory diseases of the gastrointestinal tract.<sup>1</sup>
- The prevalence of IBD is rising,<sup>2</sup> making timely and improved diagnosis increasingly important.
- The IBD diagnosis pathway involves several diagnostic tests and substantial use of physician time and healthcare resources.<sup>3,4</sup>
- Faecal calprotectin (FCP) testing for IBD diagnosis in the primary care setting is recommended by the National Institute for Health and Care Excellence (NICE) (DG11)<sup>5</sup> and by IBD UK<sup>1</sup> (Figure 1).<sup>6,7</sup> However, uptake in clinical practice has been limited.<sup>8,9</sup>
- The United Kingdom (UK) has set targets to decarbonise the National Health Service and achieve net-zero by 2030–2045.<sup>10–12</sup> Sustainable changes to clinical practice that maintain or enhance patient outcomes while reducing environmental impact are crucial to achieving this goal.
- The use of FCP testing in the diagnosis of IBD reduces secondary care referrals and endoscopic investigations,<sup>13–15</sup> with potential concomitant savings of greenhouse gas (GHG) emissions.

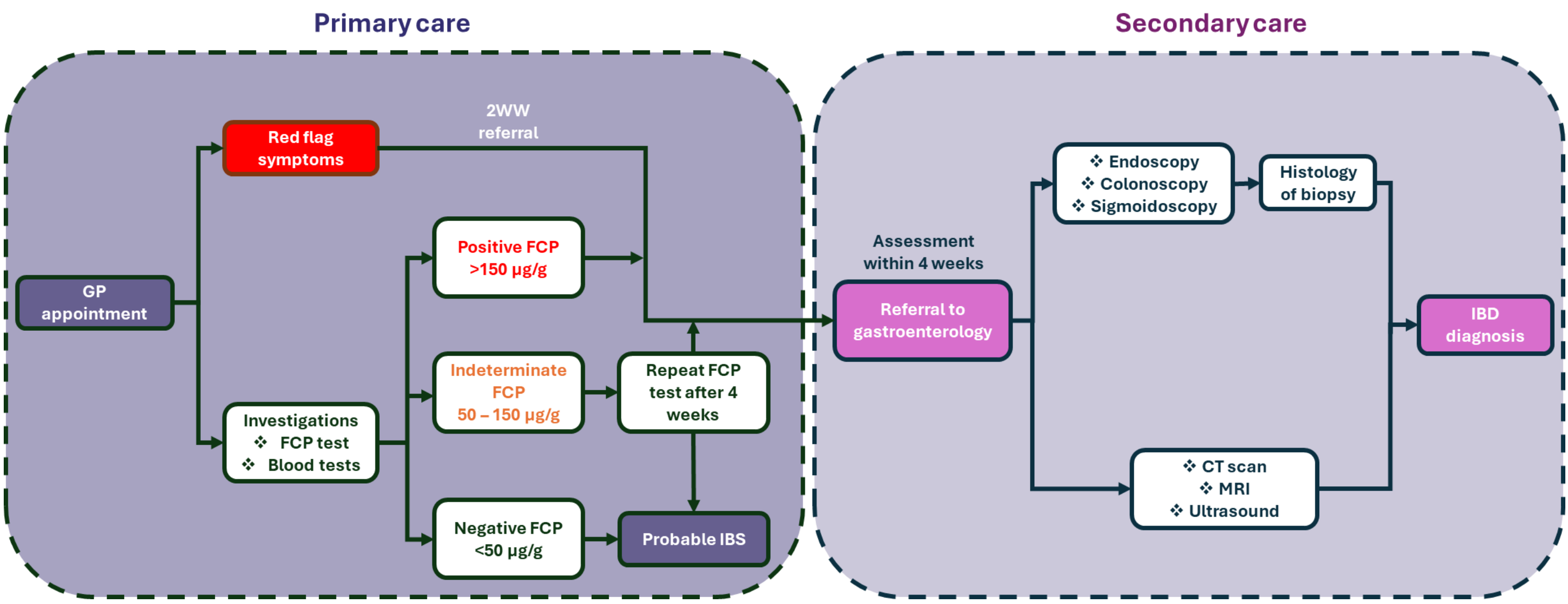


## 02 OBJECTIVE



This study aims to quantify GHG emissions associated with the UK IBD diagnosis pathway with and without FCP testing.

Figure 1. The recommended use of faecal calprotectin testing in the UK IBD diagnosis pathway according to published guidelines<sup>6,7</sup>



CT, computed tomography; FCP, faecal calprotectin; GP, general practitioner; IBD, inflammatory bowel disease; IBS, irritable bowel syndrome; MRI, magnetic resonance imaging; UK, United Kingdom; 2WW, 2 week wait.

## 03 METHODS

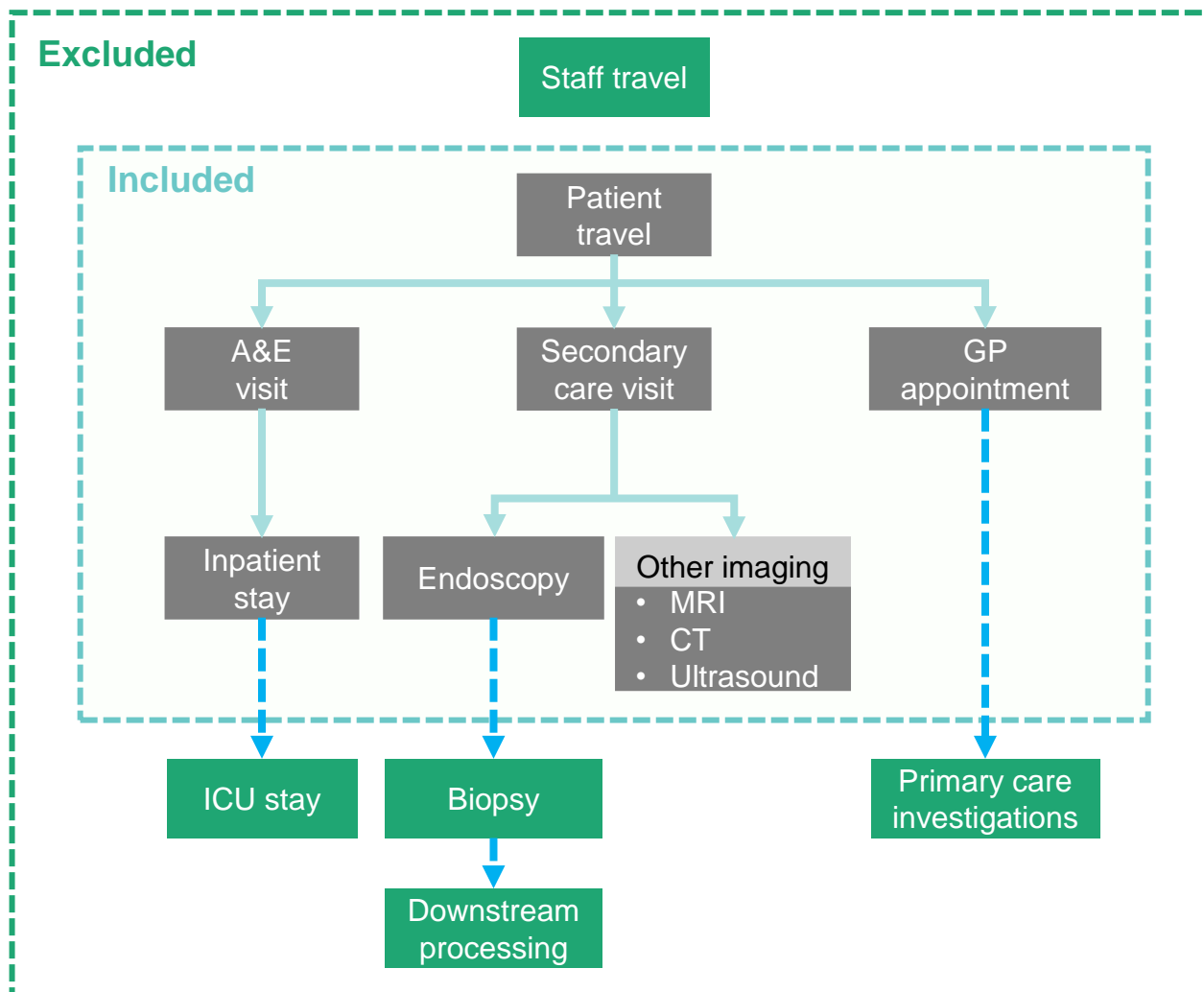


- The UK IBD diagnosis pathway was mapped over one-year according to current clinical practice and published guidelines (Figure 2).<sup>3,6</sup>

### Study limitations

- Pre-diagnosis hospitalisation is one of the most significant contributors to carbon dioxide equivalents (CO<sub>2</sub>e) in the IBD diagnosis pathway. However, this was not captured in this model due to a lack of published data on the potential reduction in pre-diagnosis hospitalisation following FCP testing implementation.
- Data on the potential change in diagnostic imaging usage (other than endoscopic investigation) with FCP testing was also not captured in this study.
- Where UK data was unavailable, data from other countries were used as proxies.

Figure 2. Study boundary diagram depicting the inclusions and exclusions of the model.<sup>21–26</sup>



A&E, accident and emergency; CT, computed tomography; GP, general practitioner; ICU, intensive care unit; MRI, magnetic resonance imaging.

- Changes in secondary care referrals and diagnostic imaging tests following the adoption of FCP testing in the primary care setting were derived from published literature (Table 1).<sup>1,13,15–18</sup>

Table 1. Greenhouse gas emissions (kg CO<sub>2</sub> equivalents) per healthcare resource use event associated with IBD diagnosis according to published literature

Healthcare resource	Greenhouse gas emissions per visit/ event (kg CO <sub>2</sub> e)	Associated patient travel (kg CO <sub>2</sub> e)	Total Greenhouse gas emissions per visit/ event (kg CO <sub>2</sub> e)
GP visit <sup>21</sup>	1.14	1.12	2.26
A&E visit only <sup>21</sup>	13.77	16.42	30.20
A&E plus inpatient stay <sup>21</sup>	241.19	16.42	257.61
Specialist care visit <sup>21</sup>	1.14	5.80	6.94
Endoscopy <sup>21,25,26</sup>	16.92	5.80	22.72
Other imaging (MRI, CT, ultrasound) <sup>21–24</sup>	11.01	5.80	16.81

\*Carbon cost for one visit to ER plus an average hospital stay of 6 days per patient per visit.<sup>27</sup>

A&E, accident and emergency; CO<sub>2</sub>e, carbon dioxide equivalents; CT, computed tomography; GP, general practitioner; IBD, inflammatory bowel disease; kg, kilogram; MRI, magnetic resonance imaging

## 04 RESULTS



- The total GHG emissions associated with the IBD diagnosis pathway without FCP testing over one-year in the UK was estimated at **4,606 tonnes of CO<sub>2</sub>e** (Table 2).
- Published literature suggests that implementation of FCP testing in primary care could reduce secondary care referrals by **53.73%**, and endoscopic investigations by **48.37%**.

Table 2. Total greenhouse gas emissions (CO<sub>2</sub> equivalents) per healthcare resource use prior to IBD diagnosis over a one-year time period according to published literature

Healthcare resource	Total greenhouse gas emissions per visit/ event (kg CO <sub>2</sub> e)	Total number of annual visits/ events	Total greenhouse gas emissions annually (kg CO <sub>2</sub> e)	Total greenhouse gas emissions annually (tonnes CO <sub>2</sub> e)
GP visit <sup>21,28</sup>	2.26	21,030.57	47,457.58	47.46
A&E visit only <sup>1,21,29</sup>	30.20	24,184.43	730,287.64	3,250.39
A&E plus inpatient stay <sup>1,21,29</sup>	257.61	9,782.47	2,520,106.38	
Specialist care visit <sup>21,28</sup>	6.94	72,270.00	501,308.08	501.31
Endoscopy <sup>21,25,26,28</sup>	22.72	20,596.95	467,859.72	
Other imaging (MRI, CT, ultrasound) <sup>21–24,28</sup>	16.81	20,187.42	339,417.82	807.28
Total			4,606,437.23	4,606.44

\*Carbon cost for one visit to ER plus an average hospital stay of 6 days per patient per visit.<sup>27</sup>

A&E, accident and emergency; CO<sub>2</sub>e, carbon dioxide equivalents; CT, computed tomography; GP, general practitioner; IBD, inflammatory bowel disease; kg, kilogram; MRI, magnetic resonance imaging.

- Following NICE recommendations to implement FCP testing could reduce GHG emissions by **495.66 tonnes CO<sub>2</sub>e annually**, which is equivalent to a **10.76% reduction in CO<sub>2</sub>e** compared to the UK IBD diagnostic pathway without FCP testing (Figure 3).

This GHG saving is comparable to:

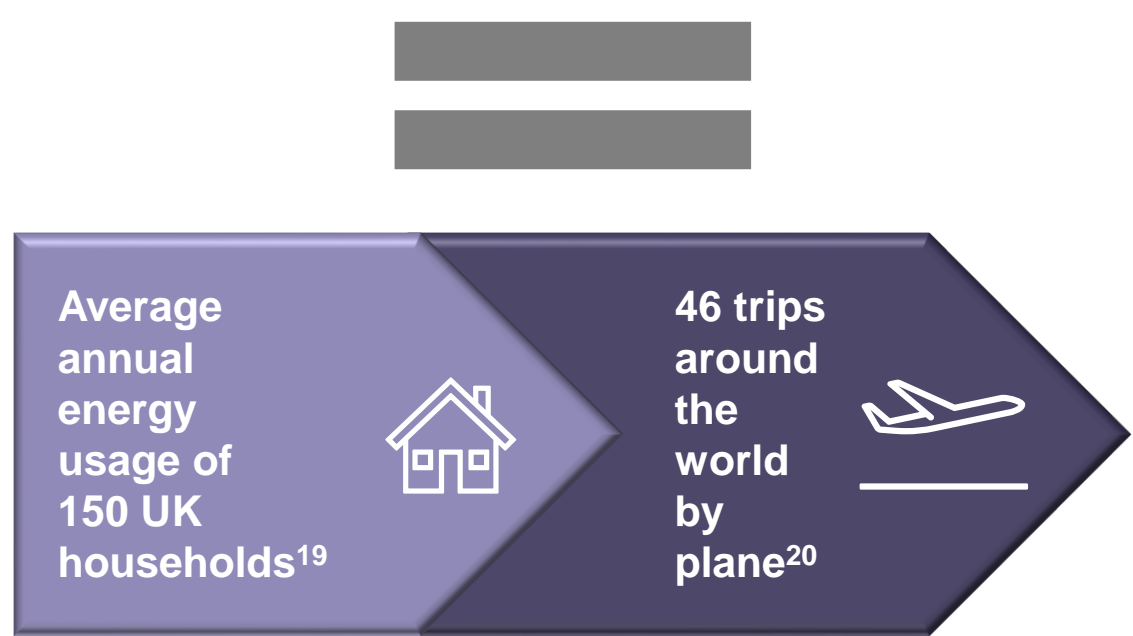
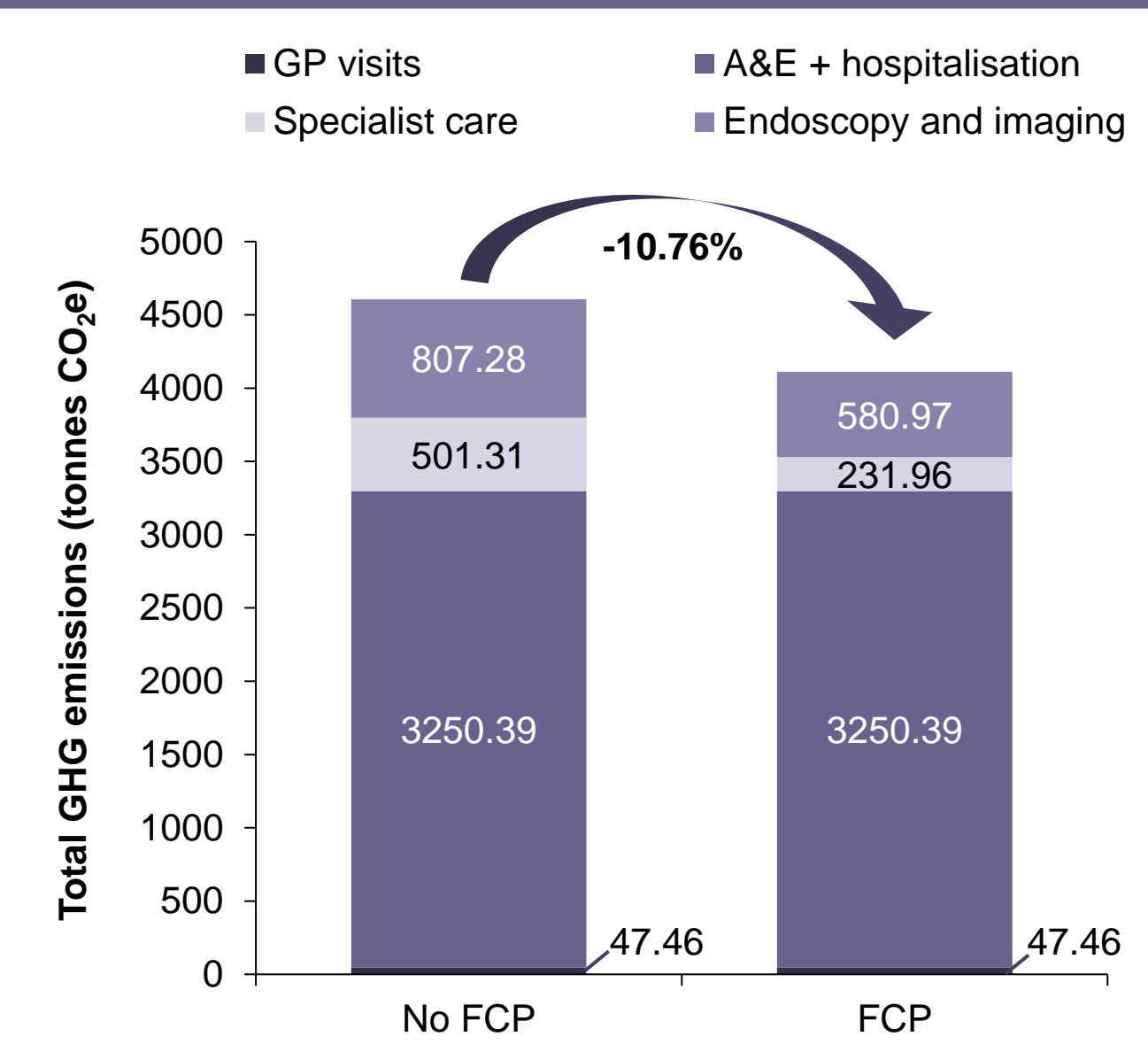


Figure 3. Implementation of FCP testing in the primary care setting reduces the annual GHG emissions in the UK



A&E, accident and emergency; FCP, faecal calprotectin; GHG, greenhouse gas emissions; GP, general practitioner; IBD, inflammatory bowel disease; UK, United Kingdom.

## 05 DISCUSSION AND CONCLUSIONS



- FCP testing confers patient benefit by reducing the time to IBD diagnosis and treatment, in addition to avoiding the need for secondary care referrals and invasive biopsy in a high proportion of patients.
- Moreover, implementing FCP testing in the primary care setting substantially reduces GHG emissions by avoiding unnecessary secondary care referrals and endoscopic investigations.
- Optimising care pathways can improve patient outcomes, as well as aiding healthcare systems to meet their net zero targets.

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