Department for Transport

Sustainable aviation fuels mandate

Summary of consultation responses

March 2022

Department for Transport
Great Minster House
33 Horseferry Road
London
SW1P 4DR

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Contents

Responses received

A total of 79 responses were received from a range of organisations concerning the government's proposals. The summary contained in this document describes the key themes set out in responses. For the sake of brevity, it does not repeat the full details contained in every response.

The following table provides a breakdown of those who responded.

Stakeholder group	**Number of respondents**
Airline	7
Airport	4
Consultancy	3
Fuel producer or supplier	21
Fuel technology licensor or supplier	2
Government body	2
Individual	6
Infrastructure & logistics provider	2
NGO	5
OEM	5
Trade association	8
Other	14
Total	**79**

1. A greenhouse gas emissions scheme to reduce the carbon intensity of jet fuel

The need for a SAF mandate outside the RTFO

Consultation proposal

The Government recognises the need for SAF usage in the short, medium and long term to contribute to delivering net zero and the UK's carbon budgets. We are therefore keen to support the development of the nascent SAF industry and a mandate is our preferred option as it could deliver a number of outcomes which could likely not be achieved through more dispersed interventions from government and industry. The obligation would be implemented as a standalone SAF mandate, outside the Renewable Transport Fuel Obligation (RTFO), should it be taken forward.

Question 1

Do you agree or disagree that a SAF mandate should be introduced in the UK?

Summary of responses

Total	Agree	Neither agree nor disagree	Disagree	Don't know
74	64	5	4	1

Most respondents agreed that a SAF mandate should be introduced in the UK, with the predominant arguments for the introduction of a SAF mandate being that it would:

- Generate demand for SAF
- Stimulate the domestic economy
- Deliver emissions savings
- Help increase investor confidence.

Stakeholders felt that a mandate was a step in the right direction but that the UK SAF industry will need multiple support mechanisms to enable it to ramp up production in

alignment with the targets set out in the mandate and to close the price gap between SAF and traditional kerosene (see **Question 30**).

Respondents who agreed that a mandate should be introduced also highlighted the importance of SAF for difficult to decarbonise long-haul aviation, but warned that multiple routes to aviation decarbonisation should be incentivised to give the UK the best chance at reaching net zero by 2050.

A very small number of respondents disagreed that a SAF mandate should be introduced in the UK. The reasons for this included:

- The scaling of SAF too quickly may lead to lack of sustainability of the resultant fuel;
- The focus should instead be on placing a cap on total aviation fuel consumption before any mandate is put in place;
- A mandate risks competitive market distortion;
- The UK is not yet ready for a mandate due to the current high cost and low production of SAF.

Question 2

Do you agree or disagree that an obligation to supply SAF in the UK should sit outside the RTFO?

Summary of responses

Total	Agree	Neither agree nor disagree	Disagree	Don't know
60	48	7	3	2

Most respondents agreed that an obligation to supply SAF in the UK should sit outside the RTFO. The main arguments offered to support this view were that it would:

- Provide an incentive to produce SAF;
- Help to avoid passing SAF costs on to road fuel users;
- Avoid administrative confusion and simplify the reporting process for SAF producers;
- Allow for the expansion of feedstock eligibility beyond what is currently included in the RTFO;
- Enable the introduction of a mandate that is not centred on fuel volumes;
- Ensure minimal competitive distortions in the fuel market.

Several stakeholders (including fuel producers, NGOs and government bodies) who agreed that an obligation to supply SAF should sit outside the RTFO felt that the mandate should complement or align with the RTFO to make it simpler for users to understand.

A small number of stakeholders suggested that access to the RTFO should only be removed once a SAF mandate is in place (see **Question 28**).

One respondent who disagreed that a mandate should sit outside of the RTFO proposed that SAF should initially be doubly incentivised through both the RTFO and the SAF mandate to help kickstart the industry.

Prioritising carbon savings rather than SAF volumes

Consultation proposal

The Government has proposed the introduction of a SAF mandate in the form of a GHG emission scheme. Under the proposed mechanism, jet fuel with a GHG emissions intensity below the target and which meets the proposed eligibility criteria would be awarded a number of credits proportional to the amount of CO_2e saved. Jet fuel with a GHG emissions intensity above the target or SAF which does not meet the proposed eligibility criteria would incur an obligation. This mechanism should encourage supply of SAF with the lowest possible GHG emissions, which we believe a fuel volume-based scheme would not necessarily do. It is proposed that the SAF mandate would entail a tradable credit scheme which would allow obligated parties to meet the obligation in a flexible and cost-effective way.

Question 3

Do you agree or disagree that a GHG emissions scheme based on tradable credits should be preferable to a fuel volume scheme when designing a SAF mandate?

Summary of responses

Total	Agree	Neither agree nor disagree	Disagree	Don't know
64	45	6	12	1

Most respondents agreed that a greenhouse gas emissions scheme based on tradable certificates would be preferable to a fuel volume scheme when designing a SAF mandate. The main arguments offered to support this view were that a greenhouse gas emissions scheme based on tradable certificates would:

- Incentivise sustainable fuel;
- Be technology agnostic;
- Align with the UK's decarbonisation goals;
- Align with other schemes such as UK ETS and CORSIA;
- Reduce the need for greenhouse gas thresholds and positive-feedstock lists for qualifying fuels.

Several of the respondents that preferred a greenhouse gas emissions scheme cited evidence of this approach being successful in other schemes, such as the California Low Carbon Fuels Standard (LCFS).

A small number of respondents preferred a volume basis as it is simpler to regulate while several stakeholders disagreed with a scheme based on tradable certificates because:

- Schemes which use tradeable credits encourage organisations to avoid carbon reduction processes by buying their way out of the obligation;
- Tradeable credit schemes are more likely to be subject to fraud;

An obligation on suppliers of avtur to the UK

Consultation proposal

The Government would like the proposed SAF mandate to fall on suppliers of jet fuel to the UK, where jet fuel refers to aviation turbine fuel (avtur) used in jet and turboprop aircraft. It was proposed that the it would not apply to aviation gasoline (avgas), as SAF is not a replacement. It was also proposed that all avtur supplied to the UK would incur an obligation.

However, the consultation welcomed views on whether a threshold should be introduced, in each reporting year, below which the avtur supplied is not obligated, and whether this threshold should distinguish between dutiable and non-dutiable fuel such that fuel supplied for certain operations (e.g. emergency services) would not be mandated.

For aviation fuel subject to fuel duty, it was proposed that the owner of the fuel at the duty point would be responsible for meeting the obligation, in line with the RTFO. For fuels which are not typically subject to excise duty, an alternative 'assessment time' would need to be introduced. The consultation welcomed views on where the assessment point under the proposed SAF mandate should be placed to ensure only those who are supplying jet fuel, and SAF, to the country incur an obligation and can claim credits effectively.

Question 4

Do you agree or disagree that the proposed SAF mandate obligation should be placed on fuel suppliers that supply aviation fuel (avtur) to the UK?

Summary of responses

Total	Agree	Neither agree nor disagree	Disagree	Don’t know
52	41	6	5	0

Most respondents agreed that the proposed mandate should be placed on fuel suppliers that supply aviation fuel (avtur) to the UK. The main argument was that it would be consistent with other schemes in place, which would simplify the process for industry and limit the potential for conflicts with CORSIA which affects airlines. Another key argument was that governing a mandate on suppliers would be easier due to fewer obligated parties and simpler logistics ensuring all fuel is mandated rather than potentially introducing exemptions for certain routes or types of airline. Furthermore, it would not increase the administrative burden on airlines already complying with UK ETS and CORSIA.

However, a few fuel producers noted that an obligation on suppliers may increase the risk of tankering (see **Question 29**). Some airlines also disagreed with the proposal as they believe it could introduce competitive distortions. Thus, they proposed that a mandate is placed on airlines with exemptions on the scope of flights included. A fuel producer also highlighted that the fuel supplier cannot always guarantee the end purpose for which the fuel is utilised as dual-purpose kerosene could be used as aviation fuel or domestic heating.

Question 5

Should the obligation apply to all avtur supplied into the UK, regardless of whether this is subject to fuel duty or not?

Summary of responses

Total	Yes	No	Don't know
48	41	3	4

Most respondents prefer the obligation to apply to all avtur supplied in the UK regardless of its dutiable status. All aviation sectors should contribute to decarbonisation efforts and differentiating between dutiable status would limit the impact of the mandate in terms of GHG emissions savings and market signal. In particular, respondents felt that general aviation is a profitable market and some of the smallest fuel customers may be best placed to cope with an increase in fuel costs. Several respondents thought that an obligation on all avtur would be easier to implement, reduce administrative burden and reduce the opportunity for potential loopholes to be exploited.

At the same time, several respondents identified specific use cases that should be exempt from the obligation including humanitarian flights, emergency services, military use, PSO routes and for testing or research purposes. However, according to others, the element of fuel duty is not known to fuel suppliers and the supply chain for different end uses can be the same. Therefore, exempting specific use cases may be challenging.

Question 6

If the obligation applies to all avtur supplied into the UK, should there be a threshold below which fuel is not obligated, in a certain obligated period? Should this threshold distinguish between dutiable and non-dutiable fuel?

Summary of responses

Question	Total	Yes	No	Don't know
Threshold	44	6	30	8
Distinguish by duty	38	3	27	8

Most respondents thought that all fuel should be mandated with no threshold, to maximise GHG savings. Respondents also felt exemptions introduce unnecessary complexity.

Those in favour argued that a threshold would protect small-scale suppliers, especially if the administrative burden is excessive compared to the amount of fuel used. This in turn would keep the market competitive. Without a threshold there may be greater risk of tankering due to higher costs of fuel across all uses.

Alternative views offered were: that such distinctions risk creating perverse incentives; that the trading scheme can allow small suppliers to meet targets flexibly to avoid any excessive administrative burden; and that many variables contribute to a supply cost increase and these may not be passed onto the customer.

Most respondents did not think a threshold should distinguish between dutiable status for the same reasons as described in **Question 5**.

Question 7

Where do you think the assessment point should be placed for jet fuel not subject to fuel duty, and how is this going to affect the definition of the proposed obligated party (aviation fuel suppliers to the UK)?

Summary of responses

A third of respondents – including fuel producers, trade associations and airlines– believed that the assessment time should be at the blending and certification point. This is the last point at which the fuel batch is identified as SAF and it is assessed for compliance with the requirements of fuel standards and is consistent with the RTFO. Several of these respondents proposed that, where SAF is manufactured or blended outside the UK, assessment should be at the point of import where independent inspectors can be appointed to verify fuel volumes and submit reports to be use in verification audits.

However, one fuel producer argued that the blending and certification point is not suitable as the assessment time. Fuel suppliers may purchase fuel from a competitor, in which case sensitive chain of custody information will have to be disclosed leading to an anti-competitive situation.

Several respondents proposed the point of fuel delivery to the airport as the assessment point. This would allow assessment at each airport and provide a standard reference point regardless of whether SAF is blended with fossil kerosene or provided as 100% SAF. A further proposal was to set the assessment point at pre-airfield jet supply terminals where jet fuel is stored in co-mingled tanks. Other suggestions included using the compulsory stock obligation (CSO) model, which would address concerns of sharing sensitive information, or the last point of quality certification to ensure that the destination of dual-purpose kerosene (DPK) is avtur rather than kerosene for home heating.

2. Fuel eligibility and sustainability criteria

Technical eligibility criteria

Consultation proposals

To count towards the mandate obligation, it was proposed that the SAF supplied in the UK meets the DEF STAN 91-091 specification, as this is the recognised jet fuel specification for the UK. As the DEF STAN 91-091 refers to ASTM de facto we expect this requirement means that, to be eligible under the SAF mandate, SAF would need to be produced through one of the pathways listed in the relevant D7566 Annex.

As SAF production pathways under certification and potentially new pathways become certified as safe to use in aircraft in the future, or if SAF blend limits are revised upwards, referring to existing DEF STAN 91-091 specification would ensure any changes are automatically transposed into a UK SAF mandate.

Question 8

Do you agree or disagree that only certified SAF that meets the DEF STAN 91-091 specification should be eligible under the proposed SAF mandate?

Summary of responses

Total	Agree	Neither agree nor disagree	Disagree	Don't know
54	42	4	5	3

Most respondents agreed that only certified SAF that meets the DEF STAN 91-091 specification should be eligible under the mandate. The most common argument put forward was that both DEF STAN 91-091 and ASTM D7566 and D1655 are current industry standards so their use would retain standard jet fuel quality, global interoperability and air safety. Further considerations raised were that aviation equipment and co-mingled logistics systems are certified to use this standard and competitive market distortions would be avoided.

Several fuel producers encouraged the Government to ensure the mandate policy wording is aligned with wider industry guidelines, such as the definition from IATA[1] or Aviation Fuel Quality Requirements for Jointly Operated Systems (AFQRJOS). Specifically, SAF producers create Synthesised Paraffinic Kerosene (SPK) that needs to be consistent with both the pathways permitted and the characteristics specified by ASTM D7566. SPK is then blended (up to a pathway-specific limit) into Jet A-1 to produce a blend that meets the DEF STAN 91-091 specification.

Of those that agreed SAF should be compliant with DEF STAN 91-091, some suggested changes should be made to the standards, although this is out of scope for this question. This included upwards revision of the maximum blending limit to support long-term SAF targets and exclusion of the lipid co-processing pathway. However, a few respondents highlighted that revising the specifications is a lengthy and costly process and could be streamlined.

Some respondents disagreed with the proposal, stating that the mandate should also apply to avgas, 100% blends will require a new specification, innovation for alternative pathways will be restricted and important sustainable fuels are excluded.

Feedstock requirements

Consultation proposals

The Government would like to introduce a SAF mandate which delivers fuels with the highest sustainability credentials. To receive credits under the proposed mandate, SAF will therefore need to adhere to strict sustainability criteria. These will ensure significant GHG emissions savings are delivered and will prevent negative environmental consequences such as the loss of biodiversity, deforestation and the clearance of land with high carbon stock (e.g. dry peatland) that could be associated with the cultivation of raw materials used in certain SAF production.

The consultation proposed the following mandatory sustainability criteria:

- Fuels must achieve a minimum GHG emissions saving on a lifecycle basis;
- Fuels must be made from sustainable wastes or residues, RCFs, RFNBOs or nuclear energy (SAF produced from food or feed crops will not be allowed);
- Waste use must comply with the waste hierarchy;
- Feedstocks, including residues, should not be obtained from land with high biodiversity value or land with high carbon stocks in or after January 2008;
- SAF production must not direct renewable electricity away from existing applications;
- Where hydrogen is used as a process input, the hydrogen must be low carbon

[1] "To be acceptable to Civil Aviation Authorities aviation turbine fuel must meet strict chemical and physical criteria. There exist several specifications that authorities refer to when describing acceptable conventional jet fuel such as ASTM D1655 and Def Stan 91-91. At the time of issue of this document, different types of blends have been found to be acceptable for use under these specifications, but must first be certified under ASTM D7566. Once the blend has demonstrated compliance with the relevant product specifications, it may be regarded as equivalent to conventional jet fuel certified under ASTM D1655."

Question 9

Do you agree or disagree with the sustainability criteria set out here? If you do not agree, what alternative or additional criteria would you recommend?

Summary of responses

Total	Agree	Neither agree nor disagree	Disagree	Don't know
58	37	8	11	2

Many respondents fully agreed with the sustainability criteria and 12 indicated broad agreement, with some amendments to be made. Several respondents – including fuel producers, airlines and airports – made reference to other sustainability frameworks, suggesting that the UK either adopts or considers these existing frameworks. This included the Roundtable of Sustainable Biomaterials (RSB) which has developed a feedstock and technology-neutral global standard and to a lesser degree International Sustainability and Carbon Certification (ISCC), CORSIA and ISO 14044:2006 for nuclear energy use.

The remaining comments are presented for each sustainability criterion presented in the consultation document.

Waste-derived biofuels

The inclusion of waste-derived biofuels was broadly accepted, although an NGO noted that 2G biofuels will only be able to replace a small percentage of fossil fuel. Many respondents agreed with the exclusion of dedicated energy crops on the basis that they have been shown to have negative environmental and social impacts such as biodiversity loss, rising food prices and water scarcity. However, a few stakeholders suggested that the Government should reconsider this position as it may allow existing 1G plants in the UK to be repurposed quickly, avoid an increased price for waste, absorb excess yields into SAF markets and exploit marginal lands. There were also questions raised over the need for an exclusion if a minimum GHG threshold is introduced and why they should be excluded from aviation but not road transport.

RFNBOs

Of those respondents that specifically mentioned RFNBOs, all were positive about their inclusion. Several respondents indicated they would like to see greater incentives for their production and use while considering the competition for renewable energy usage in other sectors. It was also noted that ISCC are currently developing a guidance document for RFNBO certification.

Several respondents recognised the importance of the requirement that renewable electricity is additional. This was on the basis that if renewable electricity is diverted away from existing applications it can cause significant indirect GHG emissions. It was suggested by some that this condition may need to be reconsidered in later years (possibly in the review points) as the production and use of RFNBOs becomes widespread.

In terms of how this condition is implemented, there was consensus among three respondents – an NGO, fuel producer and airline – that power purchase agreements (PPAs) should be used as evidence. This is because it is more likely that this power is genuinely additional, it is the most cost-effective solution as it does not require co-location of SAF and renewable power production and it is more likely to incentivise new renewable electricity production than alternative approaches e.g. Guarantees of Origin (GOs).

As a final point, a couple of respondents emphasised that the Government should not award double subsidies for the use of nuclear or green electricity through any of the existing price stability mechanisms.

RCFs

While there was general support from stakeholders, an airline, fuel producer and trade association provided caveats including the use of suitable counterfactuals to ensure their value is proportionate to the carbon savings offered, mitigating the risk of creating a business case for production using carbon waste and ensuring compliance with globally agreed sustainability criteria.

Waste hierarchy

Some SAF producers and NGOs noted the importance of including compliance with the waste hierarchy as a requirement. It was emphasised that SAF should not encourage more waste by creating markets for it and feedstocks should only be unavoidable waste. The diversion of feedstocks away from existing uses can in some cases generate indirect emissions, wherein displaced materials are replaced by substitute products. To avoid this, it was proposed that suppliers must demonstrate that the feedstock used is a true waste or residue.

Land criteria

While several respondents agreed that there is no need to include land criteria when considering only wastes and residues, there was some minor disagreement with introducing land criteria only for crop and forestry residues. It was also stated that sea, water and energy use should be included to avoid any direct or indirect land use change.

SAF from nuclear

There were no arguments made against the inclusion of fuel produced using nuclear power. However, some respondents emphasised that the same rules of additionality should apply to nuclear energy and one SAF producer suggested that the Government extends the scope of the RTFO to also include nuclear energy.

One respondent suggested that RFNBO production with nuclear power from Small Modular Reactors (SMRs) not only addresses potential renewable energy shortfalls but also might have cost advantages over wind and solar. These advantages are derived from scalability, flexibility and the prospect of utilising waste heat that would otherwise be rejected to the environment.

Low carbon hydrogen

The inclusion of low carbon hydrogen received the most varied responses. Several respondents requested that the Government provides more clarity on what is meant by the requirement for hydrogen to be low carbon; specifically, whether or not this includes blue hydrogen. A few respondents underlined the need for consistency with the Low Carbon Hydrogen Standard currently in development under BEIS.

However, some NGOs explicitly stated disagreement with the use of low carbon hydrogen and prefer only zero carbon or 'green' hydrogen to be eligible as a process input so as to limit the GHG emissions during the production lifecycle. Conversely, a small number of fuel producers explicitly expressed support for the use of blue hydrogen to produce SAF as an interim measure whilst industry scales and the grid fully decarbonises, with the eventual goal of full implementation of green hydrogen.

Some respondents suggested that this criterion should be removed entirely on the basis that low carbon hydrogen availability is currently limited and is not likely to be in widespread use until towards the end of the decade, which could limit the availability of SAF in the UK. It was suggested that a proactive review of this criterion would ensure a phased approach dependent on the availability of low carbon hydrogen in the UK. Further, the GHG emissions-based mandate should be enough to incentivise low carbon hydrogen use.

Minimum GHG threshold

Several respondents commented, both in favour and against, on the inclusion of a minimum GHG threshold in the sustainability criteria - this is explained in more detail in **Question 12**.

Consideration of non-CO2 impacts

A couple of respondents noted the importance of considering non-CO2 impacts, including contrails and pollutant and particulate emissions, because they can cause significant warming. Given that some types of SAF have been shown to reduce such emissions, it was recommended that these emissions are assessed.

Counterfactuals

Several respondents urged the Government to consider how to treat the counterfactuals of potential SAF feedstocks. According to these respondents, incineration is used as a counterfactual which allows producers to demonstrate a carbon saving versus landfill. It was argued that some feedstocks are 'locking' the carbon in landfill sites, potentially acting as a carbon removal system, and so turning them into aviation fuel could significantly decrease the expected CO_2 savings compared to leaving them underground. They called for the Government to leave open the option to verify this at a later stage and exclude feedstocks that are found to act as carbon sinks.

Other comments

In addition, two respondents noted that strict criteria could create a challenging operating environment, limit innovative use of feedstock and introduce cost pressures. An infrastructure and logistics provider suggested that the criteria could consider giving a higher reward for locally sources feedstock over imported feedstocks.

Question 10

Do you agree or disagree with the feedstocks set out here and listed in Annex B? If you do not agree, what alternative or additional feedstock(s) would you recommend?

Summary of responses

Total	Agree	Neither agree nor disagree	Disagree	Don't know
55	29	7	19	3

Several respondents – including fuel producers, OEMs and airlines - felt that setting out a list of eligible feedstocks is premature, prescriptive and unnecessary. There is a risk it would stifle innovation as fuel producers would not be able to utilise novel feedstocks and in turn investment and production volumes may go abroad. Such an approach would not be in line with a technology and feedstock-neutral position. Rather, respondents believed that by introducing robust sustainability criteria and rewarding SAF proportionately to the carbon savings achieved, feedstocks with high carbon intensity will be excluded or disadvantaged in the mandate.

Similarly, a few respondents underlined the importance of the potential to add new feedstocks in the future to reflect new evidence on availability and sustainability performance. This could be incorporated into the proposed regular reviews.

A few respondents suggested alignment with other schemes, such as EU RED and CORSIA, in order to create consistency for stakeholders and facilitate the development of a global SAF market.

Waste-derived biofuels

A few fuel producers suggested that cellulosic corn fibre (more generally C5-C6 hemi-cellulosic waste) should be included as a source of ethanol. This material has no food value and is currently used for high protein animal feed where it has a negative effect as it reduces its nutritional content. It can be produced alongside existing grain-based ethanol with modifications to the process, has been approved as a crop residue in the US and demonstrated to have high carbon savings in the LCFS.

A few airlines and NGOs did not agree with the inclusion of any palm products in the feedstock list, in particular PFAD and empty palm fruit bunches. There is a risk that these products, if considered a waste under the SAF mandate[2], would start increasing in value, and consequently increase the economic incentive for growing palm fruits. Respondents expressed concern that this would lead to additional deforestation in order to clear land for new plantations. One NGO referred to displacement analysis carried out by Malins (2017)[3] where it is suggested that some residues, particularly those whose replacements include

[2] PFAD is not currently considered a waste under the RTFO.

[3] Malins, Chris. "Waste Not Want Not: Understanding the Greenhouse Gas Implications of Diverting Waste and Residual Materials to Biofuel Production." Cerulogy, 2017.

virgin vegetable oil or woody biomass, pose strong displacement risks that would dilute any emissions savings from their use in aviation.

A few respondents emphasised that segregated oils and fats (SOFs) such as used cooking oil should be removed as eligible feedstocks so that the mandate would support higher investments for novel, scalable and currently expensive technologies and avoid the diversion of SOFs from the road transport.

Some NGOs suggested that domestic green waste should be included for production of SAF as the alternative is composting, which releases heat and carbon dioxide. Other comments warned that waste-based fuels are problematic since some release CO2 that would otherwise remain inert and others use carbon that was captured historically. In addition, some wastes, specifically farmed salmon oil, tallow and waste-wood, are subject to risk of overproduction and harmful practices to meet the increased demand.

RFNBOs

A couple of respondents underlined that the feedstocks used in RFNBO production will become increasingly important; no other comments were made.

RCFs

Several respondents, largely fuel producers, explicitly noted their agreement with the inclusion of feedstocks for RCFs. These feedstocks were underlined as an important contributor to SAF production volumes, although a couple noted that depending on how counterfactuals are accounted and RCF rewarded, certain SAF plants may or may not be financially viable. The inclusion of these fuels also provides the benefit of further diversifying the pool of eligible feedstocks beyond biomass which addresses concerns regarding feedstock competition. However, there was disagreement amongst respondents on the scope of RCF feedstocks included.

A couple of NGOs disagreed with the inclusion of non-biogenic feedstocks or fossil CO2 as it is not compatible with reaching net-zero. An individual added that the sustainability of turning industrial waste gases into valuable SAF feedstocks is also doubtful.

One respondent suggested that the scope of feedstocks eligible for support to produce RCFs should be wider and include any fuel made from genuine waste. Similarly, another respondent proposed that feedstock should not be limited to the fossil component of refuse derived fuel mixed with biological material, but that all non-biogenic waste streams that cannot be recycled should be eligible. As an example, non-recyclable plastic waste, non-biomass portion of organic municipal waste and oil derived element of recycled tyres should be eligible. These waste feedstocks would otherwise be disposed of in landfills or in waste to energy (WtE) combustion resulting in significant methane and/or CO_2 emissions as well as other air emissions, water and soil contamination (see **Question 9**). Finally, industrial waste process gases are acceptable if they would otherwise be incinerated or vented to atmosphere.

An NGO argued that fossil carbon feedstocks should be excluded as they are not compatible with carbon neutrality, unlike carbon captured in biomass or directly from the atmosphere. Furthermore, subsiding fossil carbon feedstocks may reduce the incentive to implement other solutions, such as DAC, which will could be well developed by 2030.

Energy crops

There was broad agreement that fuels should be limited to wastes and residues to ensure feedstocks do not displace or compete with food crops (see **Question 9**). A few fuel producers recommended that crop-based feedstocks that can be used for energy should also be included provided they meet the sustainability criteria. They argued that they can produce biofuels with GHG savings in a cost-effective way, they already exist at scale, ILUC and biodiversity impacts can be properly managed and mitigate potential delays in development of SAF technologies.

More specifically, it was recommended that energy and cover crops such as poplar, miscanthus, switchgrass, carinata and pennycrass should be listed as potentially eligible feedstocks as these have been evaluated by other bodies and deemed to achieve significant GHG savings even when accounting for ILUC impacts.

Specific feedstocks to be added

In addition to those described above, other specific feedstocks that were suggested to be added or removed from the list were:

- A few respondents suggested that algae should be added. Although not a residue, it could be an important feedstock in the future
- A couple of respondents suggested that many feedstocks should be removed including bracken; cashew nut liquid; rapeseed residue; sugar beet residue and tops, tails, chips; waste wood; bagasse; and straw. Each of these could cause one or more of several negative impacts like increasing waste production and impacting food chains.

Minimum carbon savings

Consultation proposals

A fuel's GHG emissions intensity is a measure of the GHG emissions generated per unit of energy contained in the fuel, expressed in gCO_2e/MJ. It was proposed 89 gCO_2e/MJ is used as the baseline lifecycle GHG emissions intensity to represent jet fuel under the SAF mandate. This figure is accepted on an international level and accurately represents real world GHG emissions.

It was proposed that SAF meets a minimum GHG saving threshold to be eligible to contribute to the proposed SAF mandate obligation. We anticipated that the minimum GHG saving threshold all SAF would need to meet should be at least 60%. We welcomed views on what the threshold should be and how this should change to reflect the expected improvements in carbon intensity over time as a result of carbon capture technologies.

Question 11

Do you agree or disagree that the baseline lifecycle GHG emissions intensity for aviation fuels for reporting purposes under a UK SAF mandate should be 89 gCO2e/MJ? If you do not agree, what should the baseline emission be and/or how should it be calculated?

Summary of responses

Total	Agree	Neither agree nor disagree	Disagree	Don't know
51	40	5	3	3

Most respondents agreed with setting the baseline lifecycle GHG emissions intensity for aviation fuels for reporting purposes at 89 gCO_2e/MJ as this aligns with the ICAO standards used for CORSIA (or other schemes such as the California LCFS), creating standardisation internationally. Using another figure could overcomplicate claiming fuel under CORSIA or possibly disadvantage the UK.

A couple of respondents supported 89 gCO_2e/MJ on the basis that it accurately reflects aviation fuel carbon intensity and referenced an ICCT paper in which a range of carbon intensities align with this figure. Going forward, an NGO and Government body suggested that this figure would need to be revised over time. For example, recent analysis by Lee et al. (2021)[4] estimates that, in 2018, the overall climate impact of flying was about three times that of CO2 alone and in the future could be accounted for in the baseline carbon intensity.

Several respondents - predominantly fuel producers - were uncertain or disagreed with 89 gCO_2e/MJ on the basis that it does not align with other schemes such as the RTFO, GFGS and RED II and would introduce unnecessary complexity.

Question 12

What should the minimum carbon intensity reduction SAF will need to meet be (subject to the final GHG methodology used)?

Summary of responses

Total	0% or 10%[5]	40%	50%	60%	65%[6]	70%
43	10	2	7	9	13	2

[4] Lee et al., "The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018," Atmospheric Environment, Volume 224, (2021), https://doi.org/10.1016/j.atmosenv.2020.117834

[5] Includes respondents that stated a preference for aligning with CORSIA

[6] Includes respondents that stated a preference for aligning with RTFO, UK ETS or the EU RED framework

Many respondents indicated that it would be ideal if the minimum threshold aligned with other domestic and/or international policies as harmonisation makes it easier for SAF producers and airlines to operate under more than one scheme. However, there was no real consensus among stakeholders as to which scheme the mandate should be consistent with:

- Several airlines and SAF producers suggested aligning with the RTFO to simplify the process for UK SAF producers operating under both schemes.
- A few respondents recommended that the SAF mandate should be consistent with CORSIA as it has a low threshold of 10% so provides flexibility to the market and provides a broad range of fuels to be used in the UK. However, a couple of respondents felt that the 10% is far too low for a minimum threshold.
- A few airlines underlined that the threshold should be 65% in alignment with UK ETS to enable airlines to claim SAF under this scheme.
- A few respondents preferred aligning with the EU RED framework, as it would facilitate EU SAF producers to locate new plants in the UK and open the UK up for imports.

In addition, several respondents indicated preference for a given threshold without mention of aligning to other schemes. Those that provided justification for their response cited:

- A ‘de minimis’ threshold of 10% could avoid the administrative burden for fuels with small GHG savings and to account for uncertainty in the GHG savings calculation methodology.
- A threshold at 40% would give producers a wider opportunity to produce eligible SAF and reduce the risk of non-compliance for producers struggling with technical difficulties, while still sending a strong signal to the market.
- Any threshold higher than 60% could make it difficult for FOAK projects to meet the GHG saving requirement without CCS while a threshold below this may not incentivise innovation in decarbonisation technologies.
- Two respondents suggested that a threshold of 70% should be used as this will drive technological development towards net zero and is already being achieved in biofuel production according to DfT’s data.

Several respondents – predominantly fuel producers and airlines – indicated that a minimum threshold is unnecessary under a GHG emissions-based scheme on the basis that the use of most sustainable fuels will already be incentivised (see **Question 3**). Among the respondents, there were concerns that implementing a threshold could introduce the risk of distortion, inadvertently incentivise specific fuels or hinder the development of new pathways. A further advantage of not implementing a threshold is that it lets the market deliver the GHG savings at the lowest cost while the proposed sustainability criteria are already likely to deliver SAF with significant GHG savings.

There was some concern that a minimum threshold would render RCFs ineligible. A few respondents underlined that the GHG calculations methodology, including counterfactuals, needs to be established prior to setting a minimum threshold (see **Question 15**) as the combination of a threshold and a counterfactual could lead to RCFs not being able to meet the criteria. Meanwhile, one respondent suggested a lower threshold of 10% could be set for RCFs only until CCS technologies are more readily available.

Question 13

Are there any land use (direct or indirect) or other implications associated with the feedstocks set out earlier that we should reflect in the eligibility criteria and minimum GHG emissions threshold?

Summary of responses

Several respondents, including fuel producers, NGOs and an individual, underlined that there is no need to account for land impacts (direct or indirect) when using wastes or residues because no land is affected. Given there are no dedicated energy crops in the proposed eligibility criteria, for which there are land use implications, the introduction of minimum GHG emissions threshold was perceived as unnecessary. In any case, a robust GHG emissions methodology should already take into account land use impacts.

However, others urged the Government to consider how other schemes treat implications on land use. In particular, consideration should be given to apply the CORSIA Land Management Practices and report GHG emissions reduction accounting both with and without ILUC for clarity and transparency. Others suggested using land use criteria that are part of approved certification schemes or recognised standards, such as RSB.

Specific considerations proposed to be accounted for in land criteria included biodiversity, water, land use, and soil health impacts. A respondents suggested that 'land' use needs to be defined and include hydroponic, aquaponic, littoral and seabed use with maritime biowaste and feedstocks included as options. Others suggested that feedstocks grown on contaminated, degraded and unused land should be allowed and biofuels should use only plant species already existing in UK, assuming that the UK is self-sufficient in feedstock.

Additional comments on specific feedstocks were:

- As discussed in **Question 10**, a few respondents were concerned about the use of waste and residue products of certain types of feedstocks, notably palm fruits (PFAD and empty palm fruit bunches) and soy, due to their land use implications. Thus, excluding certain feedstocks from the mandate will be necessary to ensure the highest sustainability credentials if land use criteria are not applied. It should be noted that CORSIA does not apply ILUC values to waste products.
- One respondent stated that given the reliance on HEFA and UCO anticipated by industry, it would be appropriate to check the end-of-life fate of these feedstocks when placed in landfills (e.g. the rate of decay into GHG), to ensure they will achieve the expected GHG savings.

Expanding the scope of the question beyond feedstocks, one respondent suggested there should be sustainability criteria regulating the construction of SAF production plants given this can have a potential impact on biodiversity and land-use change.

Question 14

As more CCUS becomes available and the GHG emissions intensity of fuels can decrease further, should the envisaged minimum GHG emissions intensity threshold be raised up over time?

Summary of responses

Total	Yes	No	Don't know
52	24	22	6

There was no consensus among respondents on this proposal. The main argument in favour of increasing the threshold is that it would help the transition to better quality SAF and set the pathway to ultimately achieving net zero aviation through the use of carbon neutral fuels, in particular PtL obtained from DAC.

Several respondents agreed that the threshold should increase over time, given that production efficiency will increase as scale increases, technical optimisation improves and fuel sources are varied. By initially setting the threshold low and increasing over time, SAF producers have a more realistic goal of producing eligible SAF in the early years and more plants are likely to develop. Furthermore, an increasing threshold could set the path towards net zero aviation and incentivise SAF producers to invest in the most carbon efficient technologies. Several respondents stated that if the threshold is to increase, this should be decided at a later date, ideally in the planned regular reviews (see **Question 21**), to allow time for carbon capture infrastructure to develop given the nascent status of CCS. Some respondents urged the Government to use technological development of SAF pathways to inform the threshold. This could be used to mitigate the risk of over or understating the emissions intensity threshold, which could potentially result in stifling development of certain pathways or impacting SAF prices if certain pathways are less commercially available.

Several respondents expressed concern that increasing the threshold would risk causing uncertainty for investors if there is no guarantee that their product will be eligible in the long-term. This could in turn impact the availability and cost of SAF for users. Some respondents proposed that any increases to the threshold should be established well in advance using a transparent process agreed with industry. Several others suggested that minimum threshold increases should only apply to new production plants to ensure future regulatory uncertainty does not undermine the investment signal of the proposed mandate.

Of those who disagreed, the most common argument was that a GHG emissions scheme awarding credits proportionate to the carbon savings will already incentivise the most sustainable fuels. A trade association added that if it becomes clear that there is scope for the mandate to deliver higher GHG savings then that is an argument in favour of increasing the overall ambition of the mandate rather than the minimum required savings.

A few others think it is premature to establish such an approach given the uncertainty of the development of CCS technologies. Respondents noted that the development of CCS infrastructure is dependent on other factors such as effective carbon pricing and government support. Other concerns with the use of CCS were that it is only applicable to some SAF production pathways or locations in the country leading to advantages for select fuel

producers, it could cause credit prices to drop or it diverts resources away from other decarbonisation measures such as zero-emission flight.

A couple of respondents disagreed with the proposal because they viewed CCS as a mitigating technology to help processes and industries which cannot change. There is a risk that SAF would be tied to the development of CCS projects and the Government should ensure that pathways to SAF production are not stifled. Furthermore, there is a risk that this proposal could become an overly restrictive demand suppression measure on aviation in the UK compared to aviation outside the UK.

Finally, a few respondents noted the interactions between the different policy mechanisms are unclear, but it will be essential to provide a business case and fiscal support to enable SAF production and CCS together.

Greenhouse gas emissions methodology

Consultation proposals

Fuel suppliers must be able to demonstrate that their fuel achieves the minimum level of GHG emissions savings through an assessment of the carbon intensities of feedstock cultivation, fuel processing and/or transport. To ensure that suppliers are able to calculate GHG emissions savings in an accurate and consistent manner, a SAF mandate requires these savings to be calculated with a prescribed GHG emissions calculation methodology. We welcomed views on what methodology should be used.

Question 15

What GHG methodology should be used to calculate the carbon intensity of fuel?

Summary of responses

<u>Existing approach to be adopted in the SAF mandate</u>

Many respondents, including fuel producers, airlines and airports, highlighted that it is preferable for the methodology to align with an existing methodology to reduce administrative complexity. As well as being embedded into third party sustainability certification schemes, this would minimise the risk of SAF accounting differences for global airlines or the risk of placing UK SAF producers at a competitive disadvantage.

11 respondents stated that the GHG methodology should align with CORSIA as it would create a level playing field given the international nature of the aviation industry and supply chains. Other reasons included that CORSIA could become the regulatory benchmark, better facilitate imports and exports and is specifically designed for SAF.

Nine respondents stated that the SAF mandate GHG methodology should align with that of the RTFO. The UK market is familiar with the methodology and it would reduce administrative burden for suppliers applying for credits under both schemes. A few of these respondents provided specific alterations to better represent the lifecycle emissions of fuel.

This included accounting for direct and indirect land use change in line with the EU RED framework, recognising additional GHG benefits of biogenic CO2 streams in comparison to other recycled carbon sources, excluding CO2 from fossil sources where this is not from fossil wastes and including bioenergy as a suitable power source.

There was some support for using an alternative methodology to either RTFO or CORSIA. A small number suggested the use of the EU RED framework methodology as it already forms the basis of the RTFO, is widely used for SAF traded in Europe, and the EU is considering methodologies for RFNBOs and RCFs which would benefit from consistency with UK. Other than this, two respondents suggested the use of the GHG model known as the GREET or best practices provided by RSB and ISCC.

Considerations for methodology

Some respondents highlighted specific considerations that the methodology should account for. In particular, many stakeholders underlined the importance of accounting for the full lifecycle of emissions. One respondent suggested that a robust lifecycle GHG methodology removes the need for additional provisions like feedstock lists and minimum thresholds. Apart from this, respondents suggested accounting for non-CO2 emissions and considering differences between specific hydrogen routes.

Question 16

How should the GHG methodology vary to take into consideration the different fuels, feedstocks, power sources and production pathways?

Summary of responses

Several respondents felt that maintaining a technology neutral approach is important and the scope of the GHG methodology should not change for specific technologies or pathways. A few highlighted that there is no need to vary the methodology when it is based upon a well audited lifecycle emission framework and called for a standardised lifecycle emissions tool such as the GREET model.

However, several respondents – mainly airlines – underlined that the GHG methodology should seek to capture the differences in GHG emissions between fuels, feedstocks, power sources and production pathways as accurately as possible. Where gaps currently exist, respondents urged the Government to work with industry to identify suitable solutions and to ensure changes are made as quickly as possible.

Some respondents also commented specifically on how fuels, feedstocks, power sources and production pathways should be treated, as described below.

Fuels

With respect to different fuel types, all comments concerned how RCFs are treated. Several fuel producers identified the need for further clarity on the RCF methodology and noted that Government should await the outcome of the upcoming RCF consultation. The lack of distinction between GHG methodologies for waste-derived biofuels and RCFs in CORSIA

was identified as an issue as it is difficult to meet the minimum threshold using this methodology without the use of CCS technologies. One airline added that it is important to enable the use of residual emissions to reduce the net climate impact of these feedstocks.

Feedstocks

One respondent suggested that the carbon intensity values should be as consistent with CORSIA as possible, where improved values for waste feedstocks are included, thereby incentivising waste derived SAF. It was suggested that the UK should adopt these default values from 2025. This would not include negative values for some dedicated energy crops that have been used during the pilot phase, ending in 2023.

Power sources

A small number of fuel producers noted there are outstanding concerns relating to the treatment of input electricity for RFNBOs. This included how the grid electricity counterfactual is treated and emissions arising from the impact of not putting that green power into the grid (i.e. is not additional). An individual also suggested that hydropower should not be used since it is stored energy and can be used to effectively balance grids.

SAF that does not meet proposed eligibility and sustainability criteria

Consultation proposal

It was proposed that SAF that does not meet the feedstocks, carbon and sustainability criteria proposed above is treated in the same way as conventional jet fuel. Such fuel would therefore become subject to an obligation under the proposed scheme. This should minimise the risk that such fuels may be supplied in the UK and result in increased emissions.

Question 17

Do you agree or disagree that SAF that does not meet the proposed eligibility and sustainability criteria should incur an obligation?

Summary of responses

Total	Agree	Neither agree nor disagree	Disagree	Don't know
50	39	6	4	1

Most of the respondents, from all stakeholder groups, agreed that SAF that does not meet the proposed eligibility and sustainability criteria should incur an obligation. One respondent noted this would ensure companies adhere to the criteria laid out and limit the use of alternative feedstocks that do not meet the eligibility criteria. Reasons for disagreeing included a proposal for a mechanism whereby fuels that do not meet the threshold should not incur an obligation as long as they provide a climate benefit.

3. Overarching trajectory

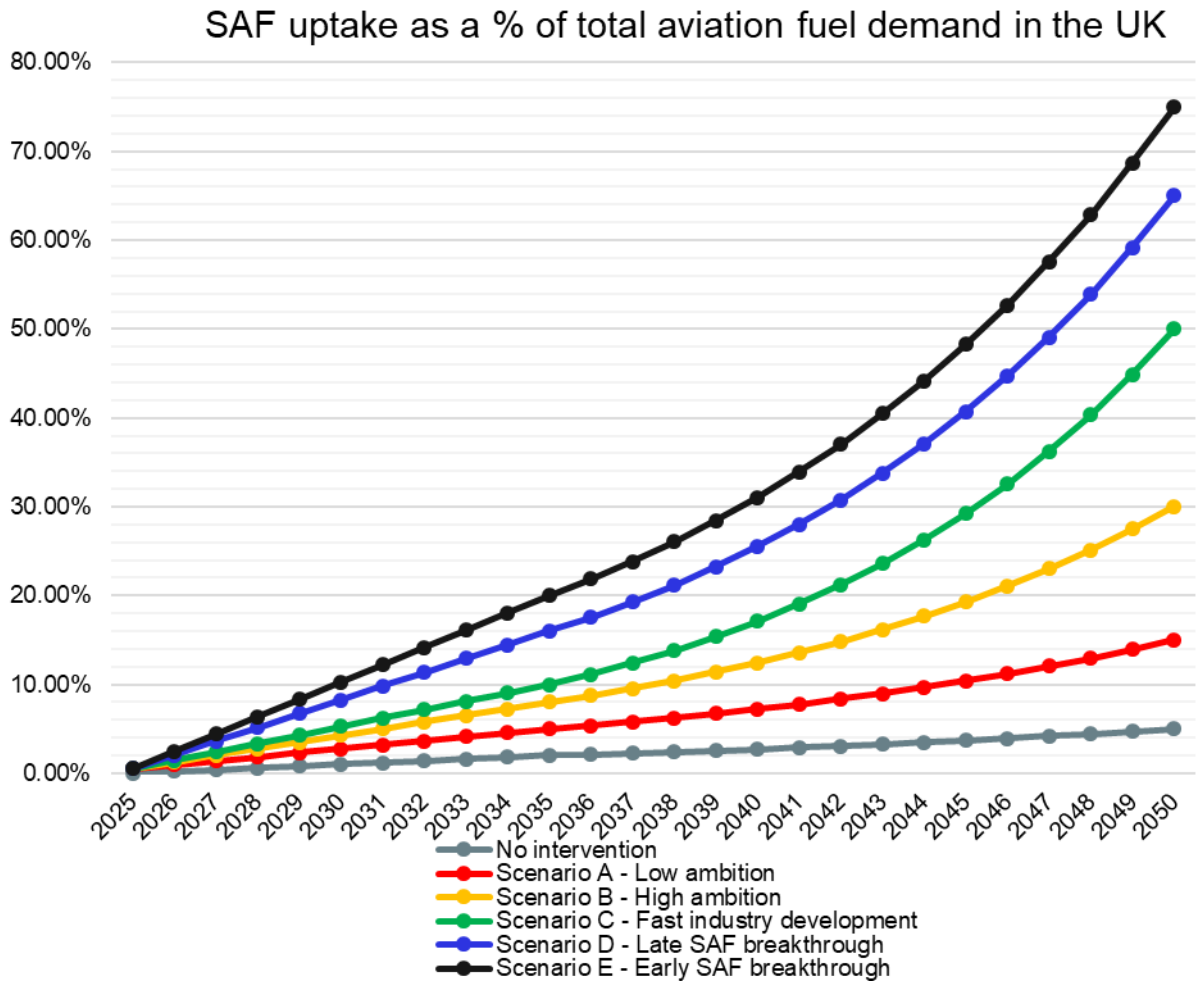
Views on preferred scenario and SAF growth over time

Consultation proposal

In the consultation, high-level scenarios for SAF uptake in the short- and long-term were presented. These scenarios are only to be considered as indicative representations of the ambition we believe could be possible for SAF uptake on the back of certain market, technology and policy conditions.

- **no additional intervention scenario**: in this scenario it is unlikely that all the existing SAF plants in the UK will develop to commercialisation nor will the existing policy framework secure additional SAF plants in the UK
- **scenario A – low ambition**: this assumes a low uptake of SAF in both the short and long term. Under this scenario, fuel production would be primarily optimised for road transport and the contribution of HEFA will likely be marginal in both short and long terms
- **scenario B – high ambition**: assumes approximately 30% SAF uptake in the long-term. It is expected all the (non-HEFA) SAF plants currently developing in the UK will become operative by 2030 and will continue to expand. More HEFA should become available at that point, as competing demand for feedstocks for renewable road transport fuel will reduce with higher uptake rates of electric vehicles, although HEFA availability in the long term will likely be limited by feedstock constraints
- **scenario C – fast industry development**: half of the UK aviation fuel demand in 2050 is met through SAF. This assumes a very high increase of plants post-2025, with approximately 6 to 8% of total 2035 fuel demand met by domestically produced (non-HEFA) SAF, and approximately a further 2 to 4% from HEFA. After 2035, total domestic supply of SAF could increase by approximately 11% per annum and could mean up to approximately 85 large-scale plants will be operational in the UK by 2050
- **scenario D – late SAF breakthrough**: this assumes a very high number of plants will develop post-2025 with a high success rate, with domestically produced (non-HEFA) SAF reaching approximately 8 to 10% of total aviation fuel in 2035 and an additional approximately 2 to 4% of aviation fuel demand to be met through HEFA. After 2035, it is expected that domestic SAF supply could increase by approximately 9% per annum, reflecting high growth rates seen in previous sectors and could mean over 100 large-scale plants will be operational in the UK by 2050

- **scenario E – early SAF breakthrough**: assumes a very high number of plants beginning to develop before 2025 with a very high success rate, with up to 20 large-scale plants already operational by 2030 and achieving up to 125 large-scale plants in 2050. Beyond 2035, supply across all pathways could increase by approximately 9% per annum. Under this scenario, SAF breakthroughs will primarily happen in the short term



Alt text: The graph presents the uptake of SAF as a percentage of total aviation fuel demand in the UK from 2025 to 2050 for each of the scenarios described. Alongside these scenarios, a 'no intervention' reference scenario is plotted. Across all scenarios, the SAF uptake trajectory grows linearly from 2025 to 2035 and exponentially from 2035 to 2050. The no intervention scenario starts at 0% uptake in 2025, increasing to 2% in 2035 and 5% in 2050. All other scenarios start at 0.5% uptake in 2025. For 2035 and 2050 respectively, scenario A has 5% and 15% uptake; scenario B has 8% and 30% uptake; scenario C has 10% and 50% uptake; scenario D has 16% and 65% uptake and; scenario E has 20% and 75% uptake.

These scenarios for SAF ambition were translated into equivalent GHG emissions reduction trajectories, which represent the target aviation fuel suppliers would need to meet.

The Government would like to introduce a carbon intensity target which is as ambitious as possible and that could deliver a world-leading UK industry. Stakeholders were asked to provide evidence on what SAF uptake trajectory can convey this ambition and what market, policy and technology circumstances will unlock such ambition.

Question 18

Do you agree or disagree that a SAF mandate should start in 2025?

Summary of responses

Total	Agree	Neither agree nor disagree	Disagree	Don't know
64	37	14	12	1

Most respondents agreed that the proposed SAF mandate should start in 2025 because this allows sufficient time for the fuel industry to prepare, while still recognising that there is urgent need to decarbonise the aviation sector. A few respondents added the caveat that, ahead of implementation in 2025, the Government should have introduced the mandate into legislation by the end of 2022. Others were supportive of aligning the start date with that of the EU mandate.

However, many respondents – including airlines, fuel producers, NGOs and OEMs – underlined that a mandate should only be introduced in 2025 provided the Government introduces additional policy support within the next two years. Some felt it was not possible to comment on the start date given that the nature of the policy support will determine the timing of the mandate that is feasible. A few respondents simply emphasised the need to ensure SAF is available in the UK, highlighting that the start date should align with fuel suppliers' capability and ability to ramp up SAF production.

Although agreeing with this start date, three respondents emphasised that this is the latest date for which a mandate should be introduced and suggested that the Government considers mandating smaller volumes at an earlier date, such as 2023, to allow more time to reach the climate targets for aviation. However, a few respondents (mainly NGOs) stated that 2025 is too late for a mandate to be introduced. The key arguments were the immediate need for the aviation sector to reduce carbon emissions and that an earlier start date will ensure production plants are supported more urgently. One respondent added that by mandating small volumes early on, it allows SAF suppliers and airlines to begin implementing processes and supply chains ensuring the industry meets the first major target in 2025. Only one respondent – a trade association - was inclined to suggest that a start date of 2025 may be premature.

Other points raised were that a 2025 mandate allows enough time for nascent technology to be included and that there is a need to keep the RTFO development fuel obligation until the SAF mandate comes into effect. An NGO also included the need for a PtL sub-mandate to be introduced in 2027 (see **Question 23**).

Question 19

Do you agree or disagree that the targets should assume a linear growth up to 2035 and an exponential growth after 2035?

Summary of responses

Growth	Total	Agree	Neither agree nor disagree	Disagree	Don't know
Linear (2025-2035)	52	29	4	12	7
Exponential (2035-2050)	51	26	4	13	8

Most respondents agreed that the targets should assume a linear growth up to 2035 and an exponential growth after 2035, but many also disagreed on the basis that there are too many uncertainties at this stage.

Most comments concerned how the fuel mix will evolve over time and the influence this has on the trajectory. In general, those that agreed highlighted that in early stages when there are fewer commercially available pathways, a linear trajectory is most appropriate due to slower development. The deployment of SAF is likely to be constrained in the first decade of policy due to the time lag associated with designing, constructing and ramping up production from facilities using novel and emerging fuel conversion technologies. In the initial years, the mandate is likely to be fulfilled using the HEFA pathway.

However, once advanced pathways, such as PtL, become viable at scale, uptake will be accelerated. These pathways have more short-term barriers with respect to cost and plant construction but have less dependency on feedstock availability. Some respondents highlighted that if technology and cost reductions accelerate earlier than expected, the exponential growth should be brought forward. One respondent underlined that their detailed assessment of feedstock availability showed that in principle there is sufficient feedstock to support an exponential trajectory.

However, a small number of respondents – including fuel producers, an airline and an NGO - suggested that the availability of such feedstocks is still uncertain. This combined with uncertainties on the sustainability criteria, ability to import fuel and the costs, mean that it is not currently possible for these respondents to provide a definitive answer. In a similar manner, some respondents underlined that it is not possible to provide an answer as it is dependent on the regulatory and fiscal support given to industry (see **Question 30**).

Other comments made by a small number of respondents included aligning with international policies such as CORSIA or the EU mandate, which use a linear growth.

Question 20

What scenario do you think represents the best trade-off between ambition and deliverability? What evidence can you provide to support your position?

Summary of responses

Total	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E	Don't know/other
65	0	2	7	3	16	37

Most qualitative responses to this question either did not know which scenario to select, did not provide a clear indication of what their preferred scenario is or that none of the listed scenarios present a good trade-off between ambition and deliverability. This was largely down to too many uncertain factors in the SAF market.

Comments on specific ambition levels

Scenario A

No respondents believed that Scenario A presents the best trade-off between ambition and deliverability. Comments implied that Scenario A is deliverable but more ambitious scenarios can also be achieved.

Scenario B

Two respondents stated that Scenario B presents the best trade-off between ambition and deliverability. Both underlined that it was comparable to other projections, specifically it is slightly more ambitious than that of Carbon Budget 6 balanced pathway and roughly in line with Sustainable Aviation's roadmap. A consultancy carried out high-level analysis of the long-term deliverability to support their decision based on assumed growth in aviation demand and UK SAF production. It was estimated that by 2050 the UK production capacity would be approximately 29% of fuel volumes, which best aligns with Scenario B.

Scenario C

Those that preferred scenario C generally did this on the basis that it seems the most realistic pathway based on production potential. Respondents reached this conclusion through a number of mechanisms including their own modelling, discussions in the Jet Zero Council SAF Delivery Group and the impact assessment from the European Commission's proposal, which all suggest that a 5% volume target in 2030 is deliverable. It was further highlighted that the expected production capabilities in the EU are likely to be similar to those in the UK.

A consultancy assessed the deliverability of the three scenarios (Scenarios A, C, and E) by estimating the number of production plants required, cost, volume of feedstock and land required on both a 2035 and 2050 timescale. Scenario C was deemed to be the scenario

with the best trade-off between ambition and deliverability based on feedstock requirements and investment.

Scenario D

Three respondents believed that Scenario D was the most realistic pathway up to 2030. Respondents suggested it is reasonable to estimate that the domestic production capacity would equal 5% of fuel volumes as this gives time for each of the first set of plants to add another of the same type, as well as some additional first-of-a-kind plants to be constructed. Allowing for some imports on top of this, Scenario D could be deliverable. However, the fuel producer emphasised that this will only be possible if the Government ensures that feedstock is directed to SAF plants instead of conventional incineration, as the amount of residual waste in the UK market is decreasing due to the continual on-streaming of large EfW projects.

An NGO presented their analysis of UK feedstock availability for SAF production and concluded that by 2030 the SAF fuel volume share could reach 7.5%, excluding PtL. With strong incentives for PtL, an additional 2.7% of 2030 demand could be met, bringing the total to 10.2%. However, this assumed that waste oils currently used in the road sector are diverted in their entirety to aviation. However, while it may be achievable, the short-term diversion of these feedstocks from the road sector has a limited net impact on the climate and could increase risk of fraud in imports.

Scenario E

The most common argument for those that showed preference for Scenario E was that setting a high level of ambition will build investor confidence in the UK SAF sector and provide long-term certainty that is needed to support investment decisions. Respondents emphasised how critical it is that the UK at least match international ambition to ensure that investment is not directed to alternative locations. Some respondents underlined that ambition is not independent of deliverability: by setting a high ambition and attracting greater investment, production will increase more rapidly than other scenarios and in turn fuel costs will come down more quickly.

Another key argument was that it is the only scenario that will truly lead to net zero aviation by 2050. Further emphasis was placed on considerations of the wider UK net zero emissions target of 2050 and 78% reduction in emissions by 2035. Some fuel producers referred to the IPCC report reiterating the urgency for ambitious climate action, while an airport cited the ETC analysis which indicates 10% by 2030 is ambitious but deliverable. Several airlines also highlighted that Scenario E is in line with their own ambition.

In terms of deliverability, one fuel producer urged the Government not to dismiss the importance of imports, stating that the likelihood of meeting Scenario E purely with domestic production is unrealistic. Given that the European SAF production industry is more developed, the UK could look to establish a functioning market with suitable incentives that can draw SAF imports to the UK, similar to that of the road biofuels market.

Alternative scenarios

Several respondents, particularly airlines, advocated for aligning the UK level of ambition with that of the EU set out in their Fit for 55 proposal. One reason being that if the UK sets

a lower ambition, investors will look to the EU as noted in the comments on Scenario E above. The other major argument is that aligning the proposals would avoid carbon leakage and competitive distortions. Aligning with the EU would require the ambition to increase from 0.5% to 2% in 2025. Similarly, other respondents recognised the need to increase the 2025 figure to avoid a dramatic and potentially undeliverable increase from 0.5% in 2025 to 10% in 2030 (in the case of Scenario E).

A small number of respondents suggested that, in the long term, even more ambitious scenarios than those set out in the consultation should be explored. This included a scenario that reaches 100% SAF by 2050.

Instead of setting a trajectory at all, one respondent suggested that a price support mechanism should be established as a priority. It was recommended to match the mandate roughly to the expected growth in production from output volumes of CfD projects.

Common positions across all scenarios

Uncertainty in long term trajectory due to feedstock availability and production capacity

Several respondents expressed uncertainty of trajectory after 2030 on the basis that feedstock availability (and production capacity) are determining factors but their long-term development is unknown. Thus, some expressed caution with any pathway that assumes that significant SAF supply becomes available after 2030 or 2035.

Linked to production capacity, there were some concerns that the Government does not have a clear idea on feedstock availability, including prioritisation over other sectors, international competition for feedstocks and how the availability will evolve over time. Once activities such as the biomass strategy and low carbon fuels strategy are completed, the SAF mandate trajectory may be more definitively established. Other unknown variables mentioned included how aviation demand will evolve over time, renewable energy requirements and capacity and UK waste policy developments.

Achievable provided additional policy interventions are introduced

Several respondents – including fuel producers, airlines and NGOs – that preferred higher ambition scenarios (Scenarios C-E) underlined that these are only achievable providing the Government introduces additional policy interventions alongside the mandate to support the SAF sector. While a few respondents mentioned tax credits or kerosene tax, several respondents urged the Government to consider a price support mechanism, specifically a CfD (see **Question 31**). Respondents emphasised that a high ambition scenario must avoid creating high demand from industry to meet the uptake trajectory, but limited supply of SAF. If this is the case, it may create significant SAF price inflation, which in turn would inevitably be passed through to consumers.

More analysis to be done

In light of the above uncertainties, some respondents urged DfT to conduct further analysis to inform industry and other stakeholders, which could take the form of an impact assessment which considers the cost effectiveness of SAF and its economic impact on consumers and industry, including a comparison with other decarbonisation solutions. Analysis would help understand the implications of each trajectory on energy requirements,

economic viability of airline routes and ensure that costs should be proportionate and manageable for passengers.

Interaction with wider aviation decarbonisation strategy

A few respondents underlined that the level of ambition should be set within the of the wider aviation decarbonisation strategy to achieve net zero. This would allow scope to compensate for underperformance in one element of the strategy by using alternative measures to keep the strategy on track. Clarity would also be needed on the interplay of each of the proposed scenarios with the wider net zero aviation ambition and strategy. Specifically, respondents wanted to know how the proposed scenarios would impact other aviation decarbonisation solutions and whether any of them would hinder the development of such solutions. Some respondents view SAF as a bridge technology and that it will not be needed in the long-term once there has been widespread adoption of zero emission flight.

Other comments

Some respondents made comments that do not fit in to sections above but are still relevant to the discussion:

- Two respondents highlighted that the trajectories set out ambition, rather than reality, in which case the most ambitious scenario should be the approach. However, this level of ambition should be higher than the mandate obligation, with additional incentives to help achieve the higher level of ambition.
- One respondent underlined the importance of the availability of construction (EPC) and access to proven technology providers / licensors. They were fearful of technology licensors becoming a bottleneck as there are only a limited number that are proven or close to full scale commercial operations. Even if each provider achieves their goals of becoming commercially viable, the demand for the technology may outweigh their capabilities, especially considering international needs.

Going higher at future review points

Consultation proposal

It is the Government's ambition to go further and faster and develop a strong SAF sector in the UK as quickly as possible. Thus, we are open to raise ambition in the future should the market and the technology develop quickly and SAF costs and carbon abatement costs come down significantly. The Government is therefore minded to introduce several review points in the next decades when a higher SAF uptake ambition will be considered. The review points were proposed to be introduced in 2030, for post-2035 uptake, in 2035 for post-2040 uptake and in 2040, for post-2045 uptake, including beyond 2050.

Question 21

Do you agree or disagree that we should include review points in 2030, 2035 and 2040, depending on initial mandate levels?

Summary of responses

Total	Agree	Neither agree nor disagree	Disagree	Don't know
59	44	3	9	3

Most respondents agreed that review points in 2030, 2035 and 2040 should be included in the proposed mandate and there was broad agreement with the benefits of review points as laid out in the consultation document. In particular, it was highlighted that frequent review points allow Government to increase mandates as the market and technology develop, economies of scale are realised, and cost comes down the cost curve. In addition to this, a small number of fuel producers recognised the importance in review points in maintaining investor confidence. A few fuel producers went on further to proposed that review points should only allow for increase in mandate targets and exclude downward revisions to avoid regulatory uncertainty that negatively impacts investment and offtake.

Several respondents called for earlier (before 2030) and later (post 2040) review dates. Those urging for earlier review points underlined that all the uncertainties concerning SAF could cause the technology and market landscape to change dramatically in the next decade. In general, respondents asked for an initial review to be carried out in 2025 to ensure that policy proposal is still relevant and provide an early indication of any 'warning signs' and to consider the publication of multiple government reviews and strategies. Those that suggested review points after 2040 provided no justification for their response.

In addition, several respondents, mainly NGOs, urged the Government to carry out more frequent reviews. The main argument given was to ensure that industry is delivering as required and to converge on the best possible policy framework as soon as possible. It would also allow other policy frameworks, such as the wider Jet Zero Strategy, to reflect on developments in the SAF sector. Most proposed reviews on an annual basis, while one respondent suggested a review every three years.

As an alternative to setting dates for review points, a small number of respondents explained that, if a CfD programme is run alongside the mandate, each round of allocation is effectively an opportunity to review progress and to structure the round accordingly.

Delivering this ambition and promoting innovation

Consultation proposals

A SAF mandate, in the short term, could drive an increased supply of Hydroprocessed Esters and Fatty Acids (HEFA). Relying on this fuel could divert used cooking oil (the primary feedstock) away from renewable diesel. Thus, the consultation welcomed views on whether HEFA should be capped and how this potential cap should evolve over time.

We are keen to capitalise on the opportunities that innovative fuels, such as power-to-liquid, can bring to the UK. Given the costs are significantly higher than the cost of SAF produced through any other pathway and that the production of these fuels is not expected to be widespread until the late 2030s, the consultation welcomed views on how to accelerate technological and commercial development of power-to-liquid fuels specifically. We are also keen to understand how the SAF mandate more in general can foster the development of SAF with the lowest greenhouse gas emissions intensity across all technologies.

Question 22

Should the amount of HEFA that can be claimed under the SAF mandate be capped over time? If this is the case, how could the cap work in practice, given the scheme will be based on GHG emissions savings? How should the cap be calculated?

Summary of responses

Total	Yes	Neither	No	Don't know
54	20	7	22	5

Respondents were fairly evenly divided in their views on the introduction of a HEFA cap, though there was broad agreement among all respondents that an excessive reliance of HEFA is detrimental to the environment and feedstock competition for other uses.

Respondents identified the principal issue that, beyond HEFA, no other pathway has been commercialised that can produce SAF in significant quantities. Moreover, the global supply of waste oil is limited and there is competition with other sectors, such as animal feed and road transport biofuels (biodiesel). Several fuel producers argued that the use of these feedstocks is better suited to the production of biodiesel as the conversion process is more efficient, therefore having greater environmental and economic benefits than the aviation counterpart. Thus, a few respondents underlined that scaling HEFA would only result in shifting of emissions savings from one sector to another, whilst reducing total emissions saved and increasing costs. Some underlined that if HEFA is diverted away from road transport, it could be detrimental to suppliers fulfilling their obligation under the RTFO.

The main argument put forward by those that agreed with a HEFA cap is that it allows other SAF pathways to be developed. Introducing a HEFA cap would stimulate investment in other pathways which have potential for greater feedstock availability and GHG emissions reductions, diversifying the fuel mix. A further advantage is that a HEFA cap would be an appropriate measure to stop fraud and address illegal imports.

At the same time, several respondents identified HEFA as an important pathway to achieve GHG emissions reductions, particularly in short term. Therefore, a number of respondents expressed concern that introducing a HEFA cap could simply limit the amount of eligible SAF available to the market, particularly if the development of other pathways is slower than anticipated. This in turn could limit emissions reductions while increasing demand and price for other pathways, outweighing the benefits of a HEFA cap. These respondents argued that its use under the mandate should not be capped as long as it achieves the minimum GHG threshold and other eligibility criteria. A small number of respondents noted that as PtL fuels

are scaled up, HEFA should have a diminishing role it was suggested that it may not be necessary to introduce a cap at this stage but could be considered later on once there is more clarity on the development and availability of other SAF pathways. Other reasons against a HEFA cap were that it would introduce unnecessary complexity, promotes certain pathways over others and could have unintended consequences.

Several respondents – including airlines, fuel producers and NGOs – argued that the introduction of a CfD scheme would mitigate the need for a HEFA cap. This is achieved by matching the mandate obligation to UK production outputs supported by a CfD. In practice, output from the CfD projects (novel pathways) would fill the mandate initially, as it would be the cheapest fuel available on the market. Fuel suppliers would then obtain any remaining credits required to meet their obligation from the purchase of other fuel, which would most likely be HEFA. Effectively, the volume difference between the mandate obligation and CfD projects' output will be equal to the volume of HEFA.

How could the cap work in practice, given the scheme will be based on carbon emissions savings?

Three respondents – a consultancy, NGO and fuel producer – stated that there should not be any issue with setting a cap in percentage volume terms, even if the basis of the mandate is GHG emissions intensity. The fuel producer suggested that it could be introduced as a carbon savings percentage but, in any case, the cap should include an absolute cap (i.e. no more than X% of volume) and a relative cap (i.e. no more than X% of the mandate obligation).

How should the cap be calculated?

Of the respondents that answered this part of the question, there was no real consensus on how the cap should be set. Suggestions included calculating the cap by assessing the feedstock requirements for other uses and setting it at a level so as to not divert away from these uses, removing the cap over time as the need for feedstocks in road transport decreases or making the cap more restrictive over time so as to eventually phase HEFA out. In terms of absolute figures provided, one respondent suggested proposed that the cap should be set at 0.8% of 2030 UK jet fuel demand (or 0.1 million tonnes), which is equivalent to the UK domestic waste oil availability, to avoid driving the demand for additional waste oil imports. Other respondents proposed a cap of 5.5%, based on the volume of European demand that can be met through HEFA, and 3%, but this had no justification.

Question 23

How can the innovation and roll-out of power-to-liquid fuels be accelerated? Should a sub-target and/or a multiplier be introduced?

Summary of responses

Some respondents selected more than one of the options, stating that either of the mechanisms could be introduced as an incentive.

Incentive	Total	Yes	No	Don't know
Sub-target	55	21	33	1
Multiplier	55	8	46	1
Other	55	22	32	1

The key issue identified with PtL fuels is that they are substantially more expensive than other pathways due to the cost of electrolysers and supply of additional renewable energy and captured carbon. Despite this, they have long-term potential on account of their feedstock availability and GHG emissions reductions. Therefore, respondents felt that a separate incentive within the mandate may be necessary in the near and mid-term (i.e. through 2035) to support their development and plant construction.

Sub-target

The main argument for a sub-target over a multiplier is that it would help scale up the production capacity by guaranteeing a certain volume of PtL is produced, which a multiplier would not do. Some respondents highlighted that the EU has proposed the introduction of a sub-target and, if the UK decides to introduce one, the target should be aligned (0.7% in 2030). Other advantages of a sub-target over a multiplier according to respondents are that it has a lower risk of inappropriate carbon accounting and double rewards, greater encouragement to invest in green hydrogen and DAC and causes less confusion to industry and wider stakeholders.

A few respondents, mainly fuel producers, urged the Government to take careful consideration when designing the sub-target to ensure the correct balance between incentive and cost-effectiveness is met. This included ensuring the sub-target is introduced at the right time, setting the buy-out at a level that facilitates investment into PtL and linking with BEIS' hydrogen strategy as it will assist in both sectors scaling up with joined investor efficiency, end to end pathways established and less chances of stranded assets being developed.

Multiplier

There were no specific arguments put forward for multipliers over sub-targets. However, some respondents noted the same advantages as a sub-target. Specifically, a multiplier in revenue streams for developers of PtL fuel plants would accelerate the scaling of PtL production capacity.

However, several respondents – including fuel producers, trade associations, NGOs and a Government body – raised concerns with introducing multipliers, claiming that there is a risk that innovation will not be promoted. Rather, sub-optimal technologies could be rolled out to take advantage of the subsidy provided by these multipliers. Another concern is that multipliers introduce complexity when trying to communicate policy aims.

Other incentivisation mechanisms

Many respondents stated that targeted price support for PtL projects would be a more effective and cost-efficient tool than either a sub-target or multiplier. As well as bring

confidence to investors, a price support mechanism promotes domestic production and removes the risk of creating competitive distortion from setting the level of reward. Outside of dedicated price support mechanisms for PtL, a small number of respondents proposed tax credits or reductions, appropriate carbon pricing and a kerosene tax as preferred policy levers to promote the uptake and development of PtL.

Several respondents underlined that more direct funding to the construction of production plants could be the best method to accelerate the development of PtL to reduce capital costs of plant construction. Respondents suggested grant programmes and loan guarantees for FOAK facilities, potentially under the UK Guarantees Scheme. Alternatively, several of the respondents proposed that funding should be directed towards research and development (R&D) activities as the mandate itself will not be sufficient to promote technological development. Finally, a small number of respondents underlined that funding should be directed towards renewable energy production, including nuclear power.

The importance of carbon capture technologies, in particular DAC, for the scaling up of PtL was highlighted by some respondents who urged the Government to provide sufficient support in this area. Long term funding should be directed towards DAC to de-risk this technology for capital investment and accelerate its development. One respondent suggested that the mandate should legislate a minimum percentage of PtL to be produced using DAC and for it to be increased over time, which could drive DAC and commercialisation of the relevant carbon management technologies.

Finally, a couple of respondents underlined the role that a UK Clearing House could have in supporting PtL fuels, stating that with a comprehensive package of support for fuels testing over multiple years, a number of carbon capture and use applications could be assisted through what can potentially be a multi-year process to have a new fuel approved.

No incentivisation mechanisms

Some respondents proposed that no incentives should be introduced as the Government should take a technology agnostic view. It was argued that PtL fuels will face similar innovation and investment challenges to other SAF production methods, so the Government should create a level playing field by having the same support mechanisms in place. Some fuel producers, airlines and trade associations argued that, given the mandate will incentivise pathways through providing credits related to GHG emissions reductions, there is no need to introduce any additional interventions. It is expected the market will drive the use of PtL given the high GHG savings.

Question 24

How can SAF produced through pathways other than HEFA and power-to-liquid be accelerated?

Summary of responses

Several respondents highlighted that the same incentives described for accelerating the development of PtL fuels are applicable to other pathways. In particular, the use of price support mechanisms.

As with PtL, several respondents from all stakeholder groups suggested that funding the development of FOAK plants is the best way of accelerating other pathways. The funding mechanisms put forward by respondents included the UK Guarantees Scheme and UK Infrastructure Bank, as well as generic grants or favourable term loans. A fuel producer and consultancy suggested that funding would be necessary to invest in skills to ensure the longevity of the industry, including chemical engineering and aviation fuel specification training. However, a different fuel producer warned against the funding of technologies such as MSW/FT-SPK because the levelised cost of production of SAF is too high.

Several respondents recommended that rewards for specific feedstocks would be beneficial. This is because, typically, waste based SAF (e.g. non-recyclable wastes and MSW feedstocks) have higher CAPEX requirement due to the complex nature of preparing the waste. Therefore, the policy could provide some level of reward proportionate to the cost of an alternative low carbon end of life fate for these waste feedstocks. One respondent called for the use of crop-based feedstocks in the production of ATJ as this would accelerate the commercialisation of their plant; otherwise, the scale up of the ATJ industry would be entirely dependent on the simultaneous establishment of a new ethanol industry or the development of fully integrated plants.

Others urged the Government to adopt technology- and feedstock-agnostic policies that do not stop new technologies or pathways from contributing or being eligible for credits.

A small number of respondents recommended that funding is directed towards R&D to develop low TRL projects. This included areas of research in feedstocks, process and economics, infrastructure and technical specifications.

A few respondents identified a UK Clearing House as a useful tool to support other pathways, which is discussed in more detail in **Question 31**.

A small number of respondents emphasised the importance of collaboration between government departments due to crossover in policy areas such as low carbon hydrogen and nuclear power and a collaborative approach will support addressing the competing demand requirements of feedstocks from different sectors. Furthermore, many SAF pathways will produce non-fuel products that can be utilised in other sectors including chemicals and materials. A final advantage is that the multiple use of fuels or by-products helps to de-risk the development of production pants and in turn attract investment.

4. Interactions with other domestic and international policy

Double counting and double claiming under multiple schemes

Consultation proposals

The Government would like to require that any SAF supplied to meet the proposed standalone SAF mandate cannot be claimed under the RTFO, and the other way around. This is to ensure carbon emissions reductions are only accounted for once. It was proposed that any emissions reductions claimed under a SAF mandate cannot also be claimed under another GHG scheme to ensure that they are only claimed once. The consultation welcomed views on how the UK ETS, CORSIA and proposed SAF mandate could be used together to continue to incentivise SAF uptake, while preventing double counting of emissions reductions.

It was also proposed that any SAF produced from plants who have benefitted from government support for R&D, feasibility studies, FEED and construction of commercial plants, either in the UK or abroad, can count towards the proposed SAF mandate obligation. This would mean that fuels supported through the Green Fuels, Green Skies competition or fuel produced by clusters receiving funding under the GHG removals or hydrogen from bioenergy with CCS programmes run by the Department for Business, Energy and Industrial Strategy, for instance, would continue to remain eligible under the proposed SAF mandate.

Question 25

Do you agree or disagree that SAF GHG emissions reductions should be claimed only once under different schemes?

Summary of responses

Total	Agree	Neither agree nor disagree	Disagree	Don't know
62	56	3	0	3

Most respondents agreed that SAF GHG emissions reductions should be claimed only once under different schemes. The main arguments to support this view were:

- There is a need to prevent double counting of emissions reductions, particularly as this undermines the credibility of climate change policies
- Only allowing emissions to be claimed once is the simplest approach
- The robust accounting of emissions is key to the success of any mandate incentive

Several stakeholders (including NGOs, OEMs, fuel producers and airlines) who agreed that GHG emissions should be claimed only once under difference schemes felt it was important that the UK was consistent with other existing global and EU rules on GHG accounting. In this case, they suggested that mandate certificates should be collected at the point of delivery of SAF into the system, but airlines should still be able to claim emissions benefits under CORSIA or the UK ETS, whilst only counting the emissions reductions once.

A few stakeholders proposed that in the same way that GHG emissions should only be claimed once under different schemes, they should also only be obligated once- i.e. a tonne of carbon should only be paid for once under one policy.

Other stakeholders argued that the answer to this question depends on how ‘scheme’ is defined. A trade association proposed that foreign programmes such as the Californian LCFS and the Canadian Clean Fuel Standard should not be considered as GHG schemes for the purposes of policy on double counting.

Question 26

How could the UK ETS, CORSIA and proposed SAF mandate be used together to continue to incentivise uptake, while preventing double counting of emissions reductions?

Summary of responses

Many respondents (OEMs, fuel producers, airlines, airports) suggested that in order to use the UK ETS, CORSIA and SAF mandate together to incentivise uptake whilst preventing double counting, the UK should align with EU, international and domestic policy solutions that are already in use. In particular, respondents pointed to using the same emission calculation methodologies used to prevent double counting in the EU ETS and CORSIA to prevent double counting through the mandate. Furthermore, many of these respondents suggested adopting the approach used by EUROCONTROL to reconcile the EU ETS and CORSIA, by using one monitoring, verification and reporting tool.

A few respondents felt that the UK should not only be engaging with the EU on incentivising SAF update and preventing double counting, but that we should be taking a more global approach to avoid competitive distortion and carbon leakage. Some solutions offered were the creation of a SAF coordination platform similar to the Jet Zero Council but open to stakeholders globally, working at ICAO to develop a common standard SAF mandate to

achieve maximum consistency across borders, and the use of a global register of SAF claims to ensure double counting is prevented.

A small number of respondents felt it wasn't possible to reconcile these policies whilst preventing double counting of emissions. In particular, one fuel producer respondent suggested that the UK ETS, CORSIA and proposed SAF mandate are three overlapping policies targeting the same objective, and that this creates an unnecessary level of complexity. Additionally, one respondent felt it was premature to address this question without a draft framework of the UK SAF mandate and while the EU is still in the process of implementing their SAF mandate. They suggested that the impact of ReFuelEU is assessed alongside UK ETS and CORSIA developments to avoid competitive distortion and carbon leakage.

Question 27

Do you agree or disagree that SAF that has been produced on the back of industrial plants or clusters which have received competition funding from government can be claimed under the proposed UK SAF mandate?

Summary of responses

Total	Agree	Neither agree nor disagree	Disagree	Don't know
49	44	2	1	2

The key argument for those in support was that, although competition funding will help overcome risk, production plants need the long-term certainty of economic operation provided by the mandate to attract sufficient investment. Thus, it is unlikely that these plants will reach commercialisation if they are ineligible under the mandate. Second to this, several respondents argued that these plants will be a critical source of domestic SAF production, particularly in the near future, without which SAF supply and uptake will be constrained.

In addition, several airlines and fuel producers highlighted that this approach would be consistent with what is seen internationally, in particular the US and the EU (where they are reviewing rules on state aid). If the UK does not follow suit, then there is a risk that fuel producers will look elsewhere to locate. Generally, respondents did not raise any concerns about double subsidies.

However, a couple of fuel producers emphasised that the Government needs to ensure a level playing field by making the support available to all market players and expressed concern that the approach outlined may damage investment for newly constructed facilities that have not benefitted from government competition funding. One respondent disagreed due to perceived ambiguity in the question.

Aviation fuels under the RTFO

Consultation proposals

The Government proposed to make aviation fuel ineligible to receive certificates under the RTFO once a SAF mandate is in place, likely in 2025, meaning that the SAF mandate would become the only scheme under which fuel suppliers would be able to claim SAF use and receive a reward, in the form of a credit, in the UK. The envisaged four-year time lag before this change comes into force should allow industry to transition towards the new scheme without significant complexities.

Question 28

Do you agree or disagree that SAF should no longer be rewarded under the RTFO when and if a SAF mandate is in place?

Summary of responses

Total	Agree	Neither agree nor disagree	Disagree	Don't know
58	45	3	7	3

Generally, respondents felt that no fuel type should be incentivised under more than one scheme to avoid any double counting and mitigate confusion for obligated parties. However, a couple of respondents noted that this will not avoid double counting the same CO2 reduction with the rest of the economy.

Several respondents highlighted that the current support for SAF in the RTFO has sent a strong market signal and should continue to be in place until the SAF mandate has been implemented. Any time delay in transition of support from RTFO to the SAF mandate should be avoided to mitigate any uncertainty and continue to attract investment in SAF production in the years leading to the start date of the mandate and beyond. Thus, the Government should provide reassurance that any transition will be managed well without any period where SAF is not supported. A few fuel producers proposed a transition period whereby fuel producers can continue to claim credits under the RTFO. This could take the form of a specified time period or allowing plants currently in development to continue to claim under the RTFO until their plant is fully operational. A couple of fuel producers added that, prior to the introduction of the mandate, the RTFO should continue to be amended to include additional SAF pathways and feedstocks such as RCFs and emphasised that these changes should not be delayed until the SAF mandate.

Several respondents highlighted that many production plants will produce fuel for road transport and aviation concurrently, therefore claiming credits under both the RTFO and the SAF mandate. Thus, the RTFO and mandate should maintain some level of consistency. If the value of the development RTFCs provided to diesel is greater than the value provided through the SAF mandate, suppliers may be inclined to use the buyout in the mandate rather than to supply SAF. Some went on further to say the reward given under the mandate should be greater than the RTFO to incentivise SAF production over diesel production.

However, a few respondents disagreed with the proposal. It was suggested that SAF as part of the mandate should not be supported under the RTFO but any additional (voluntary) SAF supply should be rewarded with RTFCs. Alternatively, it was also proposed that double incentivisation should be maintained to maximise benefits given to fuel producers.

Interactions with foreign mandates and tankering

Consultation proposals

It is essential that any potential SAF mandate introduced in the UK or elsewhere does not result in an increase in carbon emissions outside the region where a SAF mandate is implemented. In particular, airlines may decide to take on additional fuel on inbound trips to the UK to cover the outbound trip from the UK by refuelling elsewhere – this is known as 'tankering' which can result in carbon leakage, even when taking into consideration the carbon emissions saved through SAF use.

To reduce this risk of tankering, through the Jet Zero Consultation we proposed to seek a voluntary agreement from all airlines to avoid tankering where there is no practical reason to carry additional fuel (this proposal was consulted on as part of the separate Jet Zero Consultation). In this consultation, the Government welcomed views on whether some additional provisions under the proposed SAF mandate may be needed to decrease even further the risk of tankering that mandatory SAF use could result in.

Question 29

What provisions should the UK SAF mandate include to reduce the risk of tankering even further?

Summary of responses

Many respondents (including OEMs, NGOs, fuel producers and suppliers, airlines and trade associations) suggested that in order to reduce the risk of tankering further, the mandate should align with EU mandate provisions, particularly the uplift provision mentioned in the EU Fit for 55 document. This would require that a certain proportion of uplifted fuel come from UK airports. A few respondents went further than this and suggested that in order to truly address the risk of tankering, coordination needs to happen at an international level to ensure the mandate is compatible with other globally agreed schemes or enforceable mandates.

Several respondents mentioned that airlines often have legitimate reasons to tanker fuel, such as operational safety reasons, lack of availability of fuel at destination airports, quality issues and regional price differences. These respondents therefore felt it would not be possible to limit tankering entirely and that attempts could be difficult to regulate. Despite this perceived difficulty, a few respondents did suggest that one way to reduce tankering could be to pre-estimate the fuel required for certain types of flights from the UK and determine for each flight if the fuel uplift is within a certain tolerance of this estimate. Respondents admitted that this would not be a straightforward task and would need to take into account variables such as aircraft type, en-route conditions, diversionary airports etc.

A few airlines displayed disagreement on whether the mandate should cover both international and domestic or just domestic flights. One respondent suggested international coverage would likely increase tankering as airlines would seek minimum cost solutions to achieve compliance, whereas another proposed that the risk of carbon leakage is best avoided by applying the same rules to all flights departing from UK airports.

Furthermore, a few respondents felt that tankering is likely to be a minimal risk as a result of the mandate and therefore doesn't require specific provisions. It was suggested by some of these respondents that some further research should be conducted on the risk of tankering before implementing policy to reduce it.

5. Delivering SAF to the market

Building a strong UK industry

Consultation proposals

We are keen to understand how we can build investor confidence in UK plants and secure investment, allowing the UK to develop a world-leading domestic SAF sector and delivering thousands of green jobs. The consultation therefore welcomed views on what, if any, additional interventions may be needed to provide more certainty for developers and investors considering building plants in the UK. We will consult on further detail if appropriate.

Question 30

Do you consider a more comprehensive policy framework beyond a SAF mandate is required to build a successful UK SAF sector?

Summary of responses

Total	Agree	Neither agree nor disagree	Disagree	Don't know
66	56	6	1	3

Most respondents agreed that a more comprehensive policy framework beyond a SAF mandate is required to build a successful UK SAF sector, as a SAF mandate is generally not considered sufficient on its own to stimulate domestic production of SAF. The predominant argument is that while a SAF mandate will provide an important investment signal, additional complementary policies are needed to help scale the industry and lower the current price premium of SAF relative to fossil jet fuel.

A few respondents, mostly individuals, were neutral on this question. They referred to seeing little value in further regulation, suggesting that the monies could be better used elsewhere. A few NGOs suggested that it is difficult to make a strong case for public investment in risky initiatives such as SAF when there are other sectors that could more effectively address the

decarbonisation challenge. Only one respondent, disagreed, claiming that a well-designed SAF mandate providing strong, stable signals to the market is sufficient.

A few respondents urged the Government to set out a comprehensive SAF policy framework over the next 12 months, which they argue could strongly signal the direction of travel before a legislative outcome by the end of 2022 at the latest. These respondents also stated that they are confident that three operating UK SAF plants can be delivered by 2025 but only if progress allows sufficient space for the project development, construction and commissioning lead times.

Question 31

If you believe this is the case, how can this policy framework be designed? Please provide any evidence you may have available to support your answers.

Summary of responses

Total	CfD	Loans and guarantees	Grants	Tax credits	Clearing House
58	32	26	23	7	12

Respondents identified a wide range of commercial and other considerations that should be considered when designing a policy framework for SAF. Many called for a holistic and comprehensive framework or strategy that addresses the scale up of SAF production in the UK. Many added that there would be a need for DfT to engage with all departments including BEIS and HM Treasury, and for the framework to be considered alongside other frameworks in which SAF plants overlap such as the hydrogen and CCS frameworks. A few airports, airlines and NGOs proposed that the comprehensive framework should be complemented with international engagement through ICAO and with the EU, to maximise policy alignment and minimise the risk of carbon leakage and disadvantage to UK industry.

Other points raised by single respondents on the overall framework included:

- The policy framework should consider the longer-term prospects of hydrogen as a fuel;
- Government support for SAF mandates, price support mechanisms (PSMs) and FOAKs is no substitute for ongoing investment in airspace modernisation, new aircraft/engine technology development and carbon removals;
- The comprehensive policy framework for SAF should be accompanied by a robust and rising carbon price to incentivise greater energy efficiency in aircraft and operations and to help partially bridge the long-term cost differential between SAF and conventional aviation fuel; and
- The primary focus of a SAF mandate should be to maximise GHG emissions reductions, rather than developing a successful domestic SAF sector.

Many respondents across organisation type encouraged the Government to emulate the whole of government approach being taken by the US. That is, an incentive mechanism in the form of a performance based SAF credit, $4.3 billion in SAF funding opportunities,

including grants and up to $3 billion in loan guarantees. This is in addition to federal and state incentives applicable to SAF under the federal Renewable Fuel Standard and state low carbon fuel standards like the California LCFS.

We consider specific initiatives proposed below in order of stakeholder preference.

Contracts for Difference (CfDs) or other price support mechanisms

Most respondents, across organisation type, identified CfDs or other price support mechanisms as being essential. Reasons included that it would give price and offtake volume certainty to suppliers which will be a key contributor to making projects financeable and provide a significant boost to the incentive for investment into the UK SAF industry. This will help lower the barriers to entry for production and could lower the costs to consumers of SAF (depending on how it is funded). Several respondents noted how successful this mechanism has proven in the offshore wind sector. Several respondents, including NGOs, airlines and OEMs, noted that in the absence of a CfD or similar approach, the UK risks becoming largely reliant on imports to meet the volumes proposed by the SAF mandate consultation. Finally, a few respondents commented on the potential for funding a CfD scheme through the hypothecation of funds from the UK-ETS scheme.

Many of the respondents who mentioned CfDs set out some of the key features they would like to see, which include:

- Fixed contract lengths. Those respondents who specified a time preference called for these incentives to be long term (20+years) to provide investors with certainty associated with receiving the incentives;
- Fixed strike price to help remove uncertainty relative to a variable strike price;
- Price setting through administrative action or negotiation in the first round. Many of the respondents requesting this explained that this was because the market will not be mature enough to support an auction;
- Banding. Many respondents requesting this argued that it would be essential to ensuring that feedstock and technology combinations of strategic importance to the UK are supported. Examples given included ensuring that the contracts do not simply pull low carbon feedstocks away from the road sector and allowing for the repurposing of existing fossil refinery assets; and
- Designed to minimise carbon leakage.

Many respondents also made the point that CfDs should be consistent with and progressed in parallel with a SAF mandate. A few respondents proposed that volumes supported through CfDs could be deducted from the volumes obliged under the mandate; alternatively they may fall within a mandate, but this is likely to reduce the contractual payments required while increasing the total cost of a mandate, thus affecting the reference price for any CfD.

While most respondents focussed on CfDs, several pointed out that the benefits of contractual support can be realised by a variety of types of contract design and need not necessarily be a CfD. For example, the US does not have CfDs, but its combination of much higher incentives, a liquid and well-established market in the tradable certificates, and other benefits serve to enable investment.

Government loans, guarantees and equity

Most respondents identified government loans or guarantees as being another essential element of an effective policy framework, with many also adding government equity to this list. Many respondents, across organisation type, specifically identified the UK Infrastructure Bank or its predecessor, the UK Guarantees Scheme, as being explicitly designed to de-risk the large capital cost of infrastructure projects. Some added that without such support, it is unlikely that the gap between debt and equity can be bridged to deliver the first UK SAF plants by 2025.

There was a focus from many respondents, particularly fuel producers/suppliers, on emergent SAF technologies and FOAK projects as being particularly suited to this type of support. It was noted that conventional bank debt is usually not available for these projects, or if it is available it is offered at prohibitively high cost. Several respondents added that loan guarantees that are tailored to meet the needs of emerging SAF technologies, covering a proportion of the total capital required, would unlock private finance to fund the first few commercial scale facilities.

Grants for investment

Most respondents, across organisation type, identified grants for investment as being another essential element of an effective policy framework, with many suggesting that grants could be used alongside the debt, guarantees and equity discussed above to help reduce the private financing required to meet the upfront cost of new facilities.

Several respondents noted that the competitions such as GFGS were welcome but that they should be extended, and those that mentioned a value suggested a further £50m in grants for the development of SAF production across the UK. A few fuel producers suggested that an alternative approach would be to establish a fund (or investment instrument) awarded by competition and that other initiatives may offer lessons here, such as the Industrial Decarbonisation Challenge Fund and the proposed Net Zero Hydrogen Fund.

Many respondents proposed that direct government support could be focussed towards research or projects in the earlier TRL stages, with several commenting that continued R&D and demonstration funding programmes were attractive, and would be an important complementary tool to a mandate to support the commercialisation of low TRL technologies. A few NGOs felt that direct financial support should only be provided for projects using novel or emerging technologies, or which use high-performing and abundant feedstocks, including waste and residue gasification, and electrofuels.

Tax credits or other fiscal measures

Several respondents, particularly fuel producers/suppliers and NGOs, made specific requests for tax credits or other fiscal measures such as accelerated depreciation to be awarded to SAF plants. This could be a performance-oriented production tax credit lasting the project's lifetime to give certainty to investors. Alternatively, a blenders' tax credit could mitigate some of the risks that early-stage mandates can have on an industry suffering financial challenges.

Other suggestions included a tax on conventional kerosene or linking excise duty to carbon intensity. One respondent proposed that there should be incentives for airlines to go over

and above a mandate similar to the LCFS. This could reward credits for any fuel used by airlines above a mandated obligation which could help to increase and reward airlines with ambition, incentivise producers to increase production which in turn could lower to cost of overall production.

Other considerations

One respondent added that the policy framework working in conjunction with a mandate, and the UK ETS, should be designed to enable the accelerated ramp up of SAF from all available feedstocks. Another respondent added that SAF production should be aligned with parts of the UK where renewables are abundant, highlighting the leading role that Scotland has played in developing marine renewable energy and hydrogen deployment.

UK clearing house

Many respondents called for the SAF policy framework to include the development of a UK clearing house as critical to expedite a UK SAF industry. Several respondents welcomed the Government's initial £3m investment in a UK clearing house but highlighted that this investment was only for one year and no funding has yet been provided to fuel developers. The Government needs to ensure the longevity of a testing programme to truly realise the SAF ambition. They called for a multi-year approach to the testing programme. Reasons given for the importance of a UK clearance house included:

- It would lower the barriers to entry for new producers in that they would no longer have to send their fuel to the US for testing and certification
- The cost of testing (>£1.5 million for the four tiers of testing) is prohibitive for many producers, hence, the UK clearing house will reduce those barriers and enable new fuels with the highest GHG savings to reach the market. A longer term strategy for fuel approval will support producers and drive investor confidence and will complement a price stability policy.
- Clearing house funding to support early-stage developers will attract many more fuel developers to the UK and help anchor new investment;

One respondent suggested that a clearing house would not make a significant difference to the speed of adoption of SAF given that only one (HEFA) of eight approved production pathways is in production today, and none in the UK. On the other hand, the Clearing House could help support efforts to certify 100% blends.

Offtake agreements

A few respondents suggested that offtake agreements should specify that a minimum amount (%) of any SAF supplied to an airline is manufactured in the UK, which they believe would reduce the carbon footprint of shipping fuel. These respondents accept that not every aircraft fuelling can be controlled to such a level, however they consider that each fuel supplier should at least be required to account for the origin of its offtakes over a fixed time period.

Noncompliance and buy-out mechanism

Consultation proposals

The Government acknowledges future market developments or other external circumstances could mean fuel suppliers may not be able to produce sustainable fuel or buy credits, thus failing to meet (part of) their proposed obligation. It may be necessary for suppliers to pay a fixed sum for each litre of fuel for which they wish to 'buy-out' of their obligation. Should suppliers fail to produce SAF, an equivalent buy-out under the SAF mandate would allow them to fulfil their obligation, but this would result in a loss of additional carbon emissions savings. The consultation welcomed views on what measures or penalties should be in place to deter suppliers from falling short of the proposed carbon intensity targets and whether buy-out should be allowed.

Question 32

Should buy-out be allowed? If so, how should the buy-out price set to encourage actual supply of SAF and delivery of GHG emissions savings? How should the buy-out evolve over time?

Summary of responses

Total	Yes	No	Don't know
53	31	13	9

Most respondents were in favour of the introduction a buy-out mechanism under the proposed SAF mandate. Respondents claimed the mechanism would help jet fuel suppliers discharge their obligation in the absence of sufficient SAF supply, for example due to a temporary shortage of feedstocks or delays in both domestic and imported SAF production or supply. As fuel and feedstock disruptions could increase SAF prices, many stakeholders agreed a buy-out would prevent potentially high prices from being passed on to passengers and preserve the competitiveness of the UK aviation industry.

Despite being in favour, only two respondents acknowledged the use of a buy-out would not result in GHG emissions savings and should therefore be used under exceptional circumstances. To avoid this risk, several respondents suggested the buy-out price should be higher than the price of SAF, so that the mechanism encourages SAF supply, does not make non-compliance purposely cheaper for fuel suppliers and drives up the value of the mandate credits, with potential benefits to the UK market. The buy-out price should, however, be low enough to protect passengers from spikes in prices and not to distort the market.

<u>Setting the buy-out price</u>

There were multiple views on how the buy-out should be set and what factors should be considered when defining its price:

- Two fuel producers stated the buy-out price should be at least equal to the cost of road fuel to discourage competition between transport modes, with one highlighting the cost of the development fuel buy-out under the RTFO.
- Two respondents suggested the buy-out price should be, at minimum, equal to or slightly higher than the market price of SAF; a third respondent specified the buy-out should be at least equal to the minimum selling price for SAF, regardless of its technology; conversely, a fourth response suggested the average price of SAF should be used as a reference while a fifth respondent proposed to use the difference between fossil jet and the most expensive SAF available in the market.
- Two responses stressed the buy-out price could include not only the cost of the SAF not delivered to the market, but also the additional cost of the carbon externality which has not been avoided, in the form of the average carbon price for the year.

Regardless of what proxy the buy-out price is based on, one respondent suggested this should be at least equal to £300/tonne of CO2e, while another one suggested at least 3,000€/tonne, which is in line with the proposed non-compliance penalty proposed by Germany for its power-to-liquid fuels mandate (€70/Gigajoule). Overall, fuel producers suggested the buy-out level needs to effectively provide the price support for SAF projects or that the level of buy-out should allow for an appropriate return on investment.

Buy-out price over time

Respondents in favour of a buy-out mechanism were split on whether this should be a temporary or permanent feature of the SAF mandate, and on how and how often the buy-out price should change over time.

- It was highlighted a buy-out would be beneficial only in the early years, where the risks of market power or very high costs are higher especially if mandate targets are set too high.
- One respondent stressed that the buy-out provides long-term certainty and should therefore not be revised over time, apart from inflation. Conversely, many respondents agreed it should be revised either regularly (with no suggestions on frequency), annually, or every five-years.
- A few respondents suggested the buy-out price should be increased over time, for instance in a way proportional to the number of plants or mandated volumes of SAF increase. However, one respondent suggested the buy-out price should instead be reduced over time once supply is available to reflect the expected changes in market prices.

Many of those in favour of a buy-out advocated for directing the revenue gained through the potential buy-out scheme to support new plant builds and programmes that foster SAF development and supply chains.

Restrictions, penalties and practicalities

A couple of respondents proposed that safeguards should be introduced to ensure that SAF offered at the buy-out price is purchased, the mechanism does not result in a loss of carbon savings and persistent non-compliance is not encouraged. These could include additional monetary penalties for fuel suppliers if they fail to deliver SAF, restrictions on volumes allowed or caps on the percentage of fuel subject to buy-out. One NGO which advocated for

penalties, including for non-compliance, suggested these could be set as a percentage of a fuel supplier's turnover.

Interactions with CfDs

A few respondents agreed that a buyout without a CfD would be unhelpful as the mechanism may limit upsides but will not prevent downsides. No additional information was provided to support this statement. Conversely, a couple of respondents highlighted that if a price mechanism is introduced to support UK production, a buy-out should only be introduced for SAF not covered by such price mechanism. One NGO suggested that the buy-out price could be lower if a CfD is in place, as fuel suppliers would be less reliant on mandate certificate prices to drive the deployment of new capacity.

No buy-out

One respondent was not supportive of a buy-out, while another respondent stressed that a buy-out should only be allowed if SAF is not available in the market, claiming the cellulosic biofuel mandate in the US has not operated as intended due to the possibility for obligated parties to buy out of their obligation. One respondent preferred an approach aligned to the EU (penalties) to ensure consistency with other jurisdictions and avoid the risk that UK suppliers would primarily supply SAF somewhere else and buy out of their obligation in the UK. Individuals, a government body and a couple of organisations opposed a buy-out claiming it would allow the aviation sector to comply with its obligations without deliver carbon savings.

Question 33

What penalties should be introduced in addition/alternatively to a buy-out to ensure sustainable SAF, that meets the proposed criteria, is supplied?

Summary of responses

Many respondents stated that it is not necessary to introduce any additional penalties if a well-designed buy-out mechanism is implemented. In their view, the buy-out mechanism will already provide a safety net should SAF supply fall short of the obligation and further penalties risk being passed onto the consumer or incentivising imports over domestic SAF.

However, several respondents suggested that the Government considers financial penalties greater than the price difference between fossil kerosene and SAF where money generated from penalties could be redistributed to support production plants. A couple of respondents suggested that limitation on the number of times or frequency that a supplier can opt for a buy-out should be implemented to avoid excessive reliance on buy-outs. Other suggestions for penalties included enforcing suppliers to fulfil the shortfall the following year in addition to their usual obligation or publishing information on compliance which may cause adverse publicity. Several respondents simply stated that the mandate should align with the approach currently adopted in the RTFO.

6. Scheme practicalities, reporting and verification

Mass balance and chain of custody

Consultation proposals

We proposed that a mass balance approach should be the only chain of custody system permitted as part of the SAF mandate. Such a system ensures that, for each unit of biofuel claimed, an equivalent amount of feedstocks with the same sustainability characteristics of the final biofuel has been effectively used in the fuel market, even if those feedstocks have not been physically separated during the production process. To allow sustainability data to be verified, credible and adequate evidence must be in place at each stage of the supply chain.

Question 34

Do you agree or disagree that a mass balance approach should be the only chain of custody system permitted under the proposed SAF mandate?

Summary of responses

Total	Agree	Neither agree nor disagree	Disagree	Don't know
46	28	5	7	6

Most respondents agreed that mass balance should be the only chain of custody permitted with the main reason being that this is the approach that other similar schemes, particularly the RTFO, have adopted. Thus, it is seen to be a standardised and proven method of accounting. Some respondents added that it is more efficient than alternative approaches as it avoids excessive cost and administrative burden of segregation while still providing a link between all stages of custody. Several respondents indicated that mass balance is also effective given the co-mingled supply of avtur in the UK and the use of the pipeline system.

However, some fuel producers highlighted that, while mass balance may be effective for pathways such as HEFA, there may be some complexity with other feedstocks and pathways such as MSW or RFNBOs.

A few airlines and trade associations prefer a book and claim approach over mass balance. According to these respondents, this system would provide verifiable data, specific fuel does not have to be tracked onto the aircraft, reduced costs and standardised transactions. A couple of respondents suggested that after initially adopting a mass balance approach, the UK could ultimately move towards a book and claim approach for consistency with CORSIA. However, a trade association argued that a book and claim approach stating that it could lead to greater compliance risks and potentially loss of credibility with stakeholders.

Some respondents suggested that more than one chain of custody could be adopted. Proposals included using mass balance up until a prescribed point such as the blending point, after which book and claim could be used or simply allowing airlines to choose between either mass balance or book and claim.

Other comments included making the applicable definition of mass balance clearer and operating mass balance via blockchain technology to allow visibility to the customers of the source of their SAF.

Question 35

Where do you think the chain of custody will need to end? Please refer to any evidence to support your position.

Summary of responses

Many respondents stated that the chain of custody should at the blending point since it is not possible to distinguish SAF molecules from fossil kerosene at this point and mass balance relies on tracking individual molecules. At the same time, many respondents proposed that the chain of custody should end at the point in which the fuel is held in co-mingled storage. This could be an airport storage system should the fuel have been delivered by road or rail or ingress into a pipeline system that is physically connected to the airport.

Several respondents proposed that the chain of custody should extend to delivery into the aircraft, however there were no statements on how this would work in practice. Conversely, many respondents stated that it would not be possible to track the molecules into the aircraft.

One respondent suggested that the chain of custody should end at the fuel terminal from which individual airports are served, adding that any further stages of custody downstream of the terminal to the airport should be based and verified on transaction documentation such as logistics contracts or invoices.

Annual reporting

Consultation proposals

It was proposed a reporting requirement on all aviation fuel (SAF and conventional) would need to be introduced so that the obligation on aviation fuel suppliers can be calculated accurately. It is the Government's intention to ensure any additional reporting requirements minimises administrative burdens on aviation fuel suppliers, while ensuring information is collected timely so to allow a smooth and effective running of the scheme. The consultation welcomed views on what information should be reported on and what the reporting calendar should look like under the SAF mandate.

Question 36

Do you agree or disagree that obligated suppliers will need to report annually information on the aviation fuel supplied to the Department for Transport, regardless of whether they claim SAF credits?

Summary of responses

Total	Agree	Neither agree nor disagree	Disagree	Don't know
45	37	2	1	5

Those that agreed were supportive of increasing transparency as this would help to secure confidence in the scheme. It was noted that trust between industry and communities is often undermined by questionable accounting practices. Furthermore, the data reported could be valuable in monitoring policy implementation and development of the SAF market which in turn can be used to inform future policy decisions. Several airlines suggested that the information reported should be shared with end users (i.e. aircraft operators) to facilitate their claims for ETS, CORSIA and any other relevant international schemes and to show that the SAF has been consumed. It would also allow airlines to choose between suppliers based on quality of fuel. One airline noted that in other mandated markets it has been extremely difficult for airlines to obtain the correct sustainability data to enable the airlines to fully account for the SAF used.

A few respondents added that the reporting system is clear and minimises administrative burden on fuel suppliers. In particular, using a blockchain solution was outlined as a viable option. In practice, each unit of fuel produced can have a GHG tag attached to it which can share information automatically to DfT. If the date that the fuel is blended counts towards SAF credits rather than the date it is sold, it would remove unnecessary bureaucracy from holders of small volumes of fuel.

Finally, a trade association highlighted that alternative transport fuel volumes and densities are already reported to BEIS and HMRC.

Question 37

Do you have views on what information obligated fuel suppliers should report?

Summary of responses

A third of respondents stated that the lifecycle carbon intensity (as agreed per the calculation methodology) and/or the volume of SAF should be reported on. A few respondents suggested that the certifying body should be also reported on. For the volume of SAF, a few respondents suggested that suppliers should report on both SAF and conventional kerosene and a small number of respondents further suggested that this should be reported at each airport or pipeline location. Many respondents also stated that the origin of SAF and/or feedstocks used should be reported on. This could include the company, country and the supply chain delivering the feedstock. Other suggestions made by one or a small number of respondents included the point of delivery of SAF into the existing fuel infrastructure, technical standard that the SAF complies to, energy content, non-CO_2 emissions and lower heating value.

Several respondents recommended that a similar design to the RTFO reporting mechanism would be suitable, with a couple of respondents suggesting an aviation fuel equivalent of the GHG reporting regulations. One fuel producer suggested harmonising the reporting mechanism with CORSIA.

Question 38

Do you have views on the reporting calendar?

Summary of responses

Half of respondents stated that either suppliers should report on a monthly basis or the reporting timeline should align with that of the RTFO. A few of these suggested that it should be on a calendar year basis. Other suggestions were for reporting on a quarterly or annual basis but had limited support. One respondent recommended using blockchain to report on a real-time basis. Another respondent suggested that the reporting calendar should be in line with the Government financial year.

Many respondents suggested that the reporting timeline should consider the guidance claiming SAF under the UK ETS and CORSIA, which should allow for appropriate and timely verification and minimise administrative burden.

Submitting claims

Consultation proposals

Data to meet the proposed annual reporting obligations would be collected on top of the information SAF suppliers would need to submit to DfT to claim credits under the proposed SAF mandate. In most cases, it is expected that aviation fuel suppliers that supply SAF would meet the proposed reporting requirements through the information supplied in their

applications for credits throughout the year, without the need to submit a separate annual report.

It was proposed that aviation fuel suppliers can apply for credits how often they choose, at any time within the given reporting period. In line with the RTFO, it was proposed this information would need to be provided per administrative consignment. Once data is complete for one or more administrative consignments, SAF suppliers would be able to choose to apply for credits or hold data for a future application. Credits would be issued by DfT on a monthly cycle and it is expected a cut-off date could be in place.

Question 39

Do you have views on what the timescale for submitting claims and the information/evidence required by this process should be?

Summary of responses

Most respondents stated that there should be alignment with the RTFO in terms of the timescale for submitting claims and the information required. Similarly, a couple of respondents – a fuel producer and airline - suggested that submitting claims should be compatible with UK ETS, CORSIA or EU RED.

Excluding those that proposed alignment with other schemes, suggestions for the timescale for submitting claims included monthly, quarterly and five or six months after the compliance period ends. An NGO stated that claims should be submitted at the same time as SAF is supplied past the duty point. Only seven respondents provided comment on the timescale and there was no real consensus between them.

On the information required, the only comments concerned using independent verification or certification via CORSIA recognised voluntary schemes.

Voluntary schemes

Consultation proposals

It was proposed that obligated fuel suppliers would need to show that the SAF supplied meets the proposed SAF sustainability standards and would need to have their claim data independently verified before submitting an application for credits. The Government is minded to allow certifications from voluntary schemes that show the SAF supplied meets its prescribed sustainability criteria, following the feedstock or biofuel along the chain of custody.

It is not proposed that reliance on voluntary schemes would be mandatory, so that fuel producers can have flexibility to bring their preferred evidence to show compliance with the sustainability criteria. It would, however, be the SAF supplier’s responsibility to provide adequate information that can confirm the sustainability criteria have been met as deemed satisfactory by DfT.

Question 40

Should certification provided by voluntary schemes count as evidence of compliance with the sustainability criteria of the SAF mandate? If so, do you think this step should or should not be mandatory?

Summary of responses

Criteria	Total	Yes	No	Don't know
Count as evidence	46	31	4	11
Mandatory	30	12	14	4

Most respondents were in favour of using voluntary schemes as one method of providing evidence of compliance. The main support for voluntary schemes was that they serve as useful evidence for the impacts of land use and feedstocks on the environment and have been effective at demonstrating compliance in RTFO and EU RED. Other benefits noted by respondents included giving suppliers more certainty of compliance, enhanced transparency and increasing consumer awareness. One respondent suggested that independent certification schemes may help to address traceability challenges arising from the international aspect of aviation.

It was emphasised by several respondents that a list of voluntary schemes approved for use by DfT (or industry) should be specified and audited regularly. It was suggested that voluntary schemes should be assessed on their alignment with the mass balance approach, technical standard and reliability. Given that other schemes already use voluntary schemes, allowing the use of existing voluntary schemes could help to reduce complexity for SAF producers and ensure the availability of the SAF volumes for the UK market. Several respondents referred to RSB voluntary standards and one trade association suggested ISCC.

Those that were against the use of voluntary schemes as evidence of compliance expressed caution of industry certification and suggested that an authorised central scheme provider that regulates all activity should be used instead.

In terms of whether this step should be mandatory, responses were more divided. Those in favour of making this step mandatory – mostly fuel producers – argued that it provides full transparency, verification of traceability and assists in end to end auditing. Those that did not think voluntary schemes should be mandatory included trade associations, fuel producers and an airline. They felt that fuel producers should be given the opportunity to submit evidence via alternative methods should they choose to, providing it is adequately robust and auditable. One trade association noted that in their experience with existing voluntary schemes the approval process (by the European Commission) has been slow and schemes are assessed at different rates. Some respondents also noted that this approach is consistent with other schemes, such as the RTFO.

Question 41

What information should the obligated party provide, either through verifiers or other means, to demonstrate compliance with the sustainability criteria?

Summary of responses

Broadly speaking, there are three areas of information that stakeholders proposed should be provided for verification in line with what was set out in the consultation:

- The carbon intensity of the fuel to evidence that the obligation has been met
- The list of feedstocks to ensure they are in line with those used to produce the SAF are included in the list of eligible feedstocks
- That the land criteria set out in the mandate has been met

Respondents also emphasised the importance of traceability to ensure materials can be traced across the entire supply chain and the integrity of sustainability claims can be verified. One respondent added that utilising a block chain solution would facilitate traceability. Other suggestions for information to be provided included production pathways, blend, mass or volume of SAF and feedstock origin. Others simply suggested that the information provided is in line with the other schemes such as the RTFO, EU RED, CORSIA and UK ETS. Some respondents highlighted that suppliers could provide documents given to them under approved voluntary schemes.

Verification

Consultation proposals

On top of the proof of sustainability supplied by a voluntary scheme or the provision of evidence deemed acceptable by DfT, it was proposed that independent verification or assurance is also needed for fuel suppliers submitting claims under the SAF mandate.

Under the RTFO, this needs to be conducted by a qualified and competent party in line with the International Standard on Assurance Engagements (ISAE 3000, Revised) to at least the ‘limited’ assurance level defined by this (or another equivalent) standard. We welcomed views on whether verification should be conducted to a ‘reasonable’ assurance, which already happens in some circumstances under the RTFO.

Question 42

Do you agree or disagree that claims for credits under the SAF mandate should be verified? If so, should these be verified to a 'limited' or 'reasonable' assurance?

Summary of responses

Total	Agree	Neither agree nor disagree	Disagree	Don't know
43	33	6	0	4

Most respondents agree that claims for credits should be verified with the main argument that it stops fuel suppliers manipulating or abusing the mandate and thus ensures that all maintains credibility of the scheme. However, one fuel producer suggested that the voluntary scheme audit will give sufficient assurance of sustainability.

In terms of how the verification works in practice, several respondents drew comparisons with verifiers from other schemes, such as the RTFO and ETS, or suggested that any verifier should be part of a DfT approved list. A couple of respondents recommended that DfT takes into consideration the additional administrative burden that this would place on fuel suppliers. A fuel producer noted that it is imperative that international fuel suppliers must be held to the same standards as those based in the UK.

Total	Limited assurance	Reasonable assurance
25	12	13

Those that stated a preference for limited assurance argued that a reasonable assurance would add unnecessary cost to the verification of feedstocks and fuels and that a limited assurance consistent with RTFO is appropriate given the success of the policy. However, a consultancy argued that a reasonable level of assurance would ensure maximum traceability while two airlines called for consistency with ETS emissions reporting, for which they have to provide a reasonable level of assurance.

Statistical releases and market information

Consultation proposals

DfT regularly releases reports with key information provided under the GHG Reporting Regulations and the RTFO. This information includes, for instance, the sustainability characteristics of biofuels supplied under the RTFO, the proportion of the different types of fuel supplied, the average carbon emission savings. This data is typically aggregated or presented for each fuel suppliers depending on the statistical release. The Government is keen to continue to provide transparent access to information collected as part of the proposed SAF mandate, where this information is not commercially sensitive. The consultation welcomed views on what information should be ideally released and when this should be best published.

Question 43

What data related to the SAF mandate should DfT make publicly available? How often should this information be published?

Summary of responses

Many respondents suggested that three broad areas of information should be published:

- Volume of fuel supplied – it was further suggested that this could be disaggregated by conventional aviation fuel and SAF, domestic and imported SAF or by each obligated supplier.
- Emissions – this was suggested to be published as one or more of average carbon emissions per tonne of fuel and level of fulfilment of mandate, total carbon emissions for aviation fuel in the UK or total carbon mitigated. A consultancy also suggested to report on particulate emissions relative to conventional kerosene.
- Sustainability characteristics of fuel – this included type of SAF (e.g. RCFs and RFNBOs), country of origin, production pathway and feedstocks used.

In addition to this, several respondents requested that fuel supplier activity should be made publicly available. That is, the exercise of buy-outs and credits claimed for each supplier. Similarly, one respondent stated that tankering activity by airline should be published. At the same time, several respondents urged DfT to protect commercial sensitivities by avoiding publishing data attributed to specific fuel suppliers or airlines or by aggregating data by type or size of organisation.

A third of respondents referred to the data published on the RTFO stating that it has an appropriate level of detail whilst protecting commercial sensitivities. Other comments recognised the advantages of publishing such data including upholding transparency, supporting industry in monitoring and reaching targets and increasing consumer confidence.

In terms of how often this data should be published, nine respondents said that data should be published quarterly including six that suggested adopting the RTFO timescales. Six other respondents suggested published data annually while one respondent said that data should be published as close to real-time as possible.

Glossary

1G Biofuels	First generation biofuels
2G Biofuels	Second generation biofuels
ASTM	American Society for Testing and Materials
ATI	Aerospace Technology Institute
AtJ	Alcohol-to-Jet
Avgas	Aviation gasoline
Avtur	Aviation turbine fuel
CCUS	Carbon capture, utilisation and storage
CfD	Contracts for Difference
CI	Carbon intensity
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
DAC	Direct air capture
DEF STAN	Defence Standard
ETS	Emissions Trading Scheme
FEED	Front end engineering design
GFGS	Green Fuels, Green Skies
GHG	Greenhouse gas
HEFA	Hydroprocessed Esters and Fatty Acids
HVO	Hydrotreated Vegetable Oil
ICAO	International Civil Aviation Organization
ILUC	Indirect land use change
MSW	Municipal solid waste
OEM	Original equipment manufacturer
PtL	Power-to-Liquid
RCF	Recycled carbon fuel
RFNBO	Renewable fuel of non-biological origin
RTFO	Renewable Transport Fuel Obligation
SAF	Sustainable aviation fuel
TRL	Technology readiness level