

Analytical Annex to the UK Emissions Trading Scheme (ETS): Treatment of Sustainable Aviation Fuel (SAF) Consultation

Analytical annex to the joint consultation of the UK Government, the Scottish Government, the Welsh Government and the Department of Agriculture, Environment and Rural Affairs for Northern Ireland



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Analytical Annex

This annex provides background to the UK Emissions Trading Scheme (ETS): Treatment of Sustainable Aviation Fuel (SAF) Consultation. It provides an overview of the factors influencing the possible impacts of the illustrative consultation policy packages and considerations. It is not intended to reflect the full evidence base on which decisions will be taken, nor the full evidence base on which proposals have been developed to date. This is not a formal impact assessment, which will be published alongside the Authority Response in due course. We will seek to gain further evidence to inform decisions from the consultation.

In the Authority Response to the consultation, the UK ETS Authority, hereafter 'the Authority', consisting of the UK Government, Scottish Government, Welsh Government and the Department of Agriculture, Environment and Rural Affairs in Northern Ireland will set out impacts of combined proposals, considering the interaction of proposed options and overall scheme impacts. Where we identify specific risks of options, we will set out the actions we will take to appropriately mitigate any such impacts where it is necessary to do so.

Section 1: Background

UK ETS overview

In consideration of the context of the consultation, this section sets out characteristics of the existing UK ETS.

Scope/size of market

The UK ETS represents approximately 25% of UK territorial emissions based on the latest 2023 data.¹ The scheme covers the UK's power sector, energy-intensive industries, and emissions from domestic flights, flights from the UK to the European Economic Area (EEA) and Switzerland, and flights between the UK and Gibraltar.

There were 687 installations and 401 aircraft operators in the UK ETS main scheme in 2023.² In addition, the scheme regulates 250 installations under the Hospital and Small Emitter (HSE) opt out, as well as 110 Ultra-Small Emitters (USE).³ Six UK installations – electricity generators in Northern Ireland – remain in the EU Emissions Trading System (EU ETS) under the terms of the Windsor Framework.

Aviation emissions

In 2024, UK ETS-covered aviation emissions amounted to 9.0 million tonnes of CO₂ equivalent (MtCO₂e). This represents an increase in annual UK ETS aviation emissions of 1 MtCO₂e since 2022 and 0.2 MtCO₂e since 2023. This was driven by the recovery in aviation activity from the impact of the COVID-19 pandemic. UK ETS aviation emission figures do not exist for 2019 since this pre-dates the UK ETS, but total UK territorial aviation emissions dropped from 36.7 MtCO₂e in 2019 to 32.9 MtCO₂e in 2023, in large part due to the COVID-19 pandemic.

Cap

The cap is an upper limit on the quantity of UK ETS allowances (UKAs) created within the scheme in each year. The cap decreases over time, providing a signal to covered sectors to decarbonise at the pace and scale required to keep aggregate emissions at or below the cap. However, participants can purchase and hold allowances for surrender in subsequent years of Phase I (1 January 2020 – 31 December 2030). This allows individual businesses, industries and sectors to 'bank' the allowances necessary to support their own specific decarbonisation trajectories.

¹ DESNZ analysis based on DESNZ (2024), 'Provisional UK greenhouse gas emissions national statistics 2023', <https://www.gov.uk/government/statistics/provisional-uk-greenhouse-gas-emissions-national-statistics-2023>.

² Based on operators with recorded 2023 emissions in UK ETS Emissions and Surrenders report published in June 2024: <https://reports.view-emissions-trading-registry.service.gov.uk/ets-reports.html>.

³ See published list Hospital and Small Emitter list here: <https://www.gov.uk/guidance/opt-out-of-the-uk-ets-if-your-installation-is-a-hospital-or-small-emitter>; See published list of Ultra-Small Emitters here: <https://www.gov.uk/guidance/opt-out-of-the-uk-ets-if-your-installation-is-an-ultra-small-emitter>.

The base annual cap level, before accounting for hospital and small emitters:

- in 2021 was 156 MtCO_{2e},
- in 2022 was 151 MtCO_{2e},
- in 2023 was 147 MtCO_{2e},
- in 2024 was 92 MtCO_{2e},
- in 2025 will be 86 MtCO_{2e}

In the Authority's Response to the Developing the UK ETS consultation, published in 2023,⁴ the Authority committed to reduce the annual base cap to approximately 49 MtCO_{2e} in 2030, which means decreasing the overall Phase I, 2021-2030, base cap from 1,366 MtCO_{2e} to 936 MtCO_{2e}.⁵ This is in line with the Carbon Budget Delivery Plan published in March 2023, reflecting the full delivery of decarbonisation policies across sectors covered by the ETS such that the UK meets its carbon budgets (CBs) and nationally determined contribution (NDC) in 2030.⁶

Aviation Free Allocation

Free Allocation of UK ETS allowances is the primary policy instrument through which carbon leakage risk is currently addressed in the UK. Carbon leakage refers to the movement of production and associated emissions from one country to another due to different levels of decarbonisation effort through carbon pricing and climate regulation. As a result of carbon leakage, the objective of decarbonisation efforts – to reduce global emissions – would be undermined.

Aviation free allocation has been removed from 2026,⁷ as it has been assessed that the aviation industry faces no risk of carbon leakage due to UK ETS compliance costs.⁸ This is because the vast majority of passengers take round trips, and so a decrease in demand and emissions on flights in scope of the UK ETS is found to be matched by an equivalent decrease in demand and emissions outside its scope.

SAF claims for emissions reductions

Under the UK ETS Order, aircraft operators can claim emissions reductions from eligible SAF through the application of a nominal zero emissions factor. This allows aircraft operators to reduce their aviation emissions figure and the corresponding number of allowances they are

⁴ UK ETS Authority (2023), 'Developing the UK Emissions Trading Scheme: main response',

<https://www.gov.uk/government/consultations/developing-the-uk-emissions-trading-scheme-uk-ets>.

⁵ Carbon dioxide equivalent (CO_{2e}) is a measurement of the total amount of greenhouse gas emissions expressed in terms of the equivalent measurement of carbon dioxide.

⁶ Under international GHG inventory guidelines and GHG accounting rules consistent with whole economy reporting on net zero, SAF is reported as delivering 100% direct CO_{2e} emissions savings for the aviation sector.

⁷ Page 62-68: <https://assets.publishing.service.gov.uk/media/649eb7aa06179b000c3f7608/uk-emissions-trading-scheme-consultation-government-response.pdf>.

⁸ [Economic research on the impacts of carbon pricing on the UK aviation sector](#).

required to surrender under the UK ETS. Eligible SAF is zero rated, meaning it is treated as if it produces zero emissions.

SAF Mandate overview

SAF can be made from a variety of sustainable feedstocks and can be easily blended with conventional jet kerosene for use in existing engines. It has the potential to achieve over 70% emissions reductions on a lifecycle basis when fully replacing fossil kerosene.

The UK is playing a leading role in the development, production, and use, of SAF to support global decarbonisation efforts. The UK Government is doing so by securing SAF supply by supporting the development of commercial-scale SAF plants, creating demand through the SAF Mandate and creating the right conditions for UK investment through the revenue certainty mechanism.

The UK SAF Mandate came into force on 1 January 2025 and sets a legal obligation on fuel suppliers in the UK to supply an increasing proportion of SAF over time. This regulatory framework is enforced through monitoring and compliance measures. By setting clear targets and providing a stable market environment, the Mandate will drive the production and adoption of SAF, reduce aviation emissions, and support the UK's goal of net zero greenhouse gas (GHG) emissions by 2050.

The reduction in aviation emissions as a result of the SAF Mandate is forecast to increase overtime. In 2030 and 2040, it is expected that the SAF mandate will reduce aviation emissions by up to 2.7 MtCO₂e and up to 6.3 MtCO₂e per annum, respectively, compared to a counterfactual where the SAF Mandate is not implemented. The details of how the design of the SAF Mandate will achieve these GHG reductions were published in a UK Government response to the second consultation on the SAF Mandate in April 2024 and SAF Mandate Cost-Benefit Analysis.⁹ It includes information on:

- **Overall SAF demand:** From 2025 onwards, the SAF Mandate obligates fuel suppliers to progressively increase the levels of SAF in the aviation fuel mix. It requires 2% of UK aviation fuel to be SAF in 2025, 10% by 2030 and 22% by 2040.¹⁰
- **Power-to-liquid (PtL) obligation:** The Mandate includes a separate PtL¹¹ obligation from 2028, starting at 0.2% of total jet fuel, increasing to 0.5% in 2030 and 3.5% in 2040 to incentivise this critical technology.
- **Hydroprocessed esters and fatty acids (HEFA) cap:** The Mandate includes a HEFA cap starting from 2027, with a decreasing contribution from HEFA, from 71% of the total

⁹ [Creating the UK SAF Mandate: government response to the second consultation on the SAF Mandate; Sustainable aviation fuel mandate: final stage cost benefit analysis.](#)

¹⁰ Assuming that SAF saves 70% GHG compared to kerosene.

¹¹ PtL is a method of producing synthetic fuel which uses water, carbon dioxide and renewable electricity. PtL fuels are a type of SAF.

target in 2030 to 35% in 2040, to help incentivise the diversification of SAF technologies.

- **Compliance:** Suppliers can meet their obligations through supplying SAF and earning certificates, buying certificates from others, or by paying the ‘buy-out’ price.
- **Buy-out price:** The obligation buy-out price is set at the equivalent of £4.70 and £5.00 per litre for the main and PtL obligations, respectively. The buyout price, set at this level, provides a sufficiently high incentive to supply SAF into the UK market, to encourage the supply of SAF over the use of buy-out, and supports investor confidence in UK SAF projects. The buy-out price sets a maximum cost for the scheme, thereby delivering GHG emission reductions at an acceptable cost.
- **Sustainability criteria:** SAF must meet strict sustainability criteria: it must be a residual (i.e. non-recyclable) waste or residue derived biofuel, recycled carbon fuel (RCF),¹² low carbon hydrogen, or PtL fuel.

Proportional rewards: SAF is rewarded in proportion to the GHG savings it achieves, thus incentivising SAF with higher GHG savings. The UK Government will also be laying legislation to introduce a revenue certainty mechanism (RCM). The Sustainable Aviation Bill will support SAF production in the UK by providing revenue certainty to encourage investment in the construction of SAF plants across the UK. Following consultation, the UK Government has decided to proceed with the guaranteed strike price mechanism. This mechanism works in a similar way to the contracts for difference schemes in other low carbon and renewable energy sectors. This will help drive our mission to kickstart economic growth and make Britain a clean energy superpower.

There is a full Cost-Benefit Analysis available,¹³ completed by the Department for Transport (DfT), for the implementation of the SAF Mandate. This provides further detail on design options considered and the respective monetisable impacts.

RTFO overview

The Renewable Transport Fuel Obligation (RTFO) commenced on 15 April 2008 and is one of the government’s main policies for reducing GHG emissions from transport.

Under the RTFO, suppliers of relevant transport fuel (petrol, diesel, gas oil or renewable fuel) in the UK must meet an annual obligation using tradeable certificates which are awarded for the supply of sustainable renewable fuel. The RTFO is administered by a team within DfT called the Low Carbon Fuels (LCF) Delivery Unit.

¹² A type of SAF produced from recycled components of fossil origin.

¹³ <https://assets.publishing.service.gov.uk/media/66601969dc15efddd1a872d/uk-saf-mandate-final-stage-cost-benefit-analysis.pdf>.

In 2024, because of the RTFO, 3.8 billion litres of renewable fuel was supplied for use in UK transport. This constitutes 7.7% of total fuel for road and non-mobile machinery use supplied over the year. This delivered greenhouse gas savings of 7.9 million tonnes of CO₂e.

RTFO and SAF Mandate differences

SAF was eligible under the RTFO until the introduction of the SAF Mandate in 2025. The SAF Mandate introduced new eligibility and sustainability criteria for SAF, which differ from those of the RTFO, which is relevant for some of the policy packages included in the consultation. These include:

- **Sustainability Criteria:** Although the RTFO and SAF Mandate are aligned on types of fuel – biofuels, RCFs, and PtL fuels, they differ on sustainability criteria. The SAF Mandate’s eligibility criteria has expanded to include PtL fuels eligibility using nuclear energy, whilst biofuels created from food, feed or energy crops are not currently eligible.¹⁴ It is worth noting that under the UK ETS currently, only SAF derived from biomass (satisfying the RTFO sustainability criteria) is eligible for aircraft operators to claim emissions reductions under the UK ETS.
- **Emissions saving threshold:** The reduction in GHG emissions, relative to fossil equivalents, must reach a minimum level under both the SAF Mandate and the RTFO. Under the RTFO, the minimum GHG saving for SAF was 65%. For the SAF Mandate, the minimum GHG saving is 40%.
- **Fossil fuel comparator:** When calculating emissions savings, there is a standard figure used for the “carbon intensity” of fossil fuels, against which a SAF can be compared. This describes the mass of CO₂e released per unit of energy fuel burned. The RTFO uses 94gCO₂e/MJ, which reflects an average figure for fossil petrol and diesel. The SAF Mandate uses 89gCO₂e/MJ, which better reflects aviation fossil kerosene specifically. This means that the same fuel will have a different GHG saving percentages when reported under each scheme.

The consultation

The purpose of this consultation is to invite views on how the treatment of SAF under the UK ETS can be improved in the context of the introduction of the SAF Mandate.

The consultation will examine and pose questions concerning:

- Whether the Authority should expand the types of SAF eligible for an emissions reduction claim under the UK ETS beyond biofuels.

¹⁴ A call for evidence (CfE) was published in 2025 to seek feedback on the eligibility of crops in the SAF Mandate. The CfE is intended to inform areas such as feedstock availability, industrial development, sustainability and regulation. Any future changes to eligible feedstocks under the SAF Mandate would be subject to consultation.

- Whether the Authority should align SAF eligibility under the UK ETS with the SAF Mandate sustainability criteria.
- Whether the Authority should maintain the current emissions saving threshold for eligible SAF under the UK ETS or align with the SAF Mandate threshold.
- How the UK ETS should recognise and account for SAF use: continue zero rating; recognise SAF in proportion to its emissions savings; or treat it in the same way as fossil kerosene and not recognise its use.
- Other related potential operational and legal changes to existing UK ETS policy and legislation.

Further detail relating to these questions can be found in the UK ETS: Treatment of SAF Consultation document.

Section 2: SAF in the UK ETS

SAF in the UK ETS

SAF is an existing alternative to regular fossil kerosene in aviation fuelling. Different types of SAF can be made from a variety of different feedstocks, which generate lower total GHG emissions over the lifecycle of the fuel than fossil kerosene. However, the GHG emissions from engine combustion of SAF are comparable to fossil kerosene.

Under the UK ETS Order, aircraft operators can claim emissions reductions from eligible SAF through the application of a nominal zero emissions factor. This allows aircraft operators to reduce their aviation emissions figure and the corresponding number of allowances they are required to surrender under the UK ETS. Eligible SAF is zero rated, meaning it is treated as if it produces zero emissions. Article 54 of the Monitoring and Reporting Regulation 2018, as modified by the UK ETS Order, sets out the detailed rules.

Eligible SAF must currently be a biofuel and meet or exceed the sustainability criteria set out in Schedule 1 of the RTFO Order 2007 (the “RTFO sustainability criteria”). It must therefore make an emissions saving of at least 65% compared to a fossil fuel comparator of 94gCO₂e/MJ. Current eligibility and treatment of SAF in the UK ETS is summarised in the following table.

Current eligibility and treatment of SAF in the UK ETS		
1)	Eligible fuel types	Biofuels only
2)	Sustainability criteria	RTFO sustainability criteria
3)	GHG emissions saving threshold	65% (55% for older production plants ¹⁵)
4)	Fossil fuel comparator	94gCO ₂ e/MJ
5)	How SAF is recognised	Zero rated

In March 2022, the Authority consulted on the development of the UK ETS, including a Call for Evidence¹⁶ seeking views on how the then forthcoming SAF Mandate and UK ETS could interact. The Authority committed in the subsequent Authority response,¹⁷ published 3 July 2023, to continue to develop proposals on how the UK ETS should treat the claiming of

¹⁵ This refers to plants at which the production of SAF was taking place on or before 5 October 2015.

¹⁶ <https://assets.publishing.service.gov.uk/media/624ec31de90e072a04c06520/developing-the-uk-ets-english.pdf>.

¹⁷ <https://assets.publishing.service.gov.uk/media/649eb7aa06179b000c3f7608/uk-emissions-trading-scheme-consultation-government-response.pdf>.

emissions reductions from SAF by aircraft operators. As part of this, the Authority committed to explore alternative options to SAF being zero rated in the future, for example, by allowing aircraft operators to reduce their surrender obligations relative to the lifecycle emissions savings of the SAF used.

Impact of the SAF Mandate on the UK ETS

Since the SAF Mandate came into force on 1 January 2025, for SAF to be eligible under the UK SAF Mandate it must comply with the SAF Mandate sustainability criteria. As outlined, these criteria differ in some ways from the existing RTFO criteria used by the UK ETS, which are elaborated on later.

This means that, in theory, under current regulations, some SAF that would be eligible under the SAF Mandate would not be eligible under the UK ETS for claiming emissions reductions.

The Department for Transport, based on the outputs from SAF Mandate Cost-Benefit Analysis¹⁸ does not anticipate SAF eligible under one scheme but not both schemes,¹⁹ to be supplied in the UK until at least 2027. Estimated SAF production pathways²⁰ at risk of being only eligible under the SAF mandate, and not the UK ETS, are generally expected to be limited in production volume or not operational until the late 2030s.²¹ These include SAF made from recyclable plastic and waste rubber.

Rationale for policy review

The UK ETS' treatment of SAF allows the emissions reductions in the production of SAF to be accounted for. We are considering the treatment of SAF in light of recent changes to the SAF market and UK policy development, including the introduction of the SAF Mandate from 1 January 2025. Any changes to UK ETS SAF policy will be considered in the context of the UK ETS Authority's ambition for net zero by 2050,²² and the role of UK ETS to provide a framework to incentivise this to be delivered cost effectively.

Future treatment of SAF in the UK ETS

As outlined, the UK SAF Mandate came into effect on 1 January 2025 and is the UK's key policy mechanism to secure demand for SAF, succeeding the RTFO's support for SAF. We are

¹⁸ [Sustainable aviation fuel mandate: final stage cost benefit analysis](#).

¹⁹ SAF which would be eligible under the SAF Mandate, but not the UK ETS, in this period include those made from waste, those with emissions savings lower than 65% and greater than 40%, and Power-to-Liquid fuels.

²⁰ Production pathways refer to the way feedstocks are converted into aviation fuel. There are evaluated and approved by organisations such as ASTM international, and there are currently 11 approved pathways. For more details, see: [Conversion processes](#).

²¹ This holds true except in cases where pessimistic GHG savings from SAF are assumed.

²² All members of the UK ETS authority have committed to net zero, with the UK Government, Welsh Government and Northern Ireland Executive aiming to achieve this by 2050, and the Scottish Government aiming to achieve net zero by 2045.

consulting on potential updates to the five key aspects of UK ETS SAF policy, taking interactions with the SAF Mandate into account:

1. Eligible fuel types: the types of fuels that are eligible (including Recycled Carbon Fuels and Power-to-Liquid)
2. Sustainability criteria: the sustainability criteria that eligible SAF is required to comply with
3. GHG emissions saving threshold: the emissions savings eligible SAF is required to make compared to fossil kerosene
4. Fossil fuel comparator: the baseline emissions factor for fossil kerosene used, against which SAF emissions savings are measured
5. How SAF is recognised: how SAF is recognised, i.e. by how much aircraft operators can reduce their UK ETS aviation emissions and surrender obligations from SAF

DfT analysis shows that it is a combination of DfT policies (SAF Mandate, Advanced Fuels Fund (AFF), RCM) which act as the primary drivers of UK SAF uptake, rather than the UK ETS itself. Therefore, the consultation's consideration of each of the above five aspects does not include impacts on the demand and supply of SAF.

Further detail relating to these aspects can be found in the UK ETS: Treatment of SAF Consultation document.

Policy packages

The individual UK ETS SAF policy choices outlined in the consultation can be combined to produce a range of possible policy packages for the future treatment of SAF in the UK ETS.

To demonstrate how the available policy choices could work together, the Authority has brought together two similar policy packages for comparative purposes below. These packages are intended as examples and do not represent minded-to positions or Authority recommendations. These packages are outlined in the table below alongside the counterfactual and are then considered in more depth.

Other combinations of policy choices are possible, and the Authority encourages stakeholders to take the information contained within the preceding sections and in the consultation into account when considering potential combinations.

UK ETS Authority illustrative policy packages				
		Counterfactual (do nothing)	Policy package 1	Policy package 2
1)	Eligible fuel types	Biofuels only	Expand beyond biofuels	Expand beyond biofuels
2)	Sustainability criteria	RTFO sustainability criteria	UK SAF Mandate sustainability criteria	UK SAF Mandate sustainability criteria
3)	GHG emissions saving threshold ²³	65%	40%	40%
4)	Fossil fuel comparator	94gCO ₂ e/MJ	89gCO ₂ e/MJ	89gCO ₂ e/MJ
5)	How SAF is recognised	Zero rated	Zero rated	Lifecycle assessment

Counterfactual: This is the counterfactual used for the purpose of analysis. Counterfactual would represent a continuation of current practice. Biofuels would remain the only eligible types of SAF and would continue to need to make an emissions saving of at least 65%. Eligible SAF would also continue to be treated as having an emissions factor of zero.

Policy package 1: Under Policy package 1, the scope of eligible fuels would be expanded to include RCFs and PtLs, and the SAF Mandate sustainability criteria and fossil fuel comparator would be adopted. SAF would need to make at least a 40% GHG emissions saving across its lifecycle and align with the other sustainability requirements of the Mandate. Eligible SAF would continue to be zero rated.

Policy package 2: Under Policy package 2, the scope of eligible fuels would be expanded to include RCFs and PtLs, and the SAF Mandate sustainability criteria and fossil fuel comparator would be adopted. SAF would need to make at least a 40% GHG emissions saving across its lifecycle and align with the other sustainability requirements of the Mandate. The current practice of zero rating would be replaced with recognising SAF based on its actual lifecycle emissions savings.

²³ All options have been analysed where the applicable threshold is compared to a fossil fuel comparator of 89gCO₂e/MJ. If the UK ETS were to maintain the existing fossil fuel comparator of 94gCO₂e/MJ, this would affect the impacts assessed but to a marginal degree.

Section 3: Analysis

Methodology

The methodology used to assess the individual impacts of each policy package in this analytical annex is presented alongside the results from the analysis.

This analysis uses estimates of the volume and types of SAF likely to be supplied in the UK based on DfT internal modelling and has drawn upon analysis produced for the final stage SAF Mandate cost benefit analysis and insights from the Advanced Fuels Fund.²⁴ The analysis detailed in this document is modelled over the 16 year period, 2025-2040, to align with the period over which the SAF Mandate is currently legislated.

It is not expected that SAF supply in the UK will exceed the amount required under the SAF Mandate due to high costs of SAF relative to fossil jet fuel, alongside feedstock and production capacity constraints, and therefore we have not included any scenarios where this is the case. DfT analysis shows that it is a combination of DfT policies (SAF Mandate, AFF and RCM) which act as the primary drivers of SAF uptake, rather than the UK ETS itself. As a result, amending the minimum GHG saving threshold from 65% to 40% is expected to have little-to-no impact on the resulting SAF fuel mix.

All aspects of the analysis are conducted on the assumption that all other factors remain equal, so that the isolated impacts of the policy packages can be better understood. This includes the UK ETS cap, which is not currently planned to see an adjustment based on this policy decision.

It is important to note that the GHG savings detailed in the Annex are only used for determining the eligibility of a particular SAF, relative to each policy package. When calculating volumes of emissions reductions that would be claimed from SAF and any resulting figures such as change to aircraft operators' costs, these GHG savings are not factored in due to a limitation in input data. Instead, a blanket assumption of 70% GHG saving for all SAF types and years is used. This means that for Policy package 2 which uses a lifecycle assessment approach, most estimates of volumes of emissions reductions that would be claimed from SAF will be underestimates since actual GHG savings are usually higher than 70%. The Authority is committed to improving this approach for the Authority Response stage of the consultation.

Sensitivity analysis

In order to account for uncertainty, sensitivity analysis has been conducted by varying the following modelling inputs:

- **SAF Emissions Savings:** Each SAF production pathway has an associated estimate for GHG savings realised by that approach to producing SAF. Modelling in the

²⁴ [Advanced Fuels Fund \(AFF\) competition winners - GOV.UK](https://www.gov.uk/government/news/advanced-fuels-fund-competition-winners).

consultation includes pessimistic, central and optimistic estimates of these GHG savings. Details can be found in Annex A.2 SAF Emissions Savings. The uncertainty is related to various hard-to-predict factors such as: availability of feedstock; transporting of produced SAF; type of energy available during production; methodological choices from each SAF plant. These figures represent the best estimate available to the Authority, therefore high confidence is placed in these GHG savings figures.

- **UKA carbon values:** Modelling of UKA carbon values involves many hard-to-predict elements, and therefore estimates are subject to high levels of uncertainty. Internal DESNZ modelling provides low, central and high estimates of UKA carbon values under any given scenario, to represent an uncertainty in the input emission and abatement forecast values used by the model.

The policy packages modelled in this analysis use the following sensitivities to give an indication of the potential range of outcome.

	Sensitivity A	Central scenario	Sensitivity B
SAF emissions savings	Optimistic	Mid	Pessimistic
UKA carbon values	High	Mid	Low

Key Impacts

For each policy package, the impacts outlined below were considered. This section describes the methodology used, key outputs and any other relevant detail.

Flow charts are included to help illustrate the methodology. These are a generalised visual representation of the key calculations used; the exact calculations may involve additional intermediate steps.

Volume of eligible SAF supplied to UK

The volume and types of SAF likely to be supplied in the UK and claimed under the UK ETS have been estimated by the Department for Transport, which has drawn upon analysis produced for the final stage SAF Mandate cost benefit analysis, and insights from the Advanced Fuels Fund.²⁵ The total amount of HEFA and PtL supplied is assumed to be the same as the SAF Mandate cost-benefit analysis, while the supply of second generation SAF²⁶

²⁵ [Advanced Fuels Fund \(AFF\) competition winners - GOV.UK](#).

²⁶ Second generation SAF are those derived from biomass, municipal solid waste (MSW) and other non-biogenic recycled carbon fuels i.e. plastics.

has been adjusted to reflect the types of SAF expected to be produced in the UK, using insights from the Advanced Fuels Fund.

Our analysis makes the simplifying assumption that all SAF supplied under the SAF Mandate will be claimed under the UK ETS. This would illustrate the largest impact on the UK ETS across the factors considered within this analysis and therefore represents an upper bound for the expected impact of each policy package. However, it is possible for operators to claim UK supplied SAF in other compliance schemes such as the EU ETS and CORSIA, subject to meeting the criteria for eligibility of those schemes.

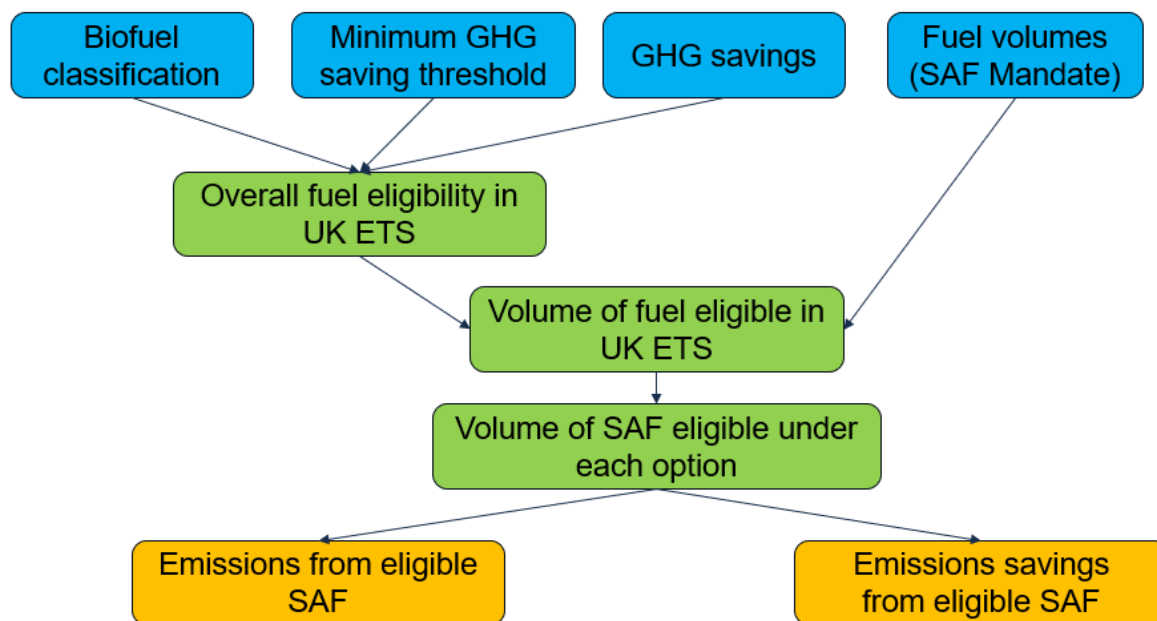
There is significant uncertainty related to the availability of feedstocks for UK SAF production and the level of SAF fuel imports accessible to the UK. The fuel scenario presented in this analysis represents a world in which the SAF supply meets overall mandated levels. However, it is possible for fuel suppliers to buy out of the SAF Mandate obligations, which would result in a lower supply of SAF, reducing the amount which could be claimed under the UK ETS.

The total volume of SAF supplied is assumed to remain the same under all policy packages. However, for each policy package, a given SAF pathway may or may not be eligible under UK ETS, depending on SAF eligibility and the minimum GHG saving threshold. As a result, while our underlying assumptions of SAF supply under the SAF Mandate are agnostic to the policy packages within the consultation, the SAF eligible to be claimed within the UK ETS varies by policy package.

Emissions from eligible SAF supplied to the UK

Each SAF pathway has a different associated emissions intensity/associated emissions reduction. Figure 1 illustrates how this analysis applies an estimated emissions saving to each type of eligible SAF pathway for each policy package.

Figure 1: Flowchart showcasing how the eligibility of SAF is determined



Blue	Inputs
Green	Calculations
Orange	Outputs

Emissions reductions associated with SAF are inherently uncertain and measuring the lifecycle GHG savings of a SAF production pathway varies depending on many factors including feedstock origin location, electricity grid power sources and fuel purchaser location. To account for this uncertainty, we test different GHG saving ranges as part of the sensitivity analysis. See Annex A.2 SAF Emissions Savings for further details regarding emissions savings from each SAF pathway.

Volume of claims

Aircraft operators can claim emissions reductions from SAF and therefore reduce their aviation emissions and UK ETS surrender obligations. Changing the manner in which SAF is recognised by the UK ETS and the volume of eligible fuels would change the volume of emissions reductions claimed from SAF under the UK ETS. This would impact decarbonisation across the UK ETS. Under current legislation, across 2025-2030 it is expected that the total volume of emissions reductions claimed from SAF under the UK ETS will total 10 MtCO_{2e}, and across 2031-2040 this grows to around 39 MtCO_{2e}.

Where policy packages would increase the volume of claims made by aircraft operators within the UK ETS, demand for UKAs from the aviation sector is expected to decrease. This would decrease the UKA carbon value, reducing the abatement incentive across all UK ETS sectors, therefore having a negative impact on UK ETS decarbonisation, all other factors remaining

equal. In the same way, a decreased volume of claims is expected to have a positive impact on decarbonisation across the UK ETS.

Claims for emissions reductions from SAF under the UK ETS are already accounted for in the DESNZ Net Zero Strategy under a static assumption of expected SAF usage in UK aviation. Due to the increased levels of SAF under the SAF Mandate it is also expected that the SAF Mandate will impact the volume of claims made within the UK ETS.

Table 1: Change in volume of claims by policy package. Central estimates are given, with a sensitivity range based on Sensitivity A and Sensitivity B given in brackets. Note that the central scenario values are not necessarily between the Sensitivity A and Sensitivity B scenario values because they represent alternative scenarios based on input data assumptions, as opposed to absolute minimum and maximums of outputs.

	Total 2025-2030 change in claims volume, relative to Counterfactual (MtCO _{2e})	Total 2031-2040 change in claims volume, relative to Counterfactual (MtCO _{2e})	Total 2025-2040 change in claims volume, relative to Counterfactual (MtCO _{2e})
Policy package 1	0.52 (0.51 to 1.5)	8.3 (8.0 to 8.3)	8.8 (8.5 to 9.8)
Policy package 2	-0.62 (-0.43 to -0.39)	3.9 (-0.49 to 5.2)	3.3 (-0.92 to 4.8)

Under the counterfactual, if some SAF production pathways cannot be used to claim emission reductions under the UK ETS, a viable abatement option within the UK ETS would be excluded. This would increase the total cost of decarbonisation across all traded sectors. Increases to volumes of claims under both policy packages are, in large part, driven by the new eligibility of fuels other than biofuels.

For Policy package 2, it should be noted that compared to the counterfactual, this package sees a reduction in the volume of claims in the immediate term. This package involves allowing non-biofuels and moving to a Lifecycle Assessment (LCA) approach, where SAF would be recognised in proportion to the actual emissions savings being made across the fuel’s lifecycle compared to fossil kerosene. In the immediate term a continuation of current SAF usage is expected, which is mostly biofuels with less than 100% emissions savings. This results in a lower volume of claims for the same SAF use. However, in later years, the GHG savings of these SAF improve due to grid decarbonisation, and other non-biofuel SAF enter the market which can now be claimed for emission reductions within the UK ETS. Over the long term, the increase in eligible fuels more than offsets the impact of awarding lower GHG savings per unit of fuel than the counterfactual, leading to a higher volume of claims than the counterfactual.

This principle has similar but inverse consequences for costs to aircraft operators, as outlined in Table 3. Decreased volumes of claims will lead to increased costs to aircraft operators.

Impact on UKA carbon values

Each policy package that would impact the volume of claims and therefore the volume of aviation emissions considered under the scheme would impact the number of allowances available to be purchased by other non-aviation sectors within the UK ETS. This could impact the value of UKAs, which is modelled using the DESNZ Carbon Markets Model (CMM). The CMM²⁷ is a fundamentals-based model which determines the required emissions reductions needed to meet the cap on an annual basis. This model uses marginal abatement cost curves (MACCs)²⁸ to then determine the cost of the last marginal reduction of GHGs.²⁹ This determines the equilibrium value of a UK ETS allowance in the model. Abatement activities below this cost level are assumed to be acted upon, and for any unabated emissions, participants would purchase allowances to comply with their UK ETS surrender obligations.

The SAF Mandate is expected to cause a significant change in availability of SAF and subsequently changes in residual aviation emissions and demand for allowances. It is additionally assumed in this analysis that the UK ETS cap, and thus allowance supply, does not change as a result of any presented policy packages. Therefore, it is expected to observe an impact on UKA carbon values. The expected impact of each policy package on the UKA value, relative to the value under the counterfactual, is given in Table 2.

Note that these UKA values are modelled over the period 2025-2040, while the UK ETS allowance cap is only legislated up to (and including) 2030. This means the period 2031-2040 in our modelling uses an estimated post-2030 UK ETS cap in projections of UKA values. The estimated post-2030 cap is subject to change, which will have a resultant impact on projected UKA values.

²⁷ See page 11 of the “Developing the UK Emissions Trading Scheme” Authority response impact assessment for more details. <https://assets.publishing.service.gov.uk/media/64b91b522059dc00125d267b/developing-uk-ets-main-impact-assessment.pdf>.

²⁸ Marginal abatement cost curves (MACCs) present the modelled volume of emissions reduction expected to occur at increasing carbon values, in different sectors at different points in time, under specific technology and macroeconomic assumptions. The abatement costs are order in ascending costs with an assumption that lower costs of abatement will occur first.

²⁹ The cost of the last marginal reduction refers to the cost of the abatement opportunity which is needed to achieve a given level of total abatement in a system.

Figure 2: Flowchart showcasing how UKA value trajectories are calculated under each policy package

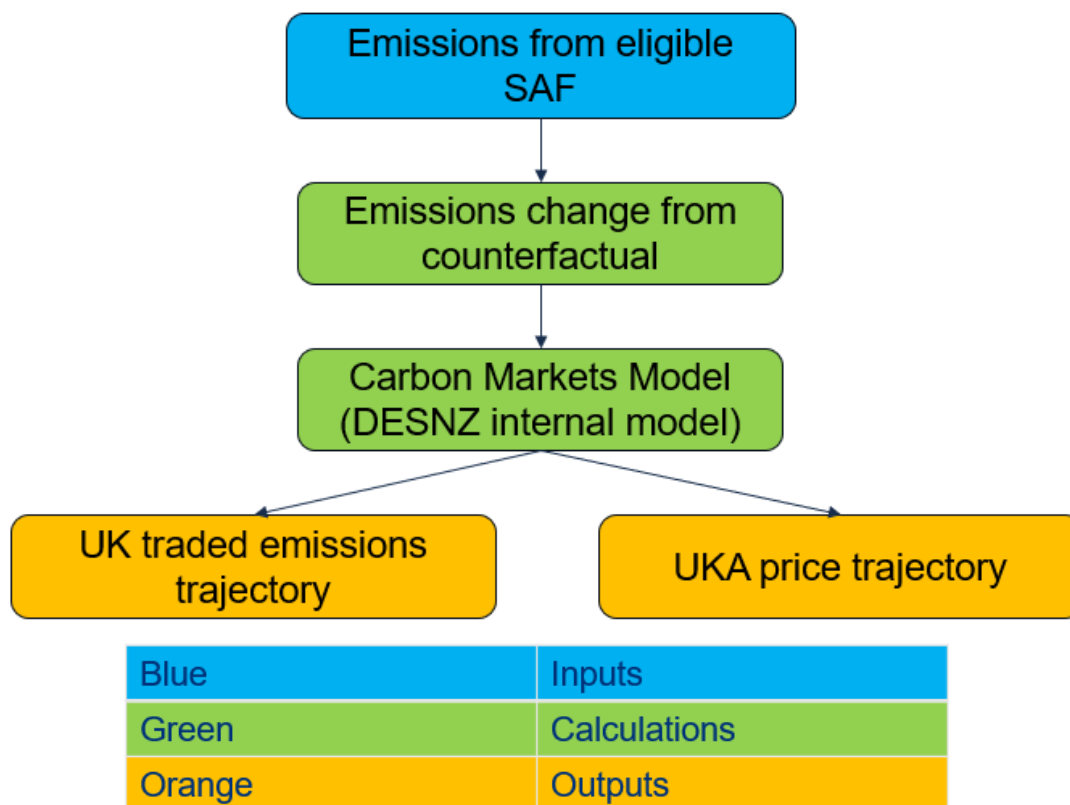


Table 2: Percentage change in UKA value relative to the counterfactual. Note that the central scenario values are not necessarily between the Sensitivity A and Sensitivity B scenario values because they represent alternative scenarios based on input data assumptions, as opposed to absolute minimum and maximums of outputs.

	2025	2030	2035	2040	2025-2040 average
Policy package 1	0.0% (0.0% to 0.0%)	-2.6% (-1.5% to -1.0%)	-4.4% (-6.7% to -3.6%)	-2.2% (-3.0% to -1.9%)	-3.1% (-4.0% to -2.4%)
Policy package 2	0.0% (0.0% to 1.4%)	0.0% (0.0% to 1.5%)	-2.2% (-2.7% to 0.0%)	-2.2% (-1.9% to 0.0%)	-1.3% (-1.4% to 0.5%)

Impact on Transfers and Government revenue

Government revenue from the UK ETS is calculated as the total number of allowances multiplied by the UKA value. It follows that any changes to the number of allowances or UKA value will change UK ETS revenue.

There are no plans to change the supply of UK ETS allowances as a result of the consultation packages being illustrated here. Any changes to government revenue because of these consultation packages will only follow as a result of changes to UKA value. Table 2 values can therefore also be taken as estimates for percentage change in gross government revenue from the UK ETS.

This impact is classified as an economic transfer, as it does not make society better or worse off but rather transfers value between economic agents.

Policy packages 1 and 2 would both lead to a reduction in gross government revenue, relative to the counterfactual (approximately 1-3% reduction for these packages, across 2025-2040).

Impact on costs to aircraft operators

Changing how SAF is recognised within the UK ETS would impact the cost of UK ETS compliance to aircraft operators. The policy packages which would impact how many claims can be made from SAF purchased by aircraft operators are presented above in the 'The consultation' section. An increase in claims from SAF use in Policy packages 1 and 2 would reduce aircraft operators' UK ETS surrender obligations, resulting in a decrease in UK ETS compliance costs for aircraft operators. The opposite would be true for a policy package which decreased the total volume of claims.

Any change in the number of UKAs purchased by aircraft operators would have an equal inverse impact on the level of government revenue raised by the UK ETS. As a result, this impact is classified as an economic transfer for the purpose of cost-benefit analysis, as society as a whole is not made better or worse off.

The expected change in aircraft operators' costs from purchasing UK ETS allowances, and the resultant change in government revenue, is calculated by multiplying the change in the volume of claims, by the UKA carbon values for each policy package.

The figures presented in Table 3 do not account for changes in ticket demand. In reality, demand for tickets may change such that aircraft operators may increase or decrease flight offerings which would also alter their emissions and UK ETS compliance costs.

In Policy package 2, reducing the GHG savings aircraft operators are able to claim per unit of SAF, more than offsets the benefit of being able to claim for more types of SAF in the period to 2030, increasing costs to aircraft operators. However, over the long term, both Policy packages 1 and 2 are expected to lead to a reduction in costs to aircraft operators, relative to the counterfactual, as aircraft operators could claim for all types of SAF under these packages (see 'Annex' for details), as opposed to just biofuel under the counterfactual. Policy package 1

would result in the biggest reduction in costs to aircraft operators due to the zero rating of SAF. Zero rating would result in aircraft operators needing to purchase fewer UKAs when using the same amount of SAF, relative to packages which use a lifecycle assessment approach (Policy package 2).

Table 3: Change in Aircraft Operator (AO) cost of purchasing UKAs, relative to the counterfactual, 2023 prices

	Total 2025-2030 change in AO UK ETS compliance costs, relative to Counterfactual (2023 £million)	Total 2031-2040 change in AO UK ETS compliance costs, relative to Counterfactual (2023 £million)	Total 2025-2040 change in AO UK ETS compliance costs, relative to Counterfactual (2023 £million)
Policy package 1	-40 (-78 to -53)	-910 (-1,100 to -630)	-950 (-1,100 to -700)
Policy package 2	51 (26 to 40)	-460 (-710 to 8.2)	-410 (-670 to 34)

Impact on ticket price

We expect that aircraft operators will pass on at least part of any changes to costs in the form of increased ticket prices. These are not an additional cost to those outlined above, rather they reflect how these costs may be passed on to consumers.

Evidence from DfT’s aviation model³⁰ suggests that carbon costs on UK to Europe routes make up an average 7% of ticket prices.³¹ This figure varies with market and route length, among other factors. For example, routes outside Europe are subject to lower carbon costs than flights within the UK and Europe.

There is significant uncertainty associated with many of the assumptions that feed into the calculation of ticket prices. There is significant variation in the potential for aircraft operators to pass costs on to customers. Research by the ICF et al. estimates average passthrough rates of around 74% for intra-EEA flights, and 77% for other routes.³² Research into the impact of

³⁰ The DfT aviation model refers to a suite of aviation models used to forecast passenger, aircraft and carbon emissions. More detail can be found here: [Aviation Modelling Suite](#).

³¹ Based on 2024 estimates in DfT Aviation Model.

³² CF, ATA, Cambridge Econometrics, HFW, NewClimate, & Starcx, S., 2020. Assessment of ICAO's global market-based measure (CORSlA) pursuant to Article 28b and for studying cost passthrough pursuant to Article 3d of the EU ETS Directive.

carbon pricing on aviation by Frontier Economics claims that 65-80% of airline operating costs tend to be passed onto passengers.³³

For the purpose of the analysis presented below, we assume that aircraft operators pass on 75% of any change in carbon costs onto consumers. Estimated baseline costs are taken from DfT’s aviation model. Estimates for changes to ticket prices are calculated by multiplying the carbon cost component of airfare on UK ETS routes, taken from DfT’s aviation model, by the expected percentage change in costs to aircraft operators from purchasing UKAs for each package (multiplied by 75% to reflect the assumed level of cost pass through).

Table 4: Percentage change in average airfares on UK ETS routes, relative to the counterfactual

	2025	2030	2035	2040	Average annual percentage change (2025-2040)
Policy package 1	0.0% (0.0% to 0.0%)	-0.2% (-0.2% to 0.2%)	-0.6% (-0.6% to 0.6%)	-1.8% (-1.8% to 1.7%)	-0.5% (-0.5% to 0.5%)
Policy package 2	0.0% (0.0% to 0.0%)	0.0% (0.0% to 0.2%)	-0.2% (-0.3% to 0.1%)	-1.2% (-1.4% to 0.5%)	-0.2% (0.0% to 0.3%)

As shown in Table 4 above, the impact of any changes in both policy packages is very small. However, there could be a knock-on impact from any changes to ticket prices, in the form of changing UK aviation demand. Where ticket prices increase, there may be a small reduction in the overall demand for flights, whilst the opposite is true for a decrease in ticket prices. Any changes in overall demand for flights could have a knock-on effect on the total level of aviation emissions falling under the scope of the UK ETS, and therefore potentially the volume of SAF claimed for under the scheme. This impact is likely to be even smaller than the change in ticket prices shown in Table 4 because the elasticity ratio of ticket prices is assumed to be marginally less than 1.

³³ Frontier Economics, AIR Transportation Analytics (2022) Economic research on the impacts of carbon pricing on the UK aviation sector, page 129. [Economic research on the impacts of carbon pricing on the UK aviation sector.](#)

Administrative impact on aircraft operators and regulators

There is likely to be an administrative impact to aircraft operators and regulators, for packages which use a LCA approach for recognising SAF. For example, there may be additional effort required for aircraft operators under Policy package 2 in order to source sufficient evidence relating to each batch of eligible SAF they are making a claim for. Similarly, there would be an administrative impact for regulators to make changes to their system (METS) to accommodate any differences in evidence required, such as the level of emissions reductions achieved by SAF. However, some of these changes are already being made in order to allow for CORSIA compliance.

The latest assessment of UK ETS administration costs was published in 2016³⁴ based on 2014 costs and found that average annual costs were £11,000 for full compliance operators and £5,600 for small emitters (simplified procedure). Adjusted for inflation these equate to approximately £13,400 and £6,800 respectively in 2023 GBP. As above, it is possible there may be an increase to these costs under Policy package 2.

These exclude regulator fees payable to the relevant regulator. Currently all aircraft operators are regulated by either the Environment Agency,³⁵ Scottish Environmental Protection Agency or Northern Ireland's Department of Agriculture, Environment and Rural Affairs,³⁶ and liable to their respective regulator fees.

³⁴ https://assets.publishing.service.gov.uk/media/5ccb1d40e5274a34eb6b991f/Cost_of_Compliance_Report.pdf.

³⁵ <https://www.gov.uk/government/publications/environment-agency-greenhouse-gas-emissions-charging-scheme-2021/environment-agency-greenhouse-gas-emissions-charges-for-1-april-2024-to-31-march-2025>.

³⁶ <https://www.sepa.org.uk/regulations/authorisations-and-permits/charging-schemes/charging-schemes-and-summary-charging-booklets/>.

Removal of SAF claims for emission reductions

As part of the consultation, another illustrative scenario is considered to contextualise the previously described outcomes. By considering the impacts of removing the provisions for SAF within the UK ETS, the underlying impacts of how aircraft operators can currently claim emissions reductions from SAF are illustrated. If aircraft operators were unable to claim emissions reductions from SAF, aviation abatement recognised within the UK ETS would decrease, UKA carbon values would increase due to increased demand for allowances, and UK ETS revenue would increase accordingly.

Under this scenario, biofuels and all other types of SAF would be treated as though they were fossil kerosene for the purpose of determining aviation emissions, which determine aircraft operators' surrender obligations. Aircraft operators' aviation emissions would be calculated using the emissions factor for fossil kerosene only, so there would be no reduction in the surrender obligation to reflect any SAF purchased.

A viable abatement option within the UK ETS would be excluded. This would increase the total cost of decarbonisation across all traded sectors.

Government revenue

This scenario would lead to an increase in gross government revenue (approximately 18% across 2025-2040), as all UK ETS participants would have to purchase more expensive UKAs for their total emissions within the scheme.

Costs to aircraft operators

This scenario would increase aircraft operators' UK ETS surrender obligations, resulting in an increase in UK ETS compliance costs for aircraft operators, as they would have to purchase UKAs for their total emissions within the scheme, even if they had purchased SAF. A significant increase in costs to aircraft operators is estimated, around £6,100m across 2025-2040.

Administration costs

This scenario would remove existing administration costs as compared to the counterfactual. There would be no need for aircraft operators to report emissions savings of purchased SAF to their UK ETS regulator, and the UK ETS regulators would not have to process emissions reductions claims from SAF.

Outputs

Outputs corresponding to the previous tables in this document are detailed below. They provide a quantified assessment of the above impacts, showing the impact of removing the provisions for SAF compared to the counterfactual of continuing current legislation.

Table 5: Impacts to volume of claims and UK ETS Costs to Aircraft Operators (AOs) by removing the provisions for SAF, relative to the counterfactual

	Total 2025-2030	Total 2031-2040	Total 2025-2040
Change in claims, relative to Counterfactual (MtCO ₂ e)	-10 (-9.8 to -9.6)	-39 (-42 to -38)	-49 (-52 to -48)
Change in AO UK ETS compliance costs, relative to Counterfactual (2023 £million)	920 (630 to 1,100)	5,200 (4,100 to 6,000)	6,100 (4,700 to 7,100)

Table 6: Impacts to UKA carbon values and average airfare costs by removing the provisions for SAF, relative to the counterfactual

	2025	2030	2035	2040	2025-2040 average
Percentage change in UKA value, relative to Counterfactual	4.4% (5.5% to 5.8%)	18.2% (14.4% to 24.5%)	26.4% (20.5% to 36.7%)	7.7% (5.6% to 12.1%)	17.9% (14.4% to 24.7%)
Percentage change in average airfares on UK ETS routes, relative to Counterfactual	0.3% (0.3% to 0.3%)	2.0% (1.9% to 2.2%)	4.2% (3.9% to 4.8%)	6.1% (5.8% to 6.8%)	3.3% (3.1% to 3.7%)

Further risks and limitations

All analysis relating to revenue and UKA carbon value impacts are subject to uncertainty. While analysis around these changes is performed on a whole-UK ETS model, the carbon value of UKAs is a live value subject to change and is hard to forecast with precision.

The SAF Mandate analysis which is used as the basis for this analysis has inherent uncertainties from attempting to predict market behaviour. SAF costs, feedstock cost and availability, imported SAF costs and volumes and SAF GHG savings are all input values for this analysis which are subject to some degree of uncertainty.

The GHG emissions savings for each SAF pathway used in this analysis are calculated excluding embodied emissions,³⁷ which may increase the GHG emissions savings compared to other analyses.

SAF is an emerging industry, and any evidence is subject to change as the industry develops. We are continuing to improve the available evidence base and any modelling will be updated as new evidence becomes available.

These caveats should be considered when interpreting the results presented in this analytical annex. We have tried to account for the impacts of the various uncertainties by conducting sensitivity analysis where the evidence allows for this. As such, all results should be understood as part of the wider range presented.

³⁷ Embodied emissions refer to those greenhouse gas emissions that are attributed to the production, transportation and disposal of goods.

Next Steps

Following analysis of consultation responses, the Authority response will be published to outline the planned legislative changes, if any, relating to the questions posed in the consultation.

The Authority response will include a full Impact Assessment wherein analysis presented in this analytical annex will be updated, costs and benefits will be explicitly listed for policy packages and a final Net Present Value will be calculated for each package as compared to the counterfactual.

Annex

A.1 SAF Types

The below table shows some SAF types expected to be included in the UK SAF supply and therefore included in our modelling. It shows each SAF's eligibility under each set of criteria, under assumptions based on 2025 production, with a central estimate of GHG savings.

The fossil fuel comparator used in calculating the below SAF GHG emissions saving figures is 89gCO₂e/MJ.

Fuel type	Current UK ETS Eligibility	SAF Mandate Eligibility
Hydrotreated Esters and Fatty Acids (HEFA) Used Cooking Oils	Y	Y
HEFA Tallow	Y	Y
Biomass to Liquid (BtL) Forestry residue	Y	Y
BtL Municipal Solid Waste (MSW)	Y	Y
BtL Agricultural Residues	Y	Y
BtL Waste Wood	Y	Y
Power Biomass to Liquid (PBtL) Forestry residue	Y	Y
PBtL MSW	Y	Y
Hydrothermal Liquefaction (HTL) Forestry residue	Y	Y
HTL Waste Wood	Y	Y
HTL Sewage Sludge	Y	Y
HTL Bagasse	Y	Y
HTL Wet Manure	Y	Y
HTL Residual Waste	N	Y
HTL Unrecyclable Plastic	N	Y
HTL Waste Rubber	N	Y

Power-to-Liquid (PtL) Direct Air Capture (DAC)	N	Y
PtL Point Source	N	Y

A.2 SAF Emissions Savings

The Greenhouse Gas emission saving assumptions used in this analysis, match those used in the SAF Mandate final cost benefit analysis³⁸ and are presented below in the table. These figures assume a degree of decarbonisation for the UK power grid.

Percentage reduction in lifecycle GHG intensity, relative to kerosene

	2025			2035			2040		
	Best	Mid	Worst	Best	Mid	Worst	Best	Mid	Worst
UCO	96%	95%	92%	97%	95%	92%	97%	96%	92%
Tallow	88%	85%	79%	93%	88%	79%	95%	89%	79%
Forestry residue	88%	87%	68%	89%	87%	70%	90%	87%	69%
MSW	73%	72%	31%	93%	91%	77%	95%	92%	79%
Agricultural Residues	89%	86%	59%	89%	85%	59%	90%	86%	59%
Waste Wood	68%	65%	10%	87%	82%	51%	88%	83%	51%
Forestry residue	97%	97%	92%	98%	97%	93%	99%	98%	93%
MSW	78%	78%	47%	91%	89%	75%	92%	90%	76%
Forestry residue	84%	83%	22%	92%	87%	25%	94%	88%	26%
Waste Wood	No savings	No savings	No savings	71%	56%	No savings	78%	61%	No savings

³⁸ [Sustainable aviation fuel mandate: final stage cost benefit analysis.](#)

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Sewage Sludge	65%	63%	15%	95%	93%	76%	96%	94%	79%
Bagasse	98%	97%	86%	99%	98%	86%	99%	98%	87%
Wet Manure	85%	82%	58%	97%	95%	88%	98%	96%	89%
Residual Waste	9%	9%	No savings	85%	83%	No savings	88%	86%	9%
Unrecyclable Plastic	40%	40%	No savings	89%	88%	61%	92%	90%	68%
Waste Rubber	50%	50%	No savings	91%	89%	72%	93%	91%	76%
DAC	100%	100%	79%	100%	100%	97%	100%	100%	98%
Waste Lubricant Oil	82%	80%	27%	97%	95%	77%	97%	96%	79%
Point Source Carbon	100%	100%	100%	100%	100%	100%	100%	100%	100%

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