HEATHROW AIRPORT EXPANSION RISKS FOR THE CLIMATE CHANGE ACT

How growing airport capacity before climate technologies succeed will break the UK's carbon budget

Tyndall Centre for Climate Change Research

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Corrections made to previous version:

Executive Summary:

Original text: "Even with this unduly large carbon budget, with some demand moderation and optimistic technology uptake assumed, aviation uses a disproportionately high share (27%) of CB7 in the CCC's Balanced Pathway scenario. This is however without a third Heathrow runway. If these multi-billion-pound developments lead to a greater increase in air passenger traffic at these airports by 2038, then the CB7 aviation budget will require a reassessment."

New text: "Even with this unduly large carbon budget, with some demand moderation and optimistic technology uptake assumed, aviation uses a disproportionately high share (27%) of CB7 in the CCC's Balanced Pathway scenario. The analysis for CB7 considers all industry proposed airport expansions as of 2024 (CCC, 2025b), of which Heathrow's is around half, however in the Balanced Pathway a significant proportion of this capacity is not utilised (Section 1). If these multi-billion-pound developments lead to a greater increase in air passenger traffic at these airports by 2038, then the CB7 aviation budget will require a reassessment."

Page 13: 'engineered removals' changed to 'removals'

Page 32:

Original text: "The capacity the DfT already assumes to exist for 2030, around 465 mppa, exceeds anything the CCC's own demand path reaches at any point before 2050, and a third runway would add up to a further 54 mppa on top."

New Text: "The capacity the DfT already assumes to exist for 2030, around 465 mppa, exceeds anything the CCC's own demand path reaches at any point before 2050."

Cover image credit: Magnific

FOREWORD

By Professor Kevin Anderson

THE CLIMATE CONTEXT – BEYOND COMFORTABLE NARRATIVES

The climate we experience today is, on average, the least extreme climate that our children will ever know. Unless we exchange comforting narratives for meaningful action, we are on course to leave them, and future generations, a world of escalating climate disruption, deepening food and water insecurity, increasing displacement and growing conflict.

Despite frequent references to a "new normal", there is nothing normal or stable about our trajectory. Every tonne of carbon dioxide emitted from burning fossil fuels adds to global warming. Cutting emissions only slows the rate of warming; it does not stop it. Temperatures stabilise only when fossil fuel emissions reach zero. Until then, climate impacts will continue to intensify.

This is not a new challenge. In 1992, governments committed under the UN Framework Convention on Climate Change to prevent "dangerous" interference with the climate system. In Paris, in 2015, they clarified what that meant: holding warming to well below 2°C while pursuing efforts to limit it to 1.5°C. Yet, more than three decades after that original commitment, global emissions continue to rise and the world is now moving beyond 1.5°C. Most tellingly, away from the climate rhetoric of our leaders, humanity has emitted more CO_2 since 1992 than it emitted throughout all of human history up to 1992.

The remaining carbon budget is now extraordinarily small. Once we set aside the increasingly implausible assumption that future generations will somehow remove hundreds of billions of tonnes of carbon dioxide from the atmosphere, the implications of the science become stark. Even retaining a reasonable chance of limiting warming to well below 2°C demands global emissions reductions approaching 8% every year, starting immediately and continuing until fossil fuel emissions cease. For wealthy nations such as the UK, which have repeatedly committed to reducing emissions earlier and faster than poorer countries, the required annual reductions are higher still.

Against this backdrop, claims of UK climate leadership deserve much closer inspection. Once emissions from international aviation and shipping are included, alongside those embodied in the goods we import and export, UK emissions have fallen by around 20% since 1990 – equivalent to less than 1% per year. This record of incrementalism is far removed from the scale or urgency of the challenge.

It is within this context - not the reassuring language of political rhetoric, but the unforgiving reality of the climate system - that proposals for airport expansion must be judged.

Aviation already accounts for around one in every ten tonnes of the UK's carbon dioxide emissions, while UK citizens fly around six times more per year than the global average. But these stark figures obscure the profound inequality in who flies. In any given year, around half of the UK population does not fly at all, while around 70% of flights are taken by just 15% of the population. Aviation's climate challenge is not about the occasional holiday or a visit to family overseas. It is the high and frequent levels of flying concentrated among a relatively small, affluent section of the population – much of it for tourism.

The economic case for ever more aviation capacity is also less straightforward than its proponents suggest. In 2023, inbound tourism brought around £31 billion into the UK economy, undoubtedly a significant contribution to the tourism industry and the Exchequer. Yet UK residents spent around £74 billion on tourism overseas that same year. The result was a net tourism outflow of £43 billion. Expanding airport capacity in the hope of further stimulating aviation risks increasing rather than reversing this structural imbalance.

But the fundamental problem is climate change. The aviation industry points to continuing efficiency improvements, so-called "sustainable aviation fuels" and, increasingly, the prospect of removing carbon dioxide from the atmosphere. These technologies may each have a role to play at the margins. None, however, provides a credible basis for continued expansion in airport capacity. Efficiency improvements are repeatedly outpaced by growth in demand; sustainable aviation fuels remain limited in scale and face significant constraints; and large-scale carbon dioxide removal remains speculative, expensive and deeply uncertain. The danger is not that researchers and engineers working on these technologies lack expertise or good intentions. It is that their potential is being used to postpone the much more difficult question of how rapidly aviation emissions actually need to fall.

That question cannot be avoided by passing responsibility to future generations. The remaining carbon budget is finite and rapidly shrinking. Every tonne of CO_2 emitted by aviation is a tonne that cannot be emitted elsewhere if the UK is to remain within its

climate commitments. Continued growth in aviation therefore places additional pressure on hospitals, schools, industry, households and other sectors to decarbonise still faster, so that a highly carbon-intensive form of consumption that disproportionately benefits an affluent minority can continue to expand.

It is in this context that the role of the Climate Change Committee (CCC) must be scrutinised. The CCC was established to provide independent advice on how the UK can meet its climate commitments. Its role should therefore be to test government policy against climate science, carbon budgets and the UK's international obligations.

Yet its approach to aviation has inverted that relationship. Rather than asking what level of aviation is compatible with those commitments, the CCC has sought to accommodate aviation growth by building its pathway around a suite of risky assumptions about future efficiency, sustainable aviation fuels and carbon removals.

This is not a minor technical disagreement. The CCC's continued adherence to a "net zero 2050" framework cannot itself be reconciled with the UK's UNFCCC and Paris commitments. On aviation alone, its pathway envisages this single sector emitting more than 20 million tonnes of CO_2 in 2050, and, by implication, continuing to emit substantial quantities year after year well into the second half of the century.

That is unequivocally the wrong direction of travel.

A credible climate advisory body must be willing to say when a politically attractive policy is incompatible with the UK's climate commitments. It should guide policy in accordance with those commitments and the science, rather than massage its assumptions to accommodate policy.

This brings us directly to Heathrow and the central focus of this report.

Heathrow expansion is not an isolated infrastructure decision. It is a decision to create additional, long-lived capacity for aviation at precisely the point when UK emissions need to be falling rapidly. The same fundamental contradiction applies to proposals for expansion at Gatwick, Luton, Stansted, Bristol, Manchester, Newcastle and elsewhere.

No amount of glossy presentation, carefully calibrated modelling or reassuring technological promise changes that underlying reality. The physics does not negotiate. A rapidly shrinking carbon budget cannot simultaneously accommodate sustained growth in aviation and deliver the deep emissions reductions required to meet the UK's climate commitments.

As this report demonstrates in detail, the conclusion is therefore clear.

Heathrow expansion is incompatible with any reasoned and credible interpretation of the UK's international climate commitments. As such, it should not proceed.

Aircraft queuing up on London Heathrow runway. Image credit: Harrison Lugard - Unsplash

EXECUTIVE SUMMARY

This report examines whether the proposed new third runway at Heathrow Airport is compatible with the United Kingdom's domestic and international obligations in the UK Climate Change Act. Through an analysis of future UK aviation scenarios and reviewing the status and outlook for key technology options, the report presents findings that show Heathrow expansion cannot reasonably be considered consistent with UK Government climate targets.

Airport expansion and rising demand for aviation, when coupled with incremental technical innovation hindered by fleet renewal timescales, has long been in tension with the UK's Climate Change Act. Currently almost all aviation fuel is kerosene; a fossil fuel that adds greenhouse gases (GHGs) and other warming pollutants into the atmosphere when combusted, thereby contributing to climate change. The proposed options to limit aviation's future climate impact are demand management, sustainable aviation fuels (SAF), efficiency improvements, electricity propulsion or other alternative fuels, and measures to remove an equivalent amount of GHGs from the atmosphere (greenhouse gas removals). At this time, demand management is the only measure without significant uncertainty about its potential to scale sufficiently in line with the Climate Change Act.

The Climate Change Act gives the UK Government a statutory requirement to ensure that UK territorial GHG emissions do not exceed set totals for a given time period – referred to as carbon budgets. The Act is also intended to deliver on the UK's international obligations to the United Nations Framework Convention on Climate Change (UNFCCC). International aviation emissions are now included within these targets. At the same time, the Heathrow Expansion National Policy Statement (HENPS) states that a third runway would contribute additional aviation demand during the seventh carbon budget period (CB7) of 2038–2042 onwards, if developed (DfT, 2026d).

The Government has accepted CB7 as a legal limit on the UK's in-scope emissions for the 2038–2042 period and this is the context in which the third runway should be assessed as the 'climate test' Government has defined. This carbon budget is based on the recommendation of the UK's Climate Change Committee (CCC). For the 1.5˚C global temperature goal in particular, this budget is itself substantively larger than the UK should receive by most measures of fairness and equity in allocating the global carbon budget [CCC 2025; Anderson et al., 2020]. Even with this unduly large carbon budget, with some demand moderation and optimistic technology uptake assumed, aviation uses a disproportionately high share (27%) of CB7 in the CCC's Balanced Pathway scenario. The analysis for CB7 considers all industry proposed airport expansions as of 2024 (CCC, 2025b), of which Heathrow's is around half, however in the Balanced Pathway a significant proportion of this capacity is not utilised (Section 1). If these multi-billion-pound developments lead to a greater increase in air passenger traffic at these airports by 2038, then the CB7 aviation budget will require a reassessment.

This report analyses the implications of the proposed Heathrow third runway in the context of other agreed airport expansions in the UK, given the UK's obligations under the UNFCCC. As such the analysis focuses on the GHG emissions included within these targets. Upstream lifecycle emissions from SAF, aviation carbon credits and non-CO_2e climate impacts from aviation are not included in the comparable assessment with CB7 in line with the GHG accounting framework of the Climate Change Act and supporting carbon budget advice from the CCC. The report presents results from a model that considers multiple variables determining GHG emission outcomes and reviews the most up-to-date status of SAF and greenhouse gas removal (GGR) to contextualise how these technologies may influence outcomes.

There are three principal areas of uncertainty arising from the airport expansions that shape what a Heathrow third runway means for the UK's legal climate commitments;

1. Demand: how will Heathrow expansion impact aviation demand, in terms of passenger numbers and the type of flight?
2. SAF: how could SAF uptake address the emissions arising from additional aviation demand?
3. GGR: will there need to be a higher level of greenhouse gas removal available to balance additional residual emissions, and is the expected amount timely and plausible?

1.DEMAND

Building additional airport capacity provides the infrastructure for growth, while constraining capacity is a lever for managing demand. The Government anticipates that a third Heathrow runway would add around 45 million additional passengers a year by 2055, compared to no expansion. This is on top of the 40 million passengers per annum (mppa) of additional capacity already planned at Gatwick, Luton, Stansted and London City by 2038. However, while airports can run at almost full capacity, enlargement doesn't necessarily mean a corresponding increase in passenger numbers and aviation demand.

The HENPS suggests that a third runway at Heathrow could predominantly displace flights from other London airports, potentially limiting the net growth in UK passenger numbers (DfT, 2026d). Similarly, the combination of long- and short-haul flights and types of aircraft served by an airport may change, rather than scaling current usage. To understand the net impact of Heathrow airport's expansion on UK aviation demand, we use Department for Transport (DfT) and our own demand scenarios to map out a range of plausible outcomes for the 2038–42 time period of CB7. This varies between the DfT's low growth scenario in which total UK demand grows by 64 mppa, and its high growth scenario, in which it grows by 153 mppa. The third runway's own contribution adds around 20 mppa at Heathrow by the CB7 period in the Department's central scenario, but nearly three quarters of this is displaced from other London airports, resulting in 5 mppa of additional demand.

When discussing aviation demand, it is essential to stress that it has a particular context that cannot sensibly be divorced from a discussion about future UK growth. Historically in the UK, growing aviation demand has predominantly meant higher income households flying more often (Büchs and Mattioli, 2021). Currently half of flights taken are by 10% of UK households. Just as UK airport expansion hasn't necessarily meant more people having access to international travel, pausing additional growth can mean a change for the minority of frequent recreational travellers rather than a change for most people.

2. SUSTAINABLE AVIATION FUELS

Operational efficiency and replacing fossil fuels with SAF lowers the carbon intensity of flying, and changes how air transport demand translates into climate impacts. Changes to aircraft efficiency also help, but this effect is incremental given the long lifespan and replacement rate of aircraft. The outlook to 2038 assumes a long-range average of between 0.9-1.9% per passenger km/year in DfT's most recent analysis [DfT, 2026a].

Amongst these options for reducing the climate impact of flying, SAF adoption is the most promising change that has the potential to significantly reduce the carbon intensity of flying and it is this technology that is assessed in this report. Currently SAF accounts for ~2% of aviation fuel used for the UK. How quickly and to what extent this can scale up is unclear. As with future demand, this report uses a range of possible levels of SAF in aviation fuel, from 2% to 22% during the CB7 period, to determine how aviation emissions from Heathrow expansion could be affected by SAF uptake.

The range in SAF usage by 2042 reflects the assessment of current state and outlook for SAF in the UK (Section 4). The UK has a mandate for SAF to account for 22% of jet fuel by 2040 to incentivise investment and uptake. There are however challenges for achieving this and higher levels of UK SAF uptake that make lower uptake scenarios sensible to consider. The most developed SAF pathway so far is hydroprocessed esters and fatty acids (HEFA) from waste fats like vegetable oil. This is a limited feedstock with competition from road transport users (Royal Society, 2023) and highly unlikely to scale up significantly further. Crop-based ethanol for kerosene production has now reached commercial production in the US but competes with food production for land and water. Gasification with Fischer-Tropsch synthesis from waste to produce SAF has not progressed beyond trials. Power-to-liquid (PtL) typically uses CO_2 captured from industrial or dedicated processes with hydrogen produced from renewable electricity. Unlike other pathways PtL is less constrained by resource sustainability, but rather its relatively low energy return on energy invested value, and the associated availability and costs for renewable electricity. Studies of global SAF scale up, such as Martulli et al (2025), show how slow progress on production and global competition mean national SAF targets are more likely to be missed than achieved on current standing.

The model in this report shows how the future uptake of SAF assumed matters when assessing airport expansion. With the SAF mandate met, aviation would exceed its allocated CB7 share by between 14 to 55 $MtCO_2e$, depending on the demand scenario, but if SAF stays at current proportions this would be 53 to 103 $MtCO_2e$. Other sectors such as agriculture (the sector with the biggest projected emissions in CB7) would need to reduce their emissions faster and deeper, or additional GGR capacity would be needed to keep within statutory targets.

3. GREENHOUSE GAS REMOVALS

This report reflects on the findings and reporting of current literature on GGR which suggests that it is not currently reasonable to assume that additional UK GGR can (or indeed should) account for higher aviation emissions than those already assumed in CB7. Much of the GGR capacity that the CCC hope the UK can provide between 2038 and 2042 is allocated to aviation, even with the lower demand growth assumed in 2025 and robust SAF uptake.

The uncertainty around whether a further 14 to 103 $MtCO_2e$ in GGR can be developed to cover additional emissions under different aviation demand and SAF scenarios is qualitatively similar to whether the UK will have any GGR capacity in 2038. Linking aviation

to GGR may help address long-term financing issues for GGR, but there are factors the aviation sector cannot directly influence. These uncertainties stem from the availability of sustainable biomass or low-carbon electricity generation to enable CO_2 capture, and access to transport and long-term durable storage infrastructure for CO_2.

Until the UK has an operating large-scale GGR facility - where resource, financing, regulation, performance and public acceptance factors take a more concrete form - assumptions on GGR capacity are substantively speculative. The implication of this is that relying on GGR to meet climate mitigation targets is a risk for the Government and that Heathrow expansion increases this risk further.

An aircraft flying over city buildings. Image credit: Nathan Hobbs - Unsplash

KEY FINDINGS

The report addresses three principal questions;

THE LEVEL OF DEMAND IMPLIED BY AN EXPANDED HEATHROW AIRPORT;

WHETHER SAF CAN MITIGATE EMISSIONS ARISING FROM ANY NET ADDITIONAL DEMAND;

AND IF GGR EXPANSION CAN MINIMISE ANY REMAINING ADDITIONAL RESIDUAL EMISSIONS.

Our analysis draws out a clear-cut conclusion: under serious efforts to meet legal climate targets, the infrastructure for large-scale UK SAF production and GGR should be operational ***prior*** to the infrastructure to expand aviation demand, and use of the latter ***contingent*** on the former. Accelerating SAF and GGR deployment is needed to give the sector options that do not compromise the existential priority of climate change mitigation. Through scenario analysis of the GHG emissions contribution of aviation, and by reviewing the current state of SAF and GGR development, this report finds ***that demand management must remain central to meeting UK climate obligations***. Heathrow expansion runs counter to this.

CONTENTS

Foreword **03**
Executive summary **05**
1. Introduction **09**
Climate change & the UK's commitments 10
Aviation as a sector 11
Heathrow and expansion 12
The climate question 13
2. Approach **14**
Model Design 15
Scenario modelling 15
Capacity utilisation scenarios 15
DfT demand scenarios 16
SAF uptake in scenarios 16
3. Aviation's share of the UK carbon budget **17**
What does existing UK airport capacity already allow? 18
DfT 2026 aviation scenarios without expansion 19
What does an expanded Heathrow mean for emissions? 20
4. The role of SAF in aviation emissions **23**
What is SAF? 24
SAF production routes 24
The SAF resource literature 25
The Policy Framework 25
Delivery to date and the project pipeline 26
The Scale of the issue 27
Conclusion on SAF availability 27
5. The role of Greenhouse Gas Removals for aviation emissions **28**
What is GGR? 29
What the CB7 Pathway Assumes for GGR 29
Delivery to date 30
Conclusion on GGR 30
6. Conclusions and implications **31**
Can Heathrow expansion credibly meet the Climate Change Act? 32
Implications 33
References **34**
Abbreviations 38
Appendix A: The DfT's eight demand scenarios 40

An aircraft landing. Image credit: Juan Domenech - Unsplash

INTRODUCTION

The UK Government is considering the approval of a third runway at Heathrow airport. If this goes ahead it will be a significant increase in the UK's air passenger capacity, with consequences for aviation demand and greenhouse gas (GHG) emissions. This report examines whether the proposal in the 2026 Heathrow Expansion National Policy Statement is compatible with the domestic and international obligations of the UK Climate Change Act. The report analyses future UK aviation scenarios, and reviews the status and outlook for the sustainable aviation fuel (SAF) and greenhouse gas removal (GGR) technologies proposed as mitigation options for aviation emissions. It presents findings that show Heathrow expansion cannot reasonably be considered consistent with UK Government climate targets.

Aircraft on a runway. Image credit: Magnific

CLIMATE CHANGE & THE UK'S COMMITMENTS

Climate change is already reshaping the world around us. The rise in global average temperature, driven by the volume of GHGs that human activity has emitted, has led to more frequent extreme weather events: heatwaves, flooding, and wildfires around the world. The consequences of a changing climate are an existential threat to nature and humanity. Yet, for a short time at least, decision-makers retain some control over the risk of catastrophic outcomes. The principal route to limit the change to our climate is to reduce emissions of carbon dioxide (CO_2) and other GHGs.

In 2015, almost every country in the world signed the Paris Agreement committing to hold the increase in global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit it to 1.5°C. As it is cumulative emissions that determine the overall amount of warming, these temperature goals can translate into finite global carbon budgets, describing the total quantity of CO_2 that can be released. The most recent published figure places the remaining global budget for limiting to 1.5°C at around 130 $GtCO_2$ from the start of 2026, a budget that would be breached by 2029 at current emission rates (Forster et al., 2026; Priestley Centre, 2025). How that global budget is then shared between countries is a question not only of science, but of equity and ethics. Wealthier countries with greater historical emissions and greater capacity to act, such as the UK, carry a responsibility to decarbonise more quickly. Signatories to the Paris Agreement agreed to take a shared but differentiated responsibility approach to reducing national emissions.

The UK's domestic climate framework is based around the Climate Change Act 2008, which created legally binding emissions targets and a system of five-yearly carbon budgets to support these. The UK has pledged to reach net zero GHG emissions by 2050. While the Climate Change Act, and the inclusion of carbon budgets specifically, demonstrated global leadership on climate change mitigation when it entered into law, with global emissions continuing to rise even the UK's current targets are now insufficient to meet UNFCCC Paris Agreement goals (Pennington et al., 2025).

The Climate Change Committee (CCC) is the Government's independent statutory advisor. In this role, they recommend the level of each carbon budget and publish pathways to meet them including indicative decarbonisation pathways across sectors. Once a budget is approved by Parliament, it becomes legally binding and the Government is required by law not to exceed it. The Seventh Carbon Budget (CB7) covers 2038-2042 and was legislated in June 2026 at 535 megatonnes of carbon dioxide equivalent ($MtCO_2e$). Since the Sixth Carbon Budget, these budgets formally include the UK's contribution to international aviation and shipping emissions. The Government's progression of Heathrow expansion was announced after CB7 was agreed and this represents a potential additional source of emissions for UK GHG emissions planning. If Heathrow expansion increases UK aviation emissions this will have a material effect on the Government's ability to meet the CB7 emissions limit.

Heavy industry scene. Image credit: Ella Jvanescu - Unsplash

AVIATION AS A SECTOR

Aviation is energy intensive. Lifting heavy aircraft and their passengers or goods off the ground to transport them long distances at high speed requires an enormous amount of power, demands large volumes of highly refined energy-dense fuel, and is carbon-intensive when powered by fossil fuel combustion. Demand for flying has grown steadily since the world's first commercial flight in 1914. Between 1980 and 2019, global air traffic rose from around 0.6 billion to 4.5 billion passengers per year (World Bank, 2026), with the rise of the low-cost carrier since the 1990s transforming flying from an occasional luxury to a frequent consumer purchase, albeit for a small proportion of people.

Flying is a concentrated and highly inequitable activity (Büchs and Mattioli, 2021). The richest fifth of the world's population take around 80% of all flights, and high-income countries, home to 16% of the world's people, account for around half (ICCT, 2022). Within the UK 62% of UK adults took at least one flight a year in 2025 (CAA, 2026b) and the distribution among those who fly, is deeply unequal, as shown in Figure 1.

Fewer than 3% of UK residents take 30% of all flights, with frequent flyers contributing most of the last two decades of passenger growth (NEF, 2025). Moreover, the roughly two-fifths of adults who did not fly at all are also disproportionately on lower incomes, and potentially more exposed to climate impacts (NEF, 2025).

The ongoing growth in this sector sets aviation apart from the rest of the UK economy. Total UK emissions have roughly halved since 1990 for a multitude of reasons, including a continued shift from coal to gas in power, and subsequent growth in renewables, movement of heavy industry outside of the UK, as well as progress to improve energy efficiency. Aviation emissions have moved in the opposite direction. In 2024 they were more than double 1990 levels (DfT, 2026a). Efficiency improvements through new aircraft and operations have historically reduced fuel burn per passenger-kilometre by around 1-1.5% a year (ICCT, 2020), but demand growth has consistently outpaced this. There has been no meaningful way to reduce emissions through technology beyond these incremental efficiency gains. Currently aviation is responsible for around 9% of the UK total GHG emissions (CO_2e), and the CCC's Balanced Pathway shows it becoming one of the UK's largest-emitting sectors, alongside agriculture, by 2040, at around 27% of remaining emissions.

The UK plays a significant role in this global industry. It is home to over 40 commercial airports, and handled a record 302 million passengers in 2025 (CAA, 2026a). It is also host to Heathrow Airport, Europe's busiest airport and, using 2024 traffic, the fifth busiest in the world (ACI World, 2025). Decisions about UK airport capacity have influence well beyond the UK's borders, given the UK is one of the centres of the aviation industry.

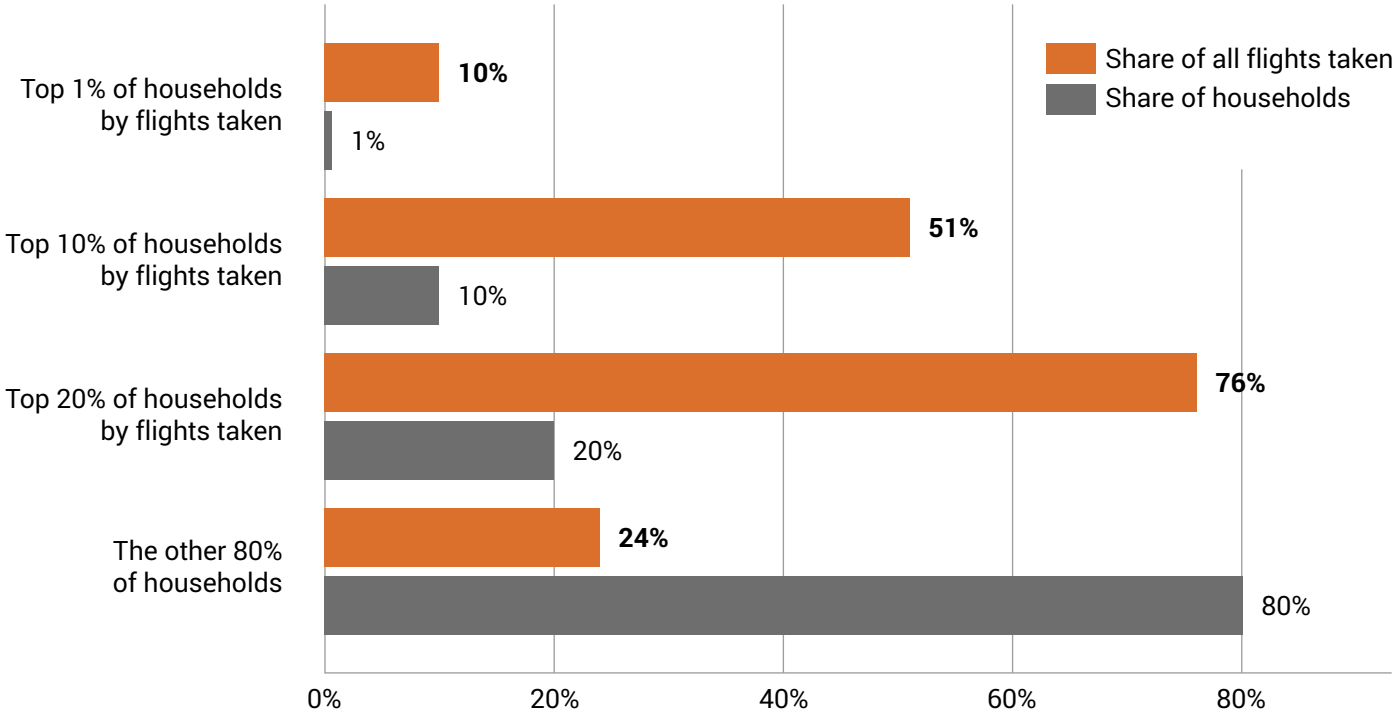


Figure 1: The distribution of flights across the UK population (Büchs and Mattioli, 2021).

HEATHROW AND EXPANSION

The Labour government in office from July 2024 to July 2026 under Keir Starmer was supportive of airport growth. This included the Chancellor Rachel Reeves, announcing the Government's backing for a third runway at Heathrow, and approving expansions at Luton (to 32 million passengers per annum (mppa)), Stansted (to 51 mppa) and Gatwick (to 80 mppa). Alongside other capacity increases, the DfT's 2026 projections put UK passenger capacity at around 414 mppa in 2025, rising to around 465 mppa by 2030 (DfT, 2026a). For comparison, the CCC's Balanced Pathway assumes almost no growth in flying over this period: demand reaches 319 mppa in 2035 (around 2% above the Committee's own 2025 starting point) and around 400 mppa by 2050 (CCC, 2025).

Heathrow operates two runways effectively at full capacity, with movements at its consented limit (CAA, 2026a). A third runway was formally proposed in the 2003 Air Transport White Paper, approved by the then Labour Government in 2009, cancelled in 2010 with the incoming coalition Government, recommended again in 2015 by the Airports Commission, and then enshrined in the Airports National Policy Statement (ANPS) in 2018. In 2020 the plan for the third runway was firstly deemed unlawful by the Court of Appeal in a case brought by Friends of the Earth for failure to comply with statutory UK climate change commitments, but later in the year this was overturned by the UK Supreme Court . Following the COVID-19 pandemic, concerns regarding the financial viability of the scheme effectively put expansion on hold until January 2025 when the Government revived the project. In November 2025, Heathrow Airport Limited's Northwest Runway scheme, designed to add around 54 mppa[1] of capacity and targeted to open in 2035, was selected to inform a review of the ANPS.

The ANPS review produced the draft Heathrow Expansion National Policy Statement (HENPS), published on 18 June 2026 and opened for public consultation over the summer of 2026, with Parliamentary scrutiny running through until late November (DfT, 2026d). The Government is aiming to complete the process by the end of 2026. If designated, the HENPS becomes the primary basis for deciding any application for development consent. It is built around four Government tests: economic growth across the country, air quality, noise, and climate.

[1] Capacity added is different to passengers served. Forecasts show Heathrow's passenger traffic could grow with or without a third runway, as larger and fuller aircraft alongside terminal upgrades raise passenger numbers.

The Government has also signalled its intention to designate the scheme as Critical National Growth Infrastructure.

The economic element of expansion has already been examined by Parliament and found to be weak. The Environmental Audit Committee reported in October 2025 that the growth benefits of airport expansion are unclear and that the Aviation Minister could not direct it to any substantial economic analysis supporting the Government's claim (EAC, 2025). The Department's own appraisal of the Heathrow scheme returns a negative net present value in every case it reports, from around −£23.4bn to −£62.5bn once carbon is monetised, and attributes 87% of the passenger benefits to leisure rather than business travel (DfT, 2026b). Independent analysis of the appraisal by NEF reached the same conclusion and found that, rather than creating net activity, the scheme would draw jobs and growth from other UK regions towards London and the South East (NEF, 2026). In any case, the Government has indicated that the proposed expansion needs to pass its 'climate test' regardless of economic outcomes.

A departure lounge at London Heathrow airport Image credit: Chris Bahr - Unsplash

THE CLIMATE QUESTION

This report concerns the question most relevant to Parliament for the 'climate test'; can Heathrow expansion, on top of the airport capacity already approved, fit within the UK's legislated carbon budgets? Throughout this report, the benchmark used to answer this question is aviation's share of CB7 in the CCC's pathway; around 146 $MtCO_2e$ over the CB7 period. While this sub-target itself is not legally binding, any excess in aviation's share must mean additional reductions in the emissions for other sectors to meet the national legally binding budget of 535 $MtCO_2e$, reductions that may be neither technically feasible nor politically deliverable.

The report focuses on the targeted greenhouse gas emissions from aviation attributable to the UK that the Climate Change Act covers, and that CCC carbon budgets refer to in carbon dioxide equivalent (CO_2e) terms. This is necessary to enable an assessment the same terms as Government targets for the purpose of the report, but this does omit the full contribution of aviation to climate change. Aviation also warms the climate through additional non-CO_2e pathways. Mainly this refers to contrail effects, and atmospheric chemical interactions with nitric oxide and nitrogen dioxide released at altitude. On a GWP100[2] basis, these are estimated to add around 70-100% again on top of the warming from CO_2 (Lee et al., 2021; DESNZ, 2026), see Box 1 for further information. Throughout this report, CO_2e refers to only the gases counted by the Climate Change Act, on a GWP100 basis. For aviation, this is CO_2 with some small CH4 and direct N_2O contributions, though CO_2 makes up around 99% of the total.

Although the assessment in this report is in relation to UK's Climate Change Act and budgets, we do not consider CB7 fit for purpose as the appropriate test of whether expansion is consistent with the UK's equitable contribution to tackling climate change. There are four reasons for this. Firstly, the budget underpinning CB7 is larger than would be consistent with an equitable UK share of the remaining 1.5°C aligned global carbon budget on most published approaches to allocating it, which include historical responsibility and capacity to act (Anderson et al., 2020). Secondly, the CCC's Balanced Pathway gives aviation a privileged status relative to other sectors – a similar share as agriculture, not requiring the deep cuts expected of other sectors, while allocating it the majority of the proposed engineered greenhouse gas removals (GGR) assumed in the CCC's pathway.

Thirdly, these budgets are defined in terms that do not include the full extent of aviation's warming effects, which are likely to at least double its CO_2 impact. Fourth, we expect that most emissions occurring from expansion will take place after the end of the CB7 legislated budget.

In the DfT's Heathrow Expansion Appraisal Report, the Department found that 98% of emissions occurred after 2042 (DfT, 2026b). Future budgets will also be legally binding, but CB8 and future budgets have yet to be formally recommended by the CCC. The Government has however legislated CB7 using the CCC's recommendations, and that is therefore the basis of this review, while acknowledging the limitations of this framing as a benchmark for Paris-aligned climate action.

Two technologies are identified by the Government and the CCC as necessary to support the case that aviation can expand within UK carbon budgets. The first is that an uptake in sustainable aviation fuel (SAF) will reduce the carbon intensity of flying to keep the sector within its budget share. The second is that dedicated durable GGR capacity will exist to balance the GHG emissions that remain: currently the CB7 pathway earmarks most removals for aviation and agriculture. This report examines what role each technology would need to play for Heathrow expansion to not materially impact the Government's ability to meet its climate targets and how credible these roles are within the proposed timescale.

To answer these questions, we firstly model UK aviation emissions to 2050 under different scenario assumptions. The Approach section sets out our model; the following section quantifies the impact of current airport capacity, and of Heathrow expansion, against the carbon budgets. Two further sections review the evidence on SAF and GGR respectively. The report closes by drawing the findings together and setting out their implications.

[2] GWP100 is global warming potential over 100 years

APPROACH

We developed a model of UK aviation emissions to test a range of different future scenarios of demand and technology uptake, including variations of the Department for Transport's (DfT) own emissions pathways in its 2026 aviation scenarios. Unlike similar DfT scenarios, we have used the same emissions accounting basis that the CCC uses[3] for carbon budgets to assess scenario emissions against CB7.

[3] The emissions pathway for the DfT assumes between 90-95% emissions reduction relative to fossil-based jet fuel, on a lifecycle basis (DfT, 2026a). The CCC instead assumes 100% emissions reductions for any biogenic SAF.

Close up shot of an airplane engine. Image credit: Magnific

MODEL DESIGN

The model represents each UK airport with a scheduled commercial service covering over 99.9% of UK passengers, and calculates emissions using:

- the number of passengers an airport serves in a year
- the split into bands of those passengers between domestic, short and long-haul journeys
- the average distance flown in each band calibrated to each airport's observed 2025 traffic (stage length)
- a per-passenger-kilometre emissions intensity.

To model future emissions we include factors for:

- varying fleet-efficiency improvements
- SAF supply and associated CO_2 savings
- stage-length variation
- airport opening dates and fill rate for new capacity
- the additionality or displacement of any new capacity.

Baseline emissions for 2025 are calibrated to match the UK's published aviation inventory of 37.9 $MtCO_2e$. Freight is assumed to track passenger activity and is around 12% of the overall emissions, as per the Department's approach. To align with UK carbon budget accounting used by the CCC in its advice to the Government, sectoral carbon offsets (in this case the Carbon Offsetting and Reduction Scheme for International Aviation - CORSIA) are not included in the analysis. GHG emissions are reported before any removals.

This model can be used to represent (i) varying passenger traffic, (ii) technology advances and (iii) rates of policy delivery. Future emissions can be calculated for any demand pathway modelled.

SCENARIO MODELLING

For this report we have used a suite of future aviation scenarios that characterise a broad range of plausible outcomes for the sector in the CB7 period, with and without Heathrow expansion, to assess what the implications of a third runway would be. We have taken demand scenarios from the DfT and developed our own that focus on different capacity utilisation outcomes.

Throughout the report, capacity refers to the maximum number of passengers an airport can serve in a year, whether through a planning cap or its physical runway or terminal infrastructure. Passenger numbers, reported as mppa, are the traffic that is actually served, while utilisation is the ratio of the two numbers. For example, the UK system as a whole served around 302 mppa in 2025, against around 414 mppa of capacity, around 73% utilisation.

CAPACITY UTILISATION SCENARIOS

For our own capacity utilisation scenarios, we use the forecast capacity at each airport as published by the DfT in its 2026 aviation projections to mean its highest possible throughput, limiting it by terminal passenger numbers or air traffic movements, depending on which is lowest. Passenger numbers can still increase while air traffic movements remain stable, as airlines use larger and fuller aircraft. This process is known as up-gauging.

While capacity provides an upper bound, what matters for emissions is how much of that capacity is used. For these scenarios we model a range of growth rates at UK airports, starting from their 2025 traffic at an annual rate until it reaches 90% of its capacity, then it remains flat. Any airports currently busier than 90% keep their current utilisation. Where an airport is limited by air traffic movements, up-gauging allows for increase in passengers until the passenger terminal throughput limit is reached.

The growth rates modelled are:

- the CCC-matched rate (0.88% per year) – the growth rate at which UK passenger numbers in our model across the CB7 period match those in the CCC's Balanced Pathway.
- the recent rate (2.38% a year) – the rate UK terminal passengers grew at between 2010 and 2025.
- the boom rate (6.2% a year) – the growth sustained by UK aviation between 1991 and 2006.

These are not demand forecasts but rather exist to understand what level of emissions might be reached under existing consented capacity, and subsequently under expansion at Heathrow.

DFT DEMAND SCENARIOS

The DfT publishes demand projections, most recently a series of eight scenarios built using the DfT's econometric approach (DfT, 2026a). These scenarios span low and high economic growth, regional and behavioural variation, technology developments, the effects of carbon-pricing, and whether or not Heathrow is expanded. The scenarios are described in more detail in Appendix A. They are *Current Trends* (the Department's central scenario), *Low Growth, High Growth, Regional Growth, Behavioural Change, Technology Development, Less Constrained Regional Airport Development*, and *Aerocharge*. The DfT publishes these scenarios under two variants, both with and without an expanded Heathrow, with the exception of the Aerocharge scenario, which models charging the cost of expansion to passengers, and the High Growth scenario which only models without expansion up to 2039, and with expansion up to 2048 after which the Department states *"The DfT aviation model stops being able to robustly fit passengers to airports with very high levels of demand and capacity constraints in future years."* (DfT, 2026a). Each demand scenario varies passenger numbers and traffic mix.

SAF UPTAKE IN SCENARIOS

In our model we also vary SAF availability to understand the impact on predicted emissions. We model three possible fuel trajectories through the different demand scenarios, which are variations of the UK's SAF delivery mandate:

(i) SAF continuing at UK's 2025 share of around 2.26% of fuel (based on the provisional figures provided for the mandate's first year (DfT, 2026c))

(ii) The mandate delivered to its 2030 level of around 10% and then flat, the trajectory if the fuel routes the mandate requires beyond 2030 do not materialise

(iii) The mandate delivered in full to 22% by 2040.

The current evidence, as discussed in Section 4, is that the capacity needed to meet the mandate to 2030 largely exists, or is being built, but that the post-2030 mandate increasingly relies on synthetic fuel for which no European plant of commercial scale has reached a final investment decision. The three trajectories are designed to bookend the plausible range. While we assume 22% of fuel as SAF in the third variant, as per the mandate, it should be noted that the DfT's recent assessments expect that the SAF mandate can be met with only 17% physical fuel with a very high lifecycle reduction, as mandate delivery is measured in certificates, rather than litres (see Section 4).

In this report, we apply the CCC's accounting approach in which biogenic derived SAF is credited with 100% emissions reductions at the point of combustion. This is in line with the Intergovernmental Panel on Climate Change (IPCC) accounting guidelines on biogenic fuels and territorial emissions accounting, and is the same approach with which the CCC constructed its aviation pathway that this report uses for its carbon budget test. This approach can only apply to SAF derived from biogenic sources, while fuel made from the fossil fraction of waste such as plastic in municipal solid waste, is counted under fossil kerosene and not as SAF. In current projections for SAF, some proportion of UK supply is expected to come from fossil-derived feedstocks through processes such as gasification. However, as no projections are published for the expected biogenic versus fossil composition of future UK SAF supply, we apply the 100% reduction to all SAF and acknowledge this may slightly overstate the emissions savings from SAF. For comparison with the DfT's emissions accounting, see Figure 6 and the accompanying discussion.

Greenhouse gas removals are not included in the model results. Emissions are reported before any removals are invoked, and the aviation pathway is a gross-emissions pathway. These can then be used to identify the quantity of GHG emissions GGR may need to balance. We then assess whether removals can credibly balance any excess over the budget in Section 5.

We validate our emissions model against the DfT's published outputs. When using the Department's accounting basis for SAF emissions reductions, our model reproduces the full emissions pathways within around 1 Mt per year (roughly 3%).

AVIATION'S SHARE OF THE UK CARBON BUDGET

An airplane taking off. Image credit: Magnific

WHAT DOES EXISTING UK AIRPORT CAPACITY ALREADY ALLOW?

UK aviation is already set to exceed its share of the Seventh Carbon Budget (CB7) even before a third runway at Heathrow is considered, if efforts are not taken to limit growth. Figure 2 shows the impact of different growth rates and SAF uptake on the budget overshoot, and in each scenario the budget is exceeded. Recent (2010-2025) growth rates of 2.38% per year would lead to overshooting the budget by around 51 $MtCO_2e$, 35% of the whole aviation sub-budget and nearly a tenth of the whole economy's 535 $MtCO_2e$, under our central SAF growth assumption. Even at the CCC-matched growth rate of 0.88%, the UK still exceeds its budget by 32 $MtCO_2e$ on the central SAF case, while very high growth of 6.2% annually results in an overshoot of 69 $MtCO_2e$.

Our model finds that even in the best-case scenario where the SAF mandate is delivered in full, passenger numbers must stay level to be in line with CB7's aviation sub-budget of 145.6 $MtCO_2e$. If the SAF mandate does not deliver, passenger numbers must fall by 0.5% per year on our central SAF assumptions. If SAF remains at today's share of around 2%, passengers must fall by 1% per year from today's figures, equal to a reduction of 3 million passengers in the first year.

These results show that national passenger numbers must therefore be capped if they are to remain within UK legally binding carbon budgets. This conclusion does not leave space for expansion at the UK's largest airport.

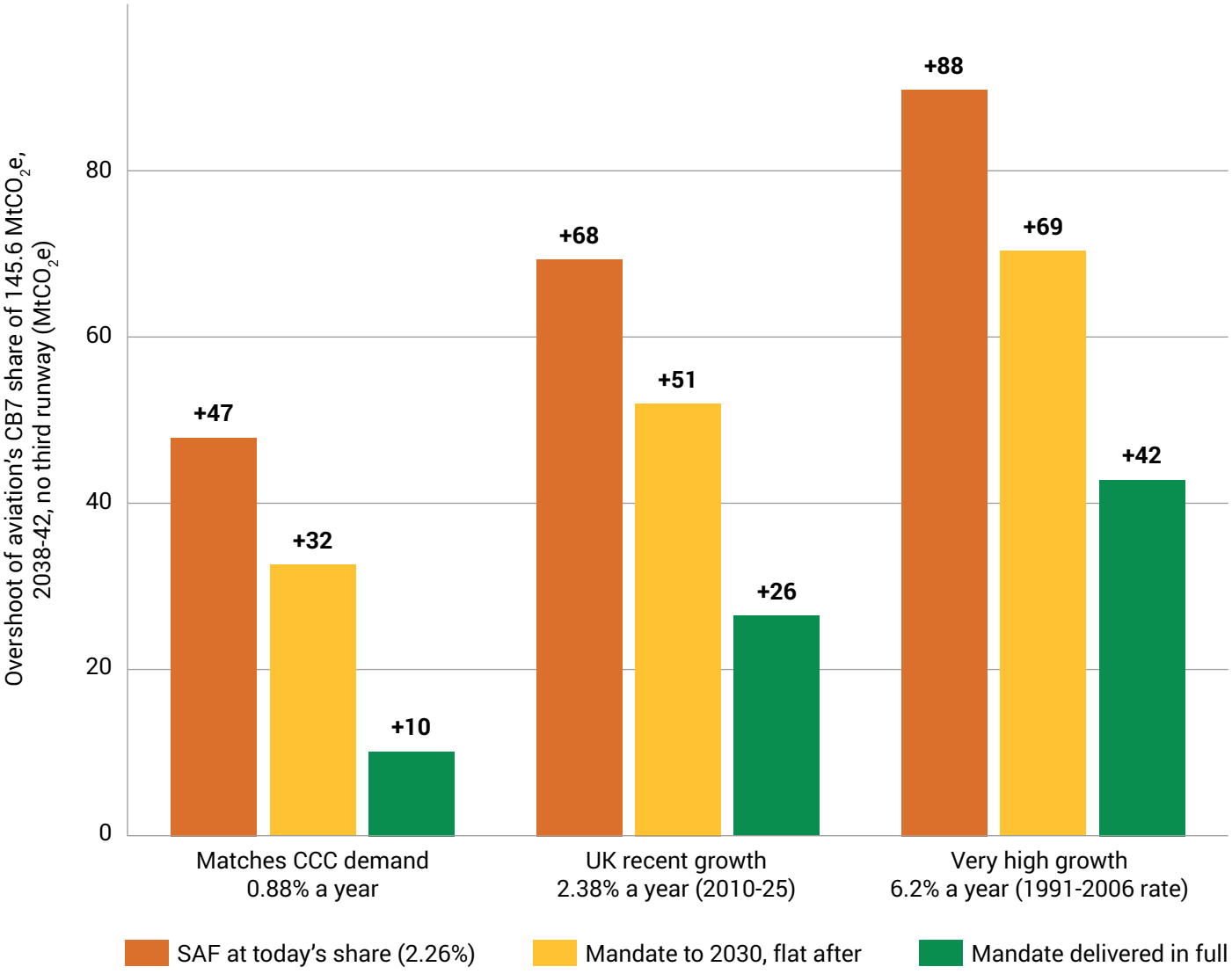


Figure 2: Overshoot of aviation's CB7 share in $MtCO_2e$, with different growth rates and SAF uptake rates.

DFT 2026 AVIATION SCENARIOS WITHOUT EXPANSION

In addition to the capacity-led varied growth rate scenarios previously shown, we applied the suite of aviation demand scenarios produced by the DfT. Under every demand profile produced by the DfT, CB7 is breached before Heathrow expansion. The DfT central scenario, *Current Trends*, exceeds the budget share by around 30 $MtCO_2e$ even if the SAF mandate delivers in full, the largest overshoot of the six DfT no-expansion scenarios that cover the CB7 window. Even Technology Development, the DfT's most optimistic scenario, exceeds aviation's share by around 16 $MtCO_2e$ despite higher SAF assumption. The scenario also reaches this number by assuming fleet fuel efficiency gains above every other scenario and a SAF supply for the UK alone that far outpaces the mandate, reaching around 4.1 Mt a year by 2050 and more than twice today's entire global SAF production (IATA, 2025).

Despite the DfT stating this scenario is used for carbon budget planning, it is not the lowest-emitting scenario during the legislated carbon budget period. Their *Low Growth* scenario exceeds the budget by a lower amount, 13 $MtCO_2e$.

The pathways of the DfT scenarios calculated based on CB7 comparable accounting methods are shown in Figure 3. Note that several of the DfT scenarios had similar pathways to *Current Trends,* so for visual clarity only four of these scenarios are plotted. High Growth is only forecast until 2039 so cannot be summed over the carbon budget period, but is plotted for comparison.

The gap between the budget and what is projected is therefore not a matter of choosing between scenarios: there is no published DfT scenario in which the sector keeps within its share of the budget, even before Heathrow expansion is considered.

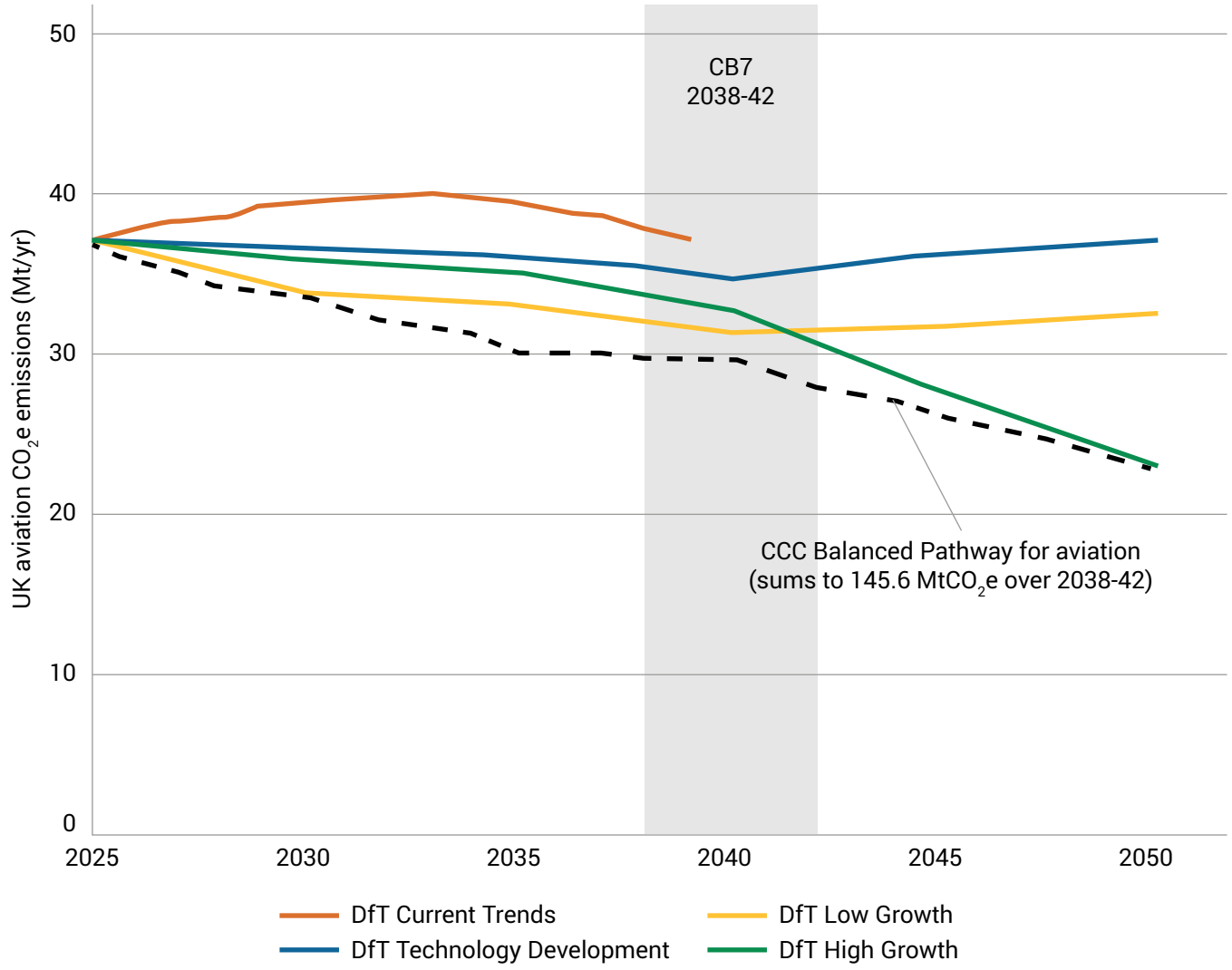


Figure 3: Annual UK aviation CO_2e emissions in four of the DfT scenarios without an expanded Heathrow. Each line shows the scenario on its most ambitious SAF basis, for Technology Development it assumes the higher SAF delivery, for all others it is shown with the SAF mandate fully delivered

WHAT DOES AN EXPANDED HEATHROW MEAN FOR EMISSIONS?

Every scenario the Government has published, as well as our own assessment of the existing capacity, shows that UK aviation will be over its share of CB7 even before any Heathrow expansion. The emissions linked to the DfT's post-expansion scenarios are shown in Figure 4. Each scenario is over-budget, ranging from 14 $MtCO_2e$ in their Low Growth scenario, through to 55 $MtCO_2e$ in their High Growth scenario.

The effect of an expanded Heathrow on any budget overshoot depends on several factors. Firstly, it depends on whether the flights from the new runway are additional, or if they are displaced from other airports. In the Government's central scenario, *Current Trends*, 74% of the nearly 20 mppa increase at Heathrow in 2040 is displaced, mostly drawn in from Gatwick (~6.4 mppa), Luton (~4.3 mppa) and London City (~2.6 mppa), notably each of which has also recently been expanded or had expansion approved (DfT, 2026b). A second factor is the length of any new flights, as long-haul flights that are similar to Heathrow's typical mix are much higher emitting than short-haul flights, such as those that would be displaced from local airports in the DfT's scenarios.

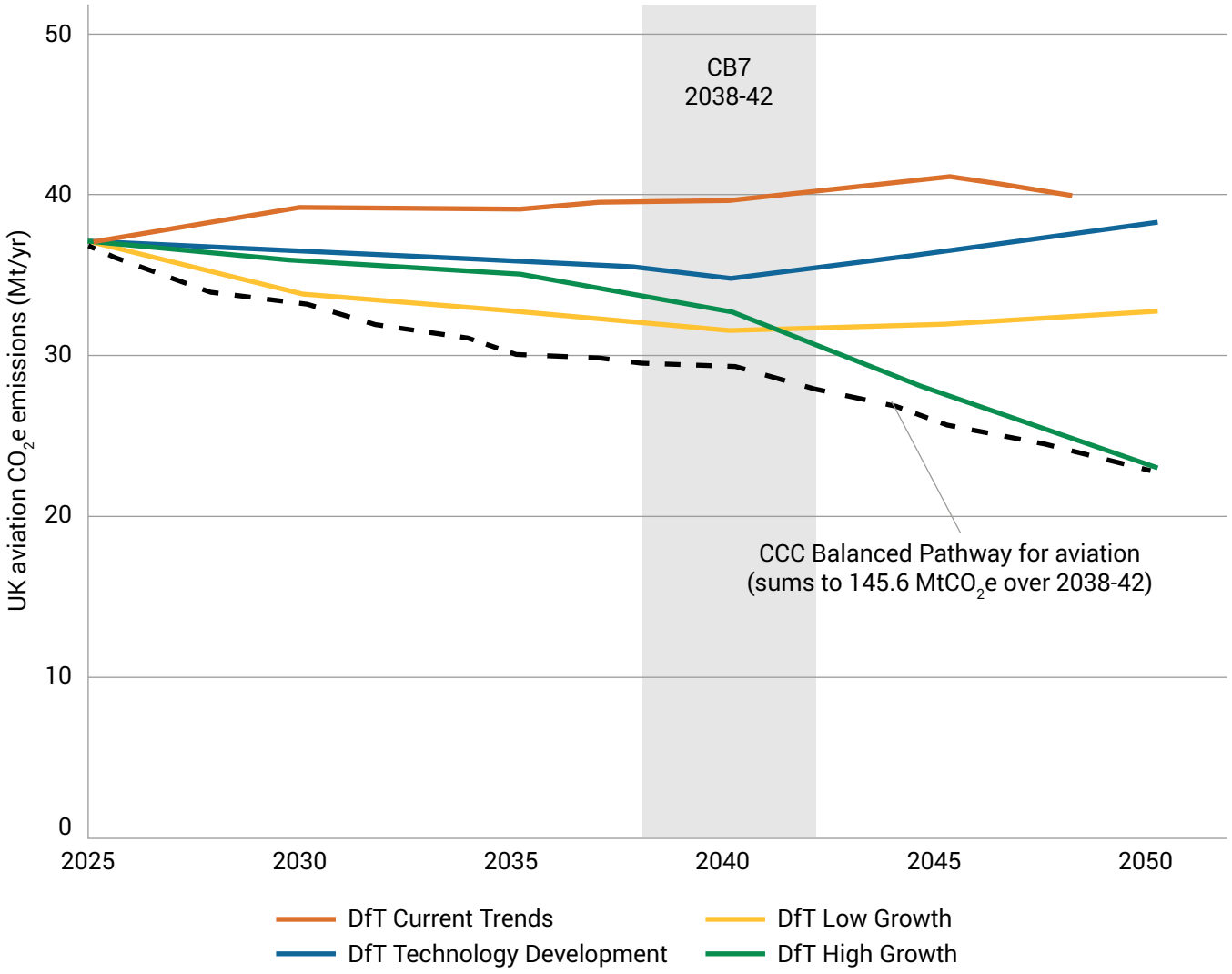


Figure 4: Annual UK aviation CO_2e emissions in four of the DfT scenarios with an expanded Heathrow. Each line shows the scenario on its most ambitious SAF basis, for Technology Development it assumes the higher SAF delivery, for all others it is shown with the SAF mandate fully delivered

Figure 5 shows the effect these assumptions have. If growth continues at the same rate as recent years (2.38% per year) even if the SAF mandate is fully realised, we find the impact of the new runway could be an additional 11 $MtCO_2e$ on top of the existing overshoot. Capping the overall national capacity is a key lever to limit aviation emissions, and Heathrow expansion risks growth that further takes us beyond UK carbon budget limits.

In the DfT's scenarios, by assuming that Heathrow's new traffic instead is displaced from local airports, the impact of the runway can be presented as only a few megatonnes. However, following that logic then the runway delivers fewer new flights, little new connectivity, and no net employment (as presented in the DfT's own appraisal of this scenario). Assuming this displacement will occur also relies on other airports conceding their traffic to Heathrow, despite recently investing in their own expansions now consented. This is a risky assumption. If non-Heathrow airports in fact refill this lost traffic, then the overshoot will be higher than the figures presented for the DfT's scenarios. Furthermore, the displacement assumption is very time-specific. In the DfT's forecasts, the early years of the runway, those covered by CB7, see mainly short-haul traffic transfer from other London airports. Heathrow's long-haul role builds later, and the vacated capacity at those other airports is projected to refill at the same time. The CB7 window therefore both captures displacement near its peak, and before any refill, which makes the impact of the runway seem marginal. A larger system, which supports flying further in the following years, means the runway locks in significantly higher emissions in the future. The capacity-led growth scenarios we have developed address this eventuality.

Here the contradiction between the growth case and the carbon case is made clear. The scheme is justified to Parliament and the public as national growth infrastructure, but the DfT appraises it for carbon on the assumption that three-quarters of its traffic is taken from airports a few miles away.

Importantly, regardless of which assumptions are used about displacement, expanding Heathrow results in a higher overshoot of aviation's share of CB7 in every Government scenario. Increasing capacity at Heathrow, or elsewhere around the country, only increases the risk that growth could continue even further beyond the limits of UK carbon budgets.

The DfT's *High Growth* scenario underlines the possible risk of this expansion-led growth. This scenario runs to 2039 without expansion, and to 2048 with expansion. With expansion, national aviation emissions reach around 200 $MtCO_2e$ across the CB7 window, around 55 $MtCO_2e$ or 37% higher than the aviation sub-budget and allowing aviation to consume **more than a third** of the entire economy's 535 $MtCO_2e$ budget.

It is essential to highlight that the runway's climate impact also sits mostly outside of any budget yet legislated. On the DfT's own assessment, the scheme adds around 185 $MtCO_2e$ over its lifetime, of which 98% arrives after 2042. Those emissions fall in budget periods that will be legally binding when set, and that must by law be ***tighter*** than the one aviation is already exceeding: the CCC's pathway shrinks aviation's share from around 146 $MtCO_2e$ in CB7 to around 131 $MtCO_2e$ in CB8, based on the CCC's Balanced Pathway.

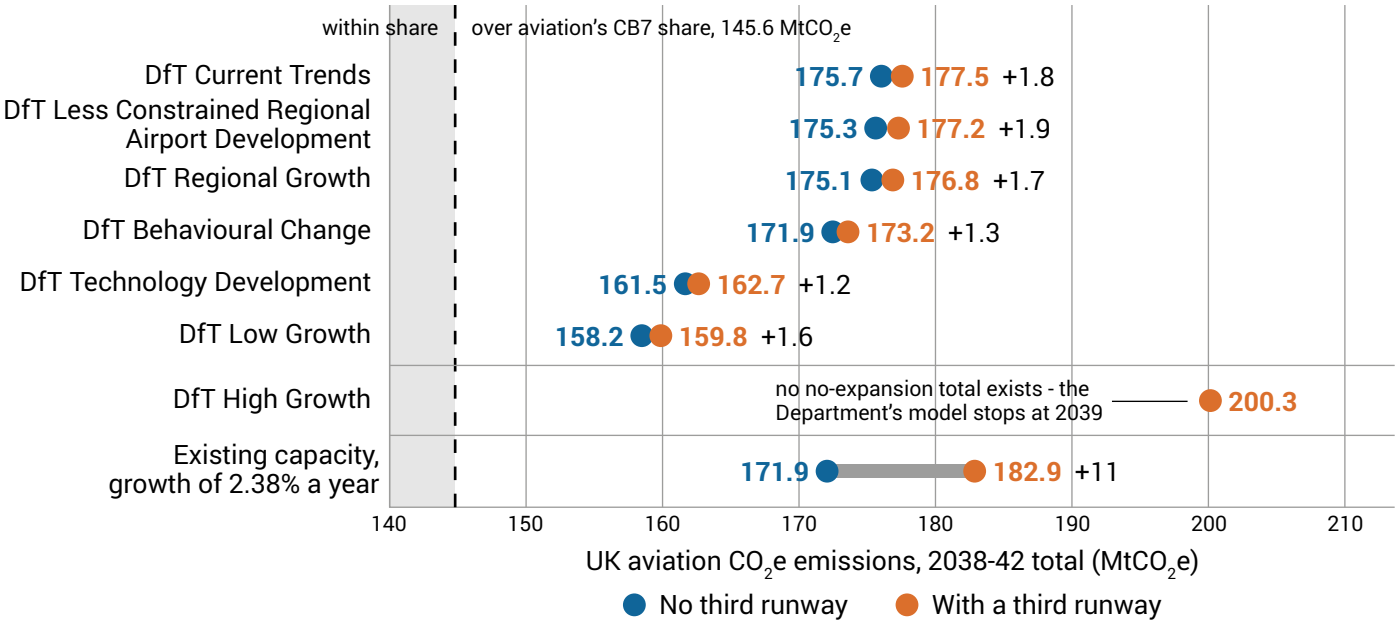


Figure 5: UK aviation emissions within the CB7 period, with and without Heathrow expansion totals and assuming a fully delivered SAF mandate, Comparison between DfT scenarios which assume Heathrow takes traffic from other local airports and a capacity-led growth scenario for all airports.

To meet aviation's CB7 share by fuel substitution alone, at the UK's own recent growth rate and with typical efficiency improvement, SAF would have to supply around 33% of all UK jet fuel between 2038 and 2042; around 4.6 Mt a year, and more than twice the world's entire current production. The mandate requires 22% of SAF jet fuel by 2040, and because compliance is measured in certificates rather than litres, the DfT expects this to be met with around 17% physical fuel (DfT, 2026b).

Figure 6 shows the different moving parts of the puzzle. If growth continues as it has in recent years, then the budget is exceeded by around 68 $MtCO_2e$. Delivered in full and credited at 100%, the mandate then reduces the overshoot to around 26 $MtCO_2e$ without a third runway. A third runway adds more burden, leaving around 37 $MtCO_2e$ of excess emissions once SAF has been accounted for. Those residual emissions must then be balanced out with engineered removals, if aviation is not to consume the budgets of other sectors.

While these figures use the CCC's accounting approach throughout, Figure 7 shows the same result under three alternative treatments: the CCC's basis, a lifecycle basis crediting SAF with 70% GHG savings (as in sector-based emissions accounting used by DfT), and a measure including aviation's non-CO_2e warming effects.

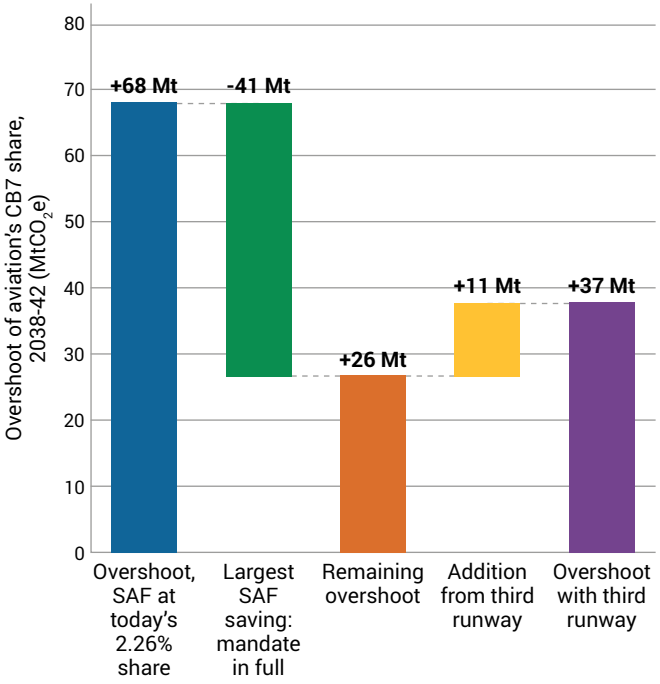


Figure 6: Overshoot of aviation's CB7 share (145.6 $MtCO_2e$, 2038–42) assuming continuous growth as in recent years, alongside the possible impact of SAF and the third runway.

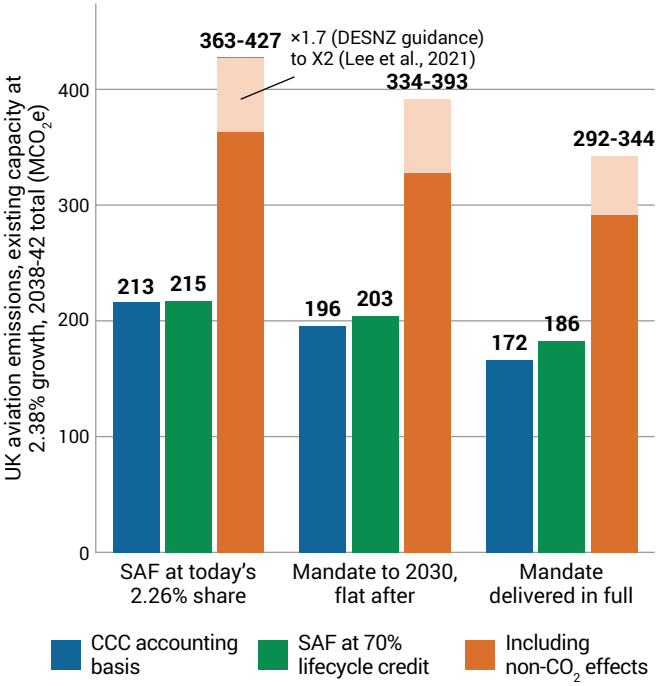


Figure 7: Impact of different emissions accounting frameworks on the emissions of the aviation sector during the CB7 period, assuming continuous growth as in recent years.

BOX 1: AVIATION'S NON-CO_2E EFFECTS

Aviation warms the climate through more than its CO_2 and the other direct GHGs emissions. Soot and water vapour seed contrails and contrail-induced cirrus, both of which have a net warming effect. In addition, nitrogen oxide chemistry and other effects specific to combustion at altitude increase warming, with these 'non-CO_2e' effects contributing roughly two-thirds of the sector's effective radiative forcing to date (Lee et al., 2021). UK Government guidance has suggested a multiplier of 1.7 on aviation GHG emissions as a GWP100-based estimate of the additional effect, while acknowledging deep uncertainty (DESNZ, 2026).

The UK's carbon budgets are defined in ways that does not include these effects entirely. Non-CO_2e effects are both localised, and shorter-lived than CO_2, which makes them a risk, as expansion increases them immediately, but potentially also an opportunity, since operational measures such as contrail avoidance could result in rapid benefits.

THE ROLE OF SAF IN AVIATION EMISSIONS

The previous section showed that no modelled route brings aviation within its budget share. Whether or not the SAF mandate is delivered represents a possible difference of around 41 $MtCO_2e$ over the CB7 period, assuming continuous recent growth trends. Here we examine the current status of SAF production, the outlook over the CB7 period, and the implications of known barriers and opportunities for assumed levels of SAF uptake.

An airplane refuelling. Image credit: Magnific

WHAT IS SAF?

SAF describes forms of drop-in jet fuels made from non-fossil sources, or waste fossil. Today's SAF is made overwhelmingly from hydroprocessed esters and fatty acids (HEFA) made from used cooking oil (UCO) and other waste fats. There are some smaller contributions, globally, from other bio-feedstocks with eleven routes currently permitted for producing SAF (ICAO, 2026). At demonstration scale only, synthetic "Power-to-liquid" (PtL or e-SAF) fuels are made from clean electricity, hydrogen, and captured carbon dioxide. SAF is chemically similar to kerosene and must be blended with jet fuel at a ratio of between 5 and 50% for commercial use. At the tailpipe, greenhouse gas emissions (and other non-CO_2 emissions) are very similar, but SAF aims to reduce lifecycle greenhouse-gas emissions. The attraction of SAF is its compatibility with current engine technology and distribution and fuelling infrastructure. However, constraints include feedstock availability, energy consumption, technology development and cost.

Policy frameworks, such as those used by the DfT, typically credit qualifying SAF with lifecycle savings of around 70% against fossil kerosene. This is not a measured physical result and has been found to overstate the emissions reductions. For waste cooking oil, it excludes the emissions displaced when a waste oil is diverted from an existing use (O'Malley et al., 2021b). It is also a CO_2-only figure. On a production-to-combustion basis, including non-CO_2 effects, recent analysis found that the maximum climate benefit of SAF compared to conventional jet fuel is just under 50% (Boerboom et al., 2025).

SAF PRODUCTION ROUTES

While eleven pathways are currently certified to produce SAF for commercial use, certified SAF is typically produced through one of four main routes.

- HEFA accounts for essentially all SAF that has been flown to date; however, its major constraint is the availability of feedstock UCO and animal products are byproducts, and their global supply is affected by how much frying and farming is done around the world. They are already traded and consumed at scale, much of the supply used in Europe comes from Asia, and there is a strong market for use in road biodiesel. Diverting these oils and fats to aviation therefore displaces existing uses, which may be at risk of switching to higher-footprint alternatives. The first year of the UK SAF mandate was delivered entirely from imported UCO (DfT, 2026c).

An airplane refuelling. Image credit: Magnific

- Alcohol-to-jet (AtJ) converts ethanol or other alcohols into kerosene. The first commercial plant began production in 2024 in the United States and its feedstock is crop-based ethanol, known for its competition with land-use and food production as it scales up.
- Gasification with Fischer-Tropsch synthesis can use waste products, including municipal or forestry waste streams as a feedstock, however there have been multiple delays and/or commercial failures; at the time of writing no plant operates in the UK at scale.
- PtL is the only route that could, in principle, scale to the industry's needs due to its feedstock of clean electricity, hydrogen and captured CO_2, rather than a finite waste stream. However, there is expected to be high competition for clean electricity and hydrogen (Ueckerdt et al., 2021) as many sectors decarbonise and it is currently very expensive to produce (Carbonnier, 2026). It is also the least developed of the four pathways.

Projections for SAF production should acknowledge the current context whereby the routes that exist look unlikely to scale, and routes that could scale up are not at a readiness level to do so. Feedstock-limited HEFA cannot go much beyond current volumes (Royal Society, 2023). PtL faces likely a decade or more of engineering design, permitting and financing before it could make significant impact (Royal Society, 2023). As such, when discussing mandated percentages, it should be made clear that they are demands placed on a supply system that, as yet, has no demonstrable way to meet them.

THE SAF RESOURCE LITERATURE

Fifteen years since the first SAF was used in a commercial plane, the barriers to scaling up production at the rate necessary to meet our climate goals no longer seem like teething problems, but rather more significant barriers to adoption. On biogenic routes, the Royal Society's assessment of net zero aviation fuels provides a clear UK-specific statement. Benchmarked against the 12.3 Mt of jet fuel the UK consumed in 2019, it finds that meeting demand from rapeseed alone would use around 68% of total UK agricultural land, and from energy grasses such as miscanthus it would use a third to over a half. For the HEFA route currently in use in the UK, UK-based waste cooking oil can supply only between 0.3% and 0.6% of annual UK jet fuel demand using the same 2019 benchmark, agricultural residues around 6% and municipal waste up to 10%. The Royal Society concluded that there is no clear or single net zero alternative to jet fuel (Royal Society, 2023).

At a European scale, the maximum advanced SAF production available from the EU resource base in 2030 has been estimated at 3.4 Mt, equal to around 5.5% of projected EU jet fuel demand, with waste fats, oils and greases contributing at most 1.2 Mt or 1.9%; the same analysis notes that nearly all recovered UCO in the EU is already used for road biofuel, so aviation mandates in this case largely incentivise diversion rather than new supply (O'Malley et al., 2021a).

On synthetic routes, one feedstock constraint is renewable electricity availability. E-fuels convert electricity to liquid hydrocarbons at efficiencies of approximately 10% to 35%, so the renewable electricity requirement is between two and fourteen times that of direct electrification. Ueckerdt et al. warn that betting on the future large-scale availability of e-fuels risks locking in fossil fuel dependency, if scale-up falls short (Ueckerdt et al., 2021). For the UK specifically, the Royal Society estimates that for synthetic fuels to replace UK jet fuel would require 468 to 660 TWh of electricity, five to eight times the UK's 2020 renewable generation. A prospective life-cycle assessment of European aviation finds that under continued demand growth, supplying the market with synthetic jet fuel would require cumulatively around seventy times the EU's 2020 electricity production between now and 2100, and concludes that reducing air traffic demand is a good short- to mid-term solution because it drastically reduces the scale of the effort required (Sacchi et al., 2023).

The upstream input is also constrained. Green hydrogen, without which there is no PtL, is likely to supply under 1% of EU final energy until 2030, even if electrolysis scales as fast as wind and solar historically did (Odenweller et al., 2022). The empirical follow-up to that work shows that it is not materialising at that rate. Of 4.3 GW of electrolysis capacity announced for 2023, 0.3 GW became operational, a realisation rate of 7%; 86% of projects announced in 2021 were delayed, 14% disappeared; and 97% of the 422 GW pipeline for 2030 lacks a final investment decision (Odenweller and Ueckerdt, 2025).

THE POLICY FRAMEWORK

The UK SAF mandate began in 2025 at 2% of jet fuel supplied, rises to 10% in 2030 and 22% by 2040. There is a separate sub-obligation for PtL fuels from 2028 (HM Government, 2024). The EU's ReFuelEU Aviation regulation follows a similar pathway: 2% in 2025, 6% in 2030, rising to 70% by 2050, with sub-targets for synthetic fuels within (European Union, 2023).

It is important to note that in the UK, the mandate is a supply obligation on fuel suppliers, rather than guarantees of production. Where fuel is unavailable, suppliers can pay a buy-out price instead, therefore a mandate can be complied with without the fuel existing. Nor do the topline percentages guarantee physical volumes: certificates are issued in proportion to a fuel's greenhouse gas savings against a 70% baseline, so higher-scoring fuel earns more than one certificate per litre, and on the DfTs latest assumptions the mandate is met in full with a physical SAF uptake of around 17% in 2040 rather than the headline 22% (DfT, 2026b, section 9.3).

In addition most major jurisdictions are now pursuing the same limited feedstocks at the same time. Any UK plan to rely on or assume the availability of imports to fill a gap is assuming that other countries, with their own mandates, will choose to export their supply rather than use it to fulfil their own international and national decarbonisation obligations.

DELIVERY TO DATE AND THE PROJECT PIPELINE

Global SAF supply grew from roughly 1 Mt in 2024, to around 1.9 Mt in 2025 or 0.6% of global jet fuel. IATA forecasts that this will grow to around 2.4 Mt (0.8%) in 2026 (SkyNRG, 2026; IATA, 2025; IATA, 2026). In the UK mandate's first year, the 2% obligation was met: provisional full-year data show around 2.26% of jet fuel supplied as SAF (final figures are due in November 2026), produced entirely from HEFA, overwhelmingly imported UCO (DfT, 2026c). Almost all of the existing capacity growth has also been HEFA.

A review of the UK and European project pipeline for SAF production facilities found that the picture looks broadly promising until 2030, but then capacity falls far behind mandate requirements. The European Union Aviation Safety Agency (EASA) projects "realistic" EU production of around 3.2 Mt by 2030, against the 2.8 Mt ReFuelEU requirement. Including all announced projects including PtL would take it to 5.5 Mt, though it will require a sharp increase in the advancement of PtL to bring this to fruition (see Figure 8). SkyNRG & the ICF forecast that globally, there will be 18.5 Mt of global announced capacity by 2030, compared to a 12.8 Mt of demand, however IATA further estimates that roughly a third of the capacity announced for 2030 is at risk of cancellation or significant delay (IATA, 2026).

In any case, beyond 2030 the mandates begin to depend on synthetic PtL. The EU sub-mandate starts from around 0.6 Mt in 2030, increasing to roughly 2 Mt in 2035, 10% of fuel in 2040 and 35% by 2050, while the UK's PtL sub-obligation begins in 2028 and rises to 3.5% of jet fuel by 2040 (HM Government, 2024). As of July 2026, no commercial-scale PtL plant (above 10,000 tonnes a year) is operating or has passed final investment decision (FID) anywhere in Europe (Carbonnier, 2026). Transport & Environment's observatory counted 41 announced large-scale European projects, with around 1.3 Mt of potential 2030 output, of which none had reached FID and only four were in front-end engineering. Sixteen large-scale projects were paused or cancelled between 2024 and early 2025, including Shell/Vattenfall's HySkies and Ørsted's Green Fuels for Denmark (T&E, 2025). The industry's own assessment is sobering; in that projects at FID would supply only 0.71% of the 2030 EU PtL requirement (A4E, 2026). The European Commission has so far stated it is committed to both the bio-SAF and the PtL obligations, but it is also facing calls for postponement from within the industry. The most advanced European project is the Concrete Chemicals consortium's ~30,000 tonne PtL plant at Schwedt. The project received around EUR 350 million of public funding in February 2026, and a final investment decision is expected by 2027 (GreenAir News, 2026).

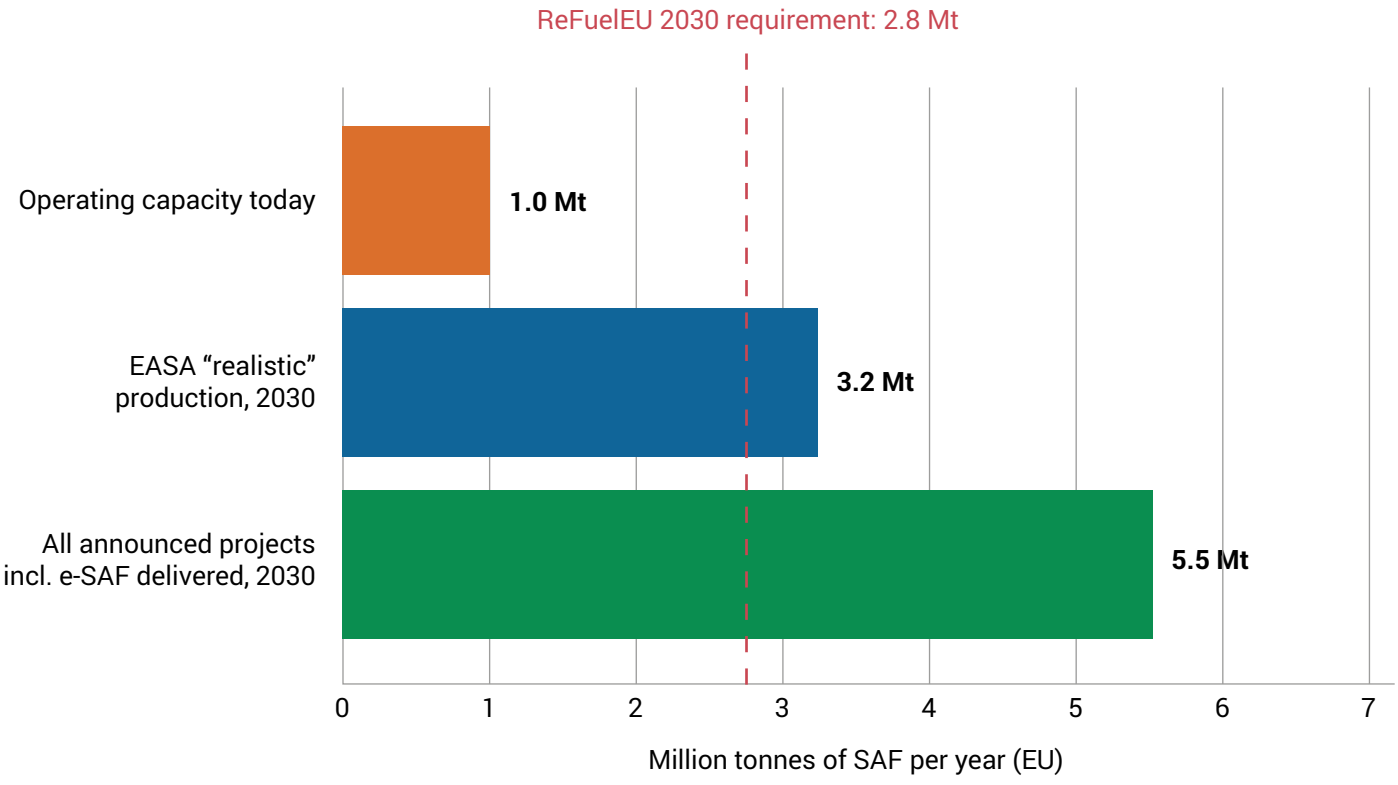


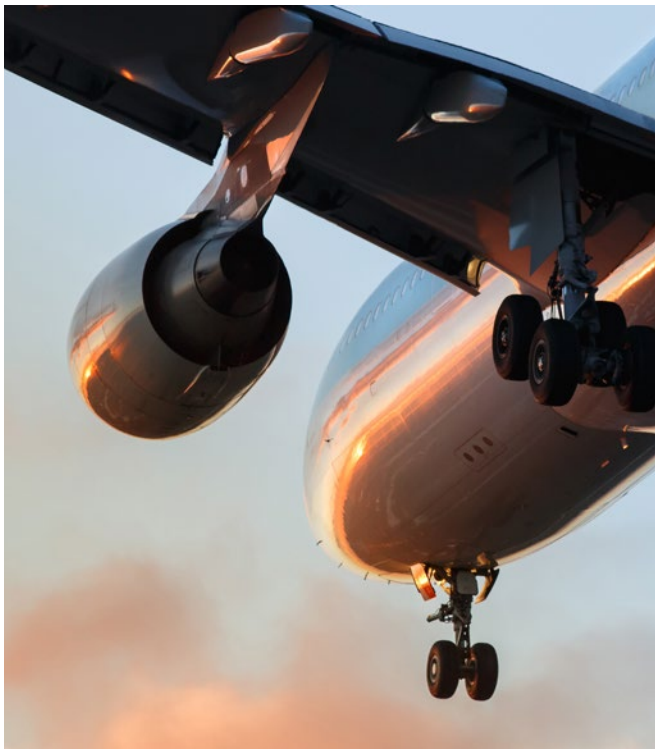
Figure 8: EU SAF production capacity to 2030: capacity operating today, EASA's "realistic" 2030 projection, and all announced projects including PtL (e-SAF) delivered in full, against the ReFuelEU 2030 requirement of 2.8 Mt (data: EASA, 2024)

The UK-specific pipeline is thinner still. Operating UK SAF supply currently is based on refinery co-processing at Phillips 66 Humber. Dedicated SAF plants are all pre-FID. In Teesside, alfanar's Lighthouse Green Fuels (~135,000 t/yr via gasification and Fischer-Tropsch) completed front-end engineering in mid-2026, and is expecting an investment decision at the end of 2027 and operations around 2032 (alfanar, 2026). LanzaJet and British Airways' Project Speedbird (~90,000 t/yr of SAF and renewable diesel) entered front-end engineering in late 2025, though no committed start date is announced (LanzaJet, 2025). The future of other announced major plants is uncertain. Fulcrum BioEnergy's plant at NorthPoint in Ellesmere Port has seen major delays, while its parent company in the US collapsed into bankruptcy. Velocys' Altalto project is also stalled. In 2025, Shell definitively cancelled its 820,000 t/yr Rotterdam biofuels plant, stating market conditions made biofuels unfavourable (Shell, 2025).

Comparing all this to the UK mandate's 2030 requirement of roughly 1.2–1.4 Mt, domestic committed capacity is a small fraction. The mandate will only be met, if at all, by imports and co-processing. Set against the *Technology Development* scenario's 4.1 Mt per year UK requirement by 2050, there is currently no visible pipeline: on optimistic schedules, the UK's two flagship plants together would supply around 5% of it, starting in the 2030s.

The UK also cannot rely on these imports. The market for waste-oil feedstocks and fuel is tightening as major Asian suppliers begin to prioritise domestic use of UCO for their own aviation mandates. China cancelled UCO export tax rebates in late 2024 and began to pilot a quota-limited SAF export (around 1.2 Mt a year for the entire world), with its UCO exports falling by roughly a third between mid-2024 and early 2025. Malaysia, Thailand and Indonesia are prioritising domestic processing, with new UCO-fed SAF plants of their own (S&P Global, 2025).

The integrity of some import channels is also now formally in question. In July 2025 the European Commission concluded an examination, prompted by an alert from the German authorities, of allegations that biodiesel imported from China had been fraudulently certified as made from waste materials (European Commission, 2025). The Commission found that the information gathered did not allow it to confirm that fraud had occurred, but it also identified systemic weaknesses in the way certification audits had been conducted, and has since begun revising the rules governing the voluntary certification schemes on which the system depends (European Commission, 2025). The UK's first mandate year was supplied from this market.



An airplane in flight. Image credit: Magnific

THE SCALE OF THE ISSUE

The gap between projected emissions and what SAF can be considered to realistically provide is not small. The UK mandate's 2040 obligation alone corresponds to around 2.9 Mt of SAF a year - more than global production in 2025. In addition, as the mandate is a share of fuel supplied, not a fixed volume, demand growth raises the obligation itself. The DfT's *Technology Development* scenario requires around 4.1 Mt a year for the UK by 2050, more than twice current global production, alongside the strongest efficiency gains of any scenario. We find little evidence that supply on this scale is currently being built or financed; the UK's two flagship plants would potentially supply just 5% of this. Moreover, even assumptions with such a high level of ambition, leave the sector above its share of the CB7 budget before a third runway at Heathrow.

CONCLUSION ON SAF AVAILABILITY

Our conclusion on SAF is that it *is* worth pursuing, but that the fuel assumptions behind the DfT's figures are not plausible. The mandate has so far been delivered using imported waste oil from a tightening market and the routes that offer the biggest emissions reductions remain pre-investment. In short, under every scenario modelled, even full delivery of the SAF mandate cannot enable the projected growth in passenger numbers if the UK is to remain within its legislated carbon budgets.

THE ROLE OF GREENHOUSE GAS REMOVALS FOR AVIATION EMISSIONS

Industrial complex surrounded by clouds. Image credit: Magnific

Dedicated capacity for removing CO_2 from the atmosphere, and placing it in durable long-term storage, is integral to current UK aviation policy. Without this, significant aviation demand reduction or much greater scaling of SAF would be needed in the CB7 period and beyond for the UK to remain within its carbon budgets. Aviation is the biggest user of projected UK GGR capacity in the CCC's CB7 analysis. In light of recently agreed airport expansions, higher demand scenarios and the proposed Heathrow third runway, GGR would be relied upon to a much greater extent. This section reviews the status of GGR in the UK to assess whether the technology can credibly scale up in time to meet the additional emissions from Heathrow expansion — set out in Section 3.

WHAT IS GGR?

GGR describes methods that take CO_2 out of the atmosphere and stores it long-term. It includes nature-based solutions such as afforestation or increasing soil carbon, and engineered approaches such as bioenergy with carbon capture and storage (BECCS), direct air carbon capture and storage (DACCS) and emerging methods such as biochar and enhanced rock weathering. Engineered removals are particularly critical for aviation in carbon budgets. Previous approaches to 'offset' fossil fuel emissions through routes including afforestation have been beset by issues of durability, monitoring and verification (Trencher et al., 2024). Engineered removals promise durable storage and clear verifiable quantification - but entail higher costs, more complex infrastructure and the development and adaptation of regulatory frameworks needed for their deployment (Fuss, 2026).

In the UK, engineered GGR is usually tied to the development of broader carbon capture and storage (CCS) applications. For the permanent geological storage of CO_2 from the atmosphere, both BECCS and DACCS rely on the development of an operational CO_2 transport and storage network, currently being developed for other industrial applications as part of the 'industrial clusters'. Thus, there is often crossover in the issues affecting the deployment of GGR and carbon capture, usage and storage (CCUS) in general.

CCS is an important technology option for tackling industrial emissions and can enable alternative power supply and synthetic fuel production pathways, where lower cost alternative approaches are not obviously available. Although increasingly central to climate policy for governments around the world, carbon capture projects have historically had a high failure rate relative to other mitigation technologies, with deployment consistently falling behind expectations (Kazlou et al., 2024). Similar issues around costs, financing, regulation, state support, social acceptance and risk attribution, that carbon capture as a broad category has faced for decades, remain relevant for GGR today (WEF, 2026). Global targets for BECCS are further complicated by concerns over the sustainability of feedstock supply chains. A number of studies, such as Prütz et al (2026) and Ampah et al (2024), point to land use and biodiversity trade-offs that would substantially reduce available biomass if addressing wider sustainability issues – reducing the future GGR potential of BECCS. Concerns remain around the electricity demand for DACCS, both as a cost, limiting scaling (Zurbriggen et al. 2026), and the environmental impacts of significant additional global power generating capacity built for this purpose (Qiu et al. 2022).

There is therefore an ongoing debate about the feasibility of GGR on the scale implied by international climate policy. Assessments of the sustainable deployment potential of the technologies suggest land, water, nutrients, energy or cost constraints make the uptake rates in modelled 1.5°C pathways unfeasible (Fuss et al., 2018). It has long been argued that the climate change mitigation agenda should proceed on the premise that GGR might not work at scale; describing dependence on GGR not as an insurance policy but as an unjust and high-stakes gamble (Anderson and Peters, 2016; Grant et al., 2021). Within this context we consider whether there is good evidence that the UK can credibly deliver not only the scale of GGR assumed for aviation in CB7, but additional GGR capacity for the emissions associated with Heathrow expansion.

WHAT THE CB7 PATHWAY ASSUMES FOR GGR

The CCC's CB7 pathway assumes UK engineered removals scale from effectively zero at the time of writing, to 21.3 $MtCO_2$ per year by 2040 and around 36 $MtCO_2$ per year by 2050. This is based predominantly on BECCS, beginning with energy from waste around 2028 with DACCS reaching around 8 $MtCO_2$/yr by 2050 (CO2RE, 2025). In 2050, it is projected that roughly 60% of these removals are earmarked to balance aviation's residual emissions, while the remainder exist to balance residual emissions of other sectors that cannot decarbonise, such as methane or nitrous oxide from agriculture. These removals are already allocated. If they do not arrive at the scale assumed by the CCC, the budget available for aviation and the other sectors must decrease accordingly. Therefore, any emissions over the sub-budget for aviation, must assume that additional removals arrive, surplus to those already committed to by the CCC. A third runway therefore bids against farming, industry, or the achievability of the carbon budget itself.

The effect and comparison to agriculture is important, as agriculture may be an example with no true alternative. Methane and nitrous oxide from livestock and soils are tied to producing food, and no abatement route removes them entirely, therefore presenting a clear case of residual emissions. Equivalent emissions from aviation are residual in a different sense. They remain because demand, principally for leisure travel, is assumed to grow, and because no fuel exists to cover that growth. Framing aviation emissions as residual assumes an equal and ethically justifiable claim on the same scarce removals as for agriculture.

DELIVERY TO DATE

GGR deployment globally is significantly off track for meeting the gigaton per annum capacity required in the majority of IPCC well below 2˚C scenarios (Zurbriggen et al. 2026). Projects for engineered removals in the development pipeline do not yet close this gap. The State of Carbon Dioxide Removal assessment (Edwards et al., 2026) which counts biochar alongside BECCS and DACCS, reports engineered removals run at around 2 $MtCO_2$ a year globally. That is ~ 0.1% of all current carbon removal, with the remaining 99.9% being conventional land-based approaches such as tree planting (Edwards et al., 2026). Globally, operational GGR projects, and those under construction, would only reach 8 $MtCO_2$ a year of capacity by 2030, with only 20% of planned capacity being built in recent years (Edwards et al., 2026). The entire world's committed engineered removal pipeline for 2030 is only a third of what the UK's CB7 pathway assumes the UK alone will operate a decade later – indicating the scale of the delivery challenge ahead.

In the UK, no engineered removals plant is operating yet. The Government's February 2025 decision on Drax provided only for low-load unabated biomass generation to 2031 and explicitly declined to make power BECCS the basis of that decision, referring the question to an independent review (DESNZ, 2025a). The project remains paused with no timeframe for revival, and a £48 million impairment was recognised in the company's 2025 results (Drax Group, 2026). The first industrial CCS clusters, that would support engineered removals, are at an early stage of construction and none of the projects have reached a definitive financial arrangement as of September 2026. The UK's first commercial direct air capture project, announced in June 2026 for Teesside, targets 20,000 tonnes a year from 2030 rising to 60,000 tonnes by 2032 (Carbon Herald, 2026).

The near-term outlook suggests that the UK is not on track for meeting CB7 goals for engineered removals. The Public Accounts Committee summarise the key reasons why Government targets for CCUS (of which engineered removals are part) are no longer considered achievable (PAC, 2025). This conclusion was based on the 5 $MtCO_2$ BECCS component being abandoned, assessing BECCS as effectively untested at commercial scale, no operating commercial-scale CCUS plants in the UK, and concerns over the business models proposed (PAC, 2025). The Government's 2025 independent review of GGR similarly suggests that the UK is not well placed to deliver the level of engineered removals expressed in CB7. It found that power BECCS was not at the technology readiness level for active commissioning and operation and only two GGR projects are in line for Government CCUS support, and highlighted the risks of relying on imported biomass due to constrained sustainable global supplies (Whitehead, 2025). The Government itself revised its predicted amount of GGR to be available in the UK by 2030, from the 5 $MtCO_2$ per year target in the Net Zero Strategy set in 2021, to 0.7 $MtCO_2$/yr of removals by 2030 in its latest plan (DESNZ, 2025b).

The delivery risk for GGR is a critical issue for aviation. Across the CB7 window, the CCC Balanced pathway relies on engineered removals of the order of 100 $MtCO_2$ economy-wide, ramping toward 21.3 $MtCO_2$ a year by 2040. The third runway at Heathrow would push this further, leaning more on a technology that is yet to demonstrate a capability to scale beyond pilots and small-scale commercial plants.

CONCLUSION ON GGR

The credibility of GGR as a means to balance out future aviation emissions is low. The Government's own revisions to GGR predictions suggest that there is decreasing confidence in GGR deployment to support expectations of more GGR to balance emissions. The modelling in this report is clear that Heathrow expansion requires ***additional*** GGR capacity in the UK to balance out the increase in emissions that expansion produces.

CONCLUSIONS AND IMPLICATIONS

This report set out to answer the climate question: can Heathrow expansion, on top of the capacity already approved, fit within the UK's legislated carbon budgets? This section pulls together the findings from this report, and sets out the implications for the decisions now before Government and Parliament.

The underside of an airplane in flight. Image credit: Cristofer Maximilian - Unsplash

CAN HEATHROW EXPANSION CREDIBLY MEET THE CLIMATE CHANGE ACT?

No. UK aviation looks likely to exceed its share of the Seventh Carbon Budget ***before*** the third runway at Heathrow is considered unless there is some external driver or shock that reduces demand. Even if the SAF mandate materialises in full, practically no growth can be accommodated if aviation is to meet CB7; aviation growth is incompatible with CB7. If advanced fuels fail to arrive after 2030, passenger numbers need to contract by around 0.5% a year. Set against this, UK terminal passengers have grown at ~2.38% annually in the fifteen years prior to 2025 – a period that included a significant hiatus due to COVID-19. The DfT's own scenarios imply around 2% yearly growth – pathways that do not align with the Government's own statutory carbon budget targets. Their central scenario instead illustrates that even without Heathrow, aviation will overshoot its budget by 30 to 72 $MtCO_2e$, from the SAF mandate delivered in full to remaining at today's share. Even the DfT's most technology-optimistic scenario, which requires levels of SAF and efficiency increases higher than anything thus-far evidenced, leads to an overshoot of 16 to 58 $MtCO_2e$. The question for Heathrow expansion is therefore not whether new capacity fits within the budgets, but *how far beyond* the budgets the sector will be allowed to go.

The two technologies required to reconcile demand growth or expansion with the budgets appear unlikely to be able to deliver in time. Meeting the budget using alternative fuels would require volumes greater than is currently demanded by the mandate, and higher than the expected supply at a time when many economies are reaching for the same resources to decarbonise their own aviation sectors. Engineered removals are delivering worldwide at a small fraction of what the UK's pathway assumes for the UK alone; every credible future tonne is already committed to making CB7 balance. Heathrow expansion would therefore require deeper cuts to emissions from farming and industry and threatens the achievability of the budget as a whole.

Furthermore the runway's own case rests on contradictory assumptions. A third runway is presented in the HENPS, as Critical National Growth Infrastructure, yet it is appraised for carbon on the assumption that three-quarters of its traffic is taken from other UK airports. That would amount to either a small climate impact through displacement with no apparent economic upside, **or** an economic benefit through new activity but that comes with a significant climate cost - **it cannot be both**. The DfT's own forecasts show that displaced traffic taken from airports that have recently been granted consent to expand themselves is expected to refill, leading to overall net higher traffic compared to without expansion and higher emissions in future carbon budgets. Taking the DfT's own figures, more than 98% of the scheme's lifetime emissions fall in later budget periods that need to be even tighter than CB7, which the aviation sector is already expected to breach.

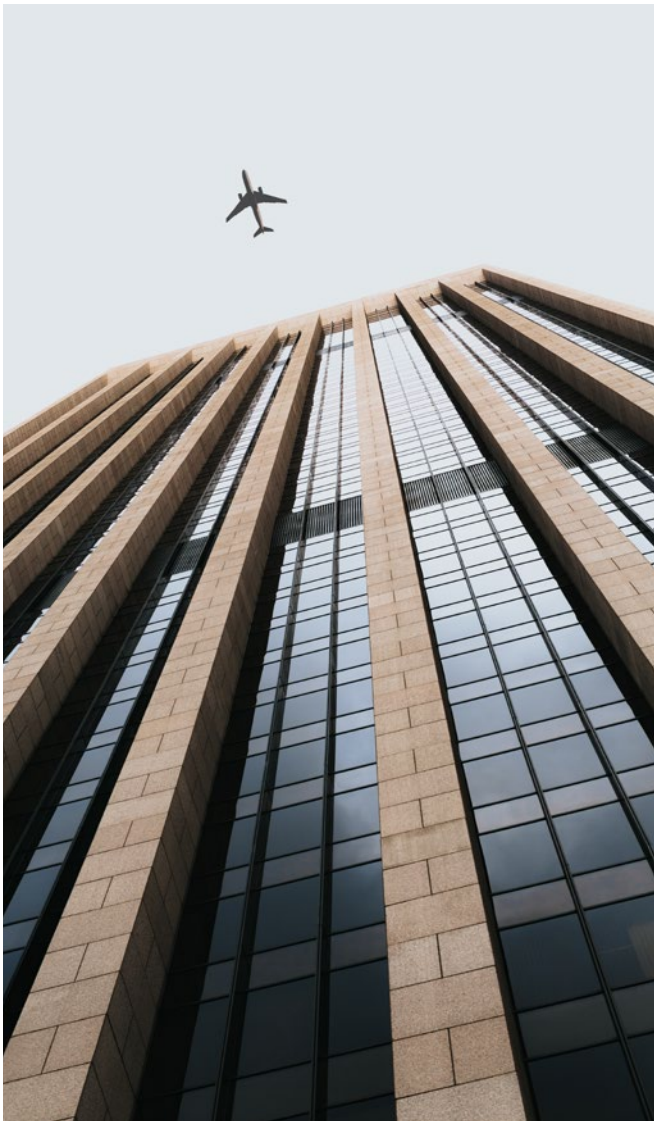
Finally, this research also highlights a significant procedural gap. Each scheme for airport expansion is assessed in isolation, and there is no framework for deciding what total UK airport capacity and usage is compatible, either with the UK's legislated carbon budgets, but also with the UK's Paris commitments. This is precisely the question that a national policy statement should exist to answer. The capacity the DfT already assumes to exist for 2030, around 465 mppa, exceeds anything the CCC's own demand path reaches at any point before 2050.

A passenger awaiting their flight. Image credit: Tomek Baginski - Unsplash

IMPLICATIONS

1. A THIRD RUNWAY AT HEATHROW SHOULD NOT BE APPROVED.

Every published Government scenario, and the full range of fifteen-year averaged growth rates seen in the sector's recent history, would result in aviation using more than its share of the Seventh Carbon Budget, even before expansion. A third runway worsens this in every case, even if most of the traffic at the new airport is assumed to be displaced traffic from other airports. If the traffic is all additional rather than displaced, the emissions are even higher. More than 98% of the scheme's lifetime emissions are expected to fall in future budget periods, which legally must be tighter than CB7 to meet UK climate targets. On this evidence, expansion is not compatible with the Climate Change Act, and the HENPS should not be designated.



And airplane flying over a city building. Image credit: Magnific

2. THE GOVERNMENT'S APPROACH TO AVIATION POLICY MUST SHIFT TO ONE BASED ON FIRMLY ESTABLISHED OPTIONS RATHER THAN HOPEFUL EXPECTATIONS.

SAF and GGR may play an important role in decarbonising aviation in future years, but they are neither timely nor at the appropriate scale to avoid breaching CB7. Current evidence shows slow and low SAF and GGR delivery. Proven scalability through successful UK commercial SAF and GGR projects should be a prerequisite to airport capacity expansion.

3. TOTAL UK AIRPORT CAPACITY SHOULD BE ASSESSED NATIONALLY AGAINST CARBON BUDGETS.

Each airport expansion scheme is currently consented in isolation, and no framework assesses what total capacity is compatible with the UK's carbon budgets or Paris commitments. The national policy statement would be a natural home for this wider system integration and must be completed before any further capacity decisions are taken.

4. A DEMAND STRATEGY ACROSS UK AVIATION IS UNAVOIDABLE.

With SAF and GGR shown to be insufficient to keep net aviation emissions within its share of the Seventh Carbon budget, limiting demand growth is the only substantive lever that remains. Assessing the implications of specific policy instruments, such as capacity or movement limits or pricing mechanisms is beyond the scope of this report, but the forthcoming CB7 delivery plan should state which of these the Government intends to use.

The evidence we have presented shows that the carbon budgets Parliament has legislated for can **only** be met if UK aviation **stops** growing. Despite this being a clear outcome of our own as well as DfT scenarios, the planned third runway at Heathrow explicitly opens up space for further growth.

The choice before Government is therefore not between growth and stasis, but between managing aviation within the framework Parliament has legislated, or knowingly approving expansion that will breach legislated budgets. If Heathrow expansion is ultimately pushed forwards, this will be in full knowledge of a high likelihood of the UK reneging on its legal climate change commitments.

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ABBREVIATIONS

TERM	MEANING
ANPS	Airports National Policy Statement. The 2018 planning framework for Heathrow expansion, now under review and to be replaced by the HENPS.
AtJ	Alcohol-to-jet. A SAF production route converting ethanol or other alcohols into kerosene.
BECCS	Bioenergy with carbon capture and storage.
CAA	Civil Aviation Authority.
CB7, CB8	The Seventh and Eighth Carbon Budgets. CB7 covers 2038–2042 and was legislated in June 2026 at 535 $MtCO_2e$. CB8 has not yet been formally recommended by the CCC.
CCC	Climate Change Committee. The Government's independent statutory adviser, which recommends the level of each carbon budget and publishes pathways to meet them.
CCS	Carbon capture and storage.
CCUS	Carbon capture, usage and storage.
CO_2e	Carbon dioxide equivalent. In this report, only the gases counted by the Climate Change Act, on a GWP100 basis.
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation.
DACCS	Direct air carbon capture and storage.
DESNZ	Department for Energy Security and Net Zero.
DfT	Department for Transport.
EAC	Environmental Audit Committee, House of Commons.
EASA	European Union Aviation Safety Agency.
e-SAF	See PtL.
FID	Final investment decision. The point at which a project is financially committed to construction.
GGR	Greenhouse gas removal. Methods that take CO out of the atmosphere and store it long term.
GHG	Greenhouse gas.

ABBREVIATIONS

TERM	MEANING
GWP100	Global warming potential over a 100-year time horizon.
HEFA	Hydroprocessed esters and fatty acids. The dominant SAF route in use today, made from used cooking oil and other waste fats.
HENPS	Heathrow Expansion National Policy Statement. Draft published 18 June 2026.
IATA	International Air Transport Association.
ICAO	International Civil Aviation Organization.
ICCT	International Council on Clean Transportation.
IPCC	Intergovernmental Panel on Climate Change.
JetZero	The UK Government's strategy for reaching net zero aviation emissions.
mppa	Million passengers per annum.
MtCO e, GtCO	Million and billion tonnes of carbon dioxide (equivalent).
PAC	Committee of Public Accounts, House of Commons.
PtL	Power-to-liquid, also called e-SAF. Synthetic fuel made from renewable electricity, hydrogen and captured CO . The least developed of the four main SAF routes.
SAF	Sustainable aviation fuel. Drop-in jet fuels made from non-fossil sources, or from waste fossil sources.
T&E	Transport & Environment.
UCO	Used cooking oil.
UNFCCC	United Nations Framework Convention on Climate Change.

THE DFT'S EIGHT DEMAND SCENARIOS

SCENARIO	DESCRIPTION	EMISSIONS PUBLISHED?
Current Trends	Central scenario showing a continuation of existing trends	Yes, both variants
Low Growth	Lower limit of the forecasts in a low-growth economy	Yes, both variants
High Growth	Upper limit of the forecasts in a high-growth economy	Yes (without-expansion ends 2039)
Behavioural Change	Environmental concerns affect passengers' likelihood to fly	Yes, both variants
Regional Growth	Stronger population and economic growth outside the South East, shifting demand towards regional airports.	Yes, both variants
Technology Development	Rapid efficiency gains and SAF uptake; used by the Department for carbon-budget planning	Yes, both variants
Less Constrained Regional Airport Development	Fewer constraints on airport development outside the South East, testing the effect of allowing regional capacity to expand more freely.	Yes, both variants
Aerocharge	The costs of expansion are charged to passengers.	Yes, with-expansion only

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