February 17, 2023

Office of Associate Chief Counsel
(Passthroughs and Special Industries)
U.S. Department of the Treasury

Submitted electronically via the Federal eRulemaking Portal

RE: Sustainable Aviation Fuel Credit, Request for Public Comments, Notice 2023-06.

These comments are submitted by the Environmental Defense Fund (EDF). Representing over 3 million members and supporters nationwide, EDF has been actively pursuing solutions to global climate change for over 30 years. This includes nearly a decade of redoubled efforts concentrated on aviation's share of harmful pollution, with a vision to mitigate climate change and deliver public health benefits by means of alternative fuels.

EDF welcomes the opportunity to provide comments on the Treasury's implementation of the Sustainable Aviation Fuel Credit § 40B of the Internal Revenue Code under the Inflation Reduction Act (IRA) of 2022. Over the past decade, EDF has been highly engaged in climate policy at the International Civil Aviation Organization (ICAO), leading and participating in expert working groups developing ICAO's Sustainability Framework for SAF – an effort that builds heavily on United States programs as well as other programs from other parts of the world. In parallel, EDF has also been highly engaged in efforts at the United States Congress with regards to all SAF related tax credits included in the IRA.[1]

The comments below offer several recommendations for the Treasury Department to consider in its efforts to implement and maximize the tax credits' benefits in sustainably mitigating greenhouse gas (GHG) emissions. Our comments are intended as a set of recommendations to ensure a no-regrets and future-proof SAF sustainability framework that help advance the decarbonization of aviation. We focus our responses in this letter on the § 40B SAF tax credit and the areas in which the Treasury requests input. Our feedback here echoes and refine many of the same themes submitted in an earlier set of comments on December 3, 2022 regarding §45Z.

We would be glad to clarify or elaborate on any points made in the above below. If there are any questions, Treasury Department staff can feel free to contact Dr. Pedro Piris-Cabezas (ppiris@edf.org), Senior Director, Global Transportation and Lead Senior Economist.

Harmonization of domestic and global visions

Given the current window of opportunity to refine and improve the eligibility to the SAF credits under Section 40B(e)(2) for the so-called domestic approach, we urge the Treasury to set standards for SAF that ensure harmonization and high integrity, providing safe-harbor interpretations for both the lifecycle GHG emissions methodology under Section 40B(e)(2) and the third-party certification requirements under Section 40B(f)(2)(A)(ii).

[1] https://downloads.regulations.gov/IRS-2022-0029-0141/attachment_1.pdf

Precautions in CORSIA, Treasury guidance, and similar policies serve to constrain SAF eligibility to only those pathways that are truly sustainable and deliver climate and public health benefits. Crucially, the Treasury defines SAF as contingent upon a robust set of sustainability criteria, as differentiated from the more generic term "alternative jet fuels."

Treasury should seize the opportunity to design the SAF Sustainability Framework as the model example for other national-level or state-level regulations to follow, in the spirit of realizing the following global aims: (1) Significantly reduce greenhouse gas emissions compared to fossil jet fuel on a lifecycle basis; (2) Protect ecosystems and natural resources whose value lies beyond the scope of quantitative emissions figures; (3) Prevent risks to human rights, food security, or local economies; and (4) Promote achievement of other United Nations Sustainable Development Goals.

At this juncture, the Treasury can take the reins in constructing a domestic SAF Sustainability Framework as a model example for other national-level or state-level regulations to follow, and in so doing further bolster the United States' track record of leadership at ICAO.

The Treasury's principal questions imply a well-founded interest in validating some of the already existing progress by independent US stakeholders to develop homegrown MRV and certification structures. That said, these potential protocols exist in scattered formats with assorted levels of rigor.

The allowances for "any similar methodology" in provisions 40B(e)(2) and 40B(f)(2)(A)(ii) present an especially advantageous platform for the Treasury to lay down cornerstones defining adequately similar and environmentally sound methodologies applied in a broad range of contexts, from tax credits to other programs. EDF's responses therefore underscore fundamental elements for such an environmentally sound framework that encompass GHG emissions accounting and broader sustainability concerns, referencing ICAO text and adding refined interpretation that would uphold cohesion during the translation of frameworks into practice.

In crafting guidance for § 40B as an economic instrument, the Treasury needs to consider the full array of environmental and social outcomes associated with SAF production. The decisions we make now must secure a vital earth for all – including those beyond "domestic production" system boundaries. To establish an environmentally sound, level playing field across SAF production pathways, sine-qua-non conditions include robust monitoring, verification, and reporting (MRV) architecture that appropriately captures the ecologically and globally entangled challenges posed by crop-based biofuels.

The rest of our comments and recommendations organized under each numbered question provide more technical insights on these issues. First, we provide responses to the specific questions provided in Notice 2023-06, Section 8.02. Second, we provide additional general comments and recommendations related to the SAF tax credits, as requested in Section 8.01 of the same Notice.

.02 Comments on specific questions (except for questions 3 to 6 on FT co-processing)

(2) ***Section 40B(e)(2) provides that "any similar methodology, which satisfies the criteria under § 211(o)(1)(H) of the Clean Air Act (42 U.S.C.***

7545(o)(1)(H)), as in effect on the date of enactment of this section" may be used to determine the reduction in lifecycle greenhouse gas emissions.

a. What methods exist that could qualify as a "similar methodology"?

It is imperative for the Treasury to ensure that "any similar lifecycle methodology [to ICAO CORSIA]" for estimating compliance with the 50% reduction and determining the amount of the SAF tax credit neither undermine nor fail to meet the level of protection CORSIA methodology guarantees. The need for similarity is rooted in the need to ensure consistency and compatibility between the methodologies in Section 40B(e)(1) and (2). In the absence of similarity, it might be possible to extract SAF tax credits twice for the same reductions by defining incompatible lifecycle system boundaries. Likewise, absence of similarity could leave open loopholes for gaming the lifecycle assessment to meet the 50% reduction by claiming credits outside the appropriate system boundaries, e.g., emissions reductions belonging to a different production pathway that taps as feedstock a co-product the main pathway under examination.

The definition of lifecycle GHG emissions under § 211(o)(1)(H) of the Clean Air Act (42 U.S.C. 7545(o)(1)(H))[2] is broad enough for the Treasury Department to accommodate an alternative lifecycle methodology for as long as it is consistent with the applying criteria as determined by the Environmental Protection Agency (EPA) and that were in effect on the date of enactment of this section in 2022 The conditional in that statement merits emphasis: not all lifecycle emissions claims and methodological choices are consistent with the criteria applicable under the Renewable Fuel Standard (RFS)[3].

For instance, the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model developed by the Argonne National Laboratory has a number of modules for estimating effects of various land management change options at the individual farm level that could, in theory, reduce the nominal carbon intensity of certain biogenic SAF production pathways. Some of these farm level improvements that reduce fertilizer and agrochemical use have a real physical basis aligning with the criteria previously determined by EPA for estimating lifecycle GHG emissions. However, many others of these credits involve carbon sequestration claims incompatible with aforementioned criteria, which focus on GHG emissions.

GREET itself is an analytical tool, not to be confused with a methodology. GREET provides a flexible, multi-parameter lifecycle assessment (LCA) platform that users can tune to their respective purposes and contexts. Given this versatility, GREET could be easily parametrized to meet the conditions named in Section 40B(e)(2). This can be done in a way that is consistent and compatible with the method under Section 40B(e)(1) to avoid, e.g., diverging co-product methods –which can be subjective and affect the LCA results significantly— or using incompatible land use change emissions factors or amortization periods at odds with from those used in Section 40B(e)(1) by ICAO. As such, offering GREET as an approved LCA suggestion must also be accompanied by specific restrictions on/ indications for the user's input assumptions and dataset

---

[2] "The term "lifecycle greenhouse gas emissions" means the aggregate quantity of greenhouse gas emissions (including direct emissions and significant indirect emissions such as significant emissions from land use changes), as determined by the Administrator, related to the full fuel lifecycle, including all stages of fuel and feedstock production and distribution, from feedstock generation or extraction through the distribution and delivery and use of the finished fuel to the ultimate consumer, where the mass values for all greenhouse gases are adjusted to account for their relative global warming potential."
https://www.law.cornell.edu/uscode/text/42/7545
[3] See the Regulatory Impact Analysis for RFS2,
https://nepis.epa.gov/Exe/ZyPDF.cgi/P1006DXP.PDF?Dockey=P1006DXP.PDF

choices to ensure compatibility with both the criteria informing Section 40B(e)(1) by ICAO and those determined by the EPA under the RFS.

The necessary guidance can be distilled from two documents describing the LCA methodology applicable in Section 40B(e)(1):

- The ICAO document with the actual lifecycle emissions methodology,[4] which describes, inter alia, the applicable system boundaries, co-product allocation method for upstream emissions, and how to handle wastes, residues, and by-products. Some sections of the methodology such as those pertaining to the emissions credits such as the (i) landfill emission credit and similar approaches, (ii) carbon capture and storage of process emissions or the removals under the direct land use change methodology are inapplicable as these appear to be incompatible with the criteria applicable to the lifecycle GHG emissions methodology under § 211(o)(1)(H) of the Clean Air Act (42 U.S.C. 7545(o)(1)(H)).
- The ICAO document with the sustainability criteria, which includes critical safeguards that directly affect the form and steps in the LCA methodology. These determine (1) sustainable harvesting rates for agriculture residues such as corn stover, and (2) direct land use change (dLUC) emissions for land use conversion happening after 2007 to ensure that the modelled induced land use change (ILUC) values are representative.

Important to note, in the case of the ICAO methodology under Section 40B(e)(1), compliance with the sustainability criteria is integral to Section 40B(f)(2)(A)(i) concerning general requirements, supply chain traceability requirements, and information requirements. In other words, these two pieces cannot be treated in isolation. Therefore, any similar methodology under Section 40B(e)(2) would need to ensure that it applies a coherent set of requirements under Section 40B(f)(2)(A)(ii) as well.

b. *Do the lifecycle emissions values that have been developed by the Environmental Protection Agency for the Renewable Fuel Standard qualify as a "similar methodology"?*

The lifecycle emissions values developed by EPA for RFS do not qualify as a similar methodology. This is mostly driven by fundamental differences regarding the "general requirements, supply chain traceability requirements, and information requirements" established in Section 40B(f)(2)(A)(i) for the methodology under Section 40B(e)(1). As noted above, these include critical eligibility requirements that determine both the sustainability of the claims and the lifecycle emissions. These are beyond the scope of the RFS, meaning the RFS values list does not capture the essential features that would be consistent with the SAF tax credit's performance-based approach. Besides, the lifecycle emissions values developed by EPA are limited in coverage, excluding non-biogenic SAF pathways. As a result, it would constrain the eligibility of SAF pathways to only biogenic pathways and undermine the technology neutrality enshrined in the definition of SAF under Section 40B.

c. *Does the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model developed by the Argonne National Laboratory qualify as a "similar methodology"?*

[4] See https://www.icao.int/environmental-protection/CORSIA/Documents/ICAO document 07 - Methodology for Actual Life Cycle Emissions.pdf

As noted above, the GREET model is an analytical tool that provides a lifecycle assessment (LCA) platform, and as such could qualify as a similar methodology provided guidance is available. Such guidance is critical because the co-existence of multiple methodologies could result, inter alia, in diverging estimates for a single SAF pathway or double claiming of GHG emissions reductions. For instance, the options in the GREET Aviation module span an assorted set of conflicting methodologies for accounting for land use change (LUC) emissions. As such, it can either use induced LUC values consistent with those adopted for methodologies in Section 40B(e)(1) (i.e., ICAO CORSIA), or the aggregate of domestic and international LUC values estimated using the Carbon Calculator for Land Use and Land Management Change from Biofuels Production (CCLUB).

The estimates resulting from CCLUB are an entire order of magnitude apart of the ILUC values applicable under Section 40B(e)(1) and fail to provide critical safeguards against dLUC emissions or account for foregone carbon sequestration. And this before accounting for additional optional measures to claim emissions reductions from non-permanent soil organic carbon (SOC) enhancements through individual cultivation practices, such as tillage practices, the introduction of cover crops (such as rye during corn's off-season), or animal manure. Because the carbon sequestration from those cultivation practices is temporary, crediting them is inconsistent with the principles that need to govern a performance-based approach as that enshrined in the SAF tax credit. Indeed, rewarding SOC sequestration remains an uncertain approach to climate change mitigation due to reversal risk and the uncertainties of accurately detecting carbon stock change over time. For SOC sequestration to become a valid strategy, a credible, cost-effective, and consistent MRV system is essential for building trust and confidence in the credits generated.[5]

A decade ago, ANL's CCLUB model included emissions factors that considered changes in soil carbon sequestration due to changes in land cover, an important development, because changes in land cover could modify the soil organic content.[6] While there have been some improvements in that module the rest of CCLUB appears frozen in time, using emissions factors from 2010 and 2009 and a modeling exercise from an old version of GTAP. That 2013 GTAP version simulates domestic and international areas of land conversion for a market demand shock unrelated to SAF. As a result, it appears to strongly underestimate ILUC emissions. In contrast, the ILUC modeling approach developed in the context of ICAO provide a more robust result driven by scrutinized model enhancements and runs. The ICAO approach builds on both GTAP-BIO (with global AEZ('s) emissions factors as opposed to the mismatching emissions factors used in CCLUB) and GLOBIOM (with emissions factors embedded within the model). Both models incorporate and refine ANL's CCLUB key features for SOC for cellulosic ethanol and in the case of GLOBIOM also for corn. Furthermore, the ICAO approach explicitly evaluates the land use change impacts of SAF expansions or shocks for the estimated SAF production projected in 2035, where each of the SAF pathways evaluated has a share of the total shock to ensure consistency of assumptions and capture critical interactions. CCLUB does not have this embedded consistency feature, but rather considers a 2013 GTAP model run for ground transportation focused on the United States, and that allows for using outdated emissions factors from 2011 and 2013 for estimating the international LUC emissions. Using GREET-CCLUB to generate SOC credits would lead to double counting SOC benefits already accounted for in the ICAO ILUC values and

---

5 For a detailed overview of the need for caution and high integrity see Oldfield, E.E., A.J. Eagle, R.L Rubin, J. Rudek, J. Sanderman, D.R. Gordon. 2021. Agricultural soil carbon credits: Making sense of protocols for carbon sequestration and net greenhouse gas removals. Environmental Defense Fund, New York, New York. edf.org/sites/default/files/content/agricultural-soil-carbon-credits-protocol- synthesis.pdf.

6 Taheripour, F., Tyner, W.E., 2013, *Induced Land Use Emissions due to First and Second Generation Biofuels and Uncertainty in Land Use Emission Factors*, Economics Research International 2013, 12.

generate a dangerous loophole for gaming the lifecycle assessment to meet the 50% reduction and maximize the amount of the SAF tax credit without any environmental benefits.

In light of the above, the Treasury should provide guidance to ensure that only the ICAO ILUC approach is used for the purpose of Section 40B(e)(2). Still, as noted in the general comments, the ILUC values should only be used to identify feedstocks with ILUC risk, not to propagate through the LCA tabulation and, in so doing, imply acceptance of ILUC-related harms when balanced out by emissions savings elsewhere in the summation. Instead, such risks should be materially mitigated to prevent adverse ripple effects on ecosystems and communities.

(6) Section 40B(f)(2)(A)(ii) (concerning general requirements, supply chain traceability requirements, and information requirements established under CORSIA) provides that in the case of any methodology established under § 40B(e)(2) (concerning any similar methodology, which satisfies the criteria § 211(o)(1)(H) of the Clean Air Act (42 U.S.C. 7545(o)(1)(H))), requirements similar to the requirements described in section 40B(e)(1) apply. What CORSIA requirements are needed to ensure supply chain traceability of information related to lifecycle greenhouse gas emissions and what unrelated party or parties are qualified to demonstrate compliance?

The reference to "any general requirements, supply chain traceability requirements, and information transmission requirements established under ICAO CORSIA" in 45Z (f)(1) refers to requirements in ICAO Document "CORSIA Eligibility Framework and Requirements for Sustainability Certification Schemes". "[A]ny general requirements, supply chain traceability requirements, and information transmission requirements established under ICAO CORSIA" include all the requirements in Tables 2, 3 and 4 of that ICAO Document, including the CORSIA sustainability criteria specified in ICAO Document "CORSIA Sustainability Criteria for CORSIA Eligible Fuels". All these requirements are applicable to all economic operators along the SAF supply chain both in the U.S. and abroad to ensure supply chain traceability and sustainability. Crucially, these requirements encapsulate critical components of the lifecycle methodology that are not captured in the default lifecycle values. In the absence of these requirements, clean fuel producers could wrongly claim greater SAF tax credits than they deserve – in other words, reap the rewards without meeting the minimum requirements.

ICAO's SAF certification program provides a full-fledged monitoring, reporting and verification system including a high level of assurance. Such a full-fledged system is indispensable for the successful execution of a performance-based system such as the SAF tax credits.

ICAO's approach is the most comprehensive SAF Framework adopted to date as it ensures full supply-chain traceability and compliance with crucial sustainability criteria. This is essential to safeguard against direct and indirect negative effects on ecosystems and communities that are not captured or are underestimated by the lifecycle assessment approach and to promote sustainable development. The sustainability criteria cover 12 themes that encompass the three pillars of sustainability: social, environmental, economic. For each theme, the text outlines a set of criteria capturing the binding provisions pertaining to emissions reductions, carbon hotspots, water, soil, air, conservation, waste and chemicals, human and labor rights, land use rights and land use, water use rights, local and social development, and food security. To be eligible under ICAO's CORSIA to generate emissions reduction credits for compliance purposes, SAF must meet all the sustainability criteria.

CORSIA's sustainability criteria for SAF take a robust and equitable approach, placing environmental and social safeguards on the production of SAF across its entire supply chain. It also provides a harmonized approach to ensure that air carriers using SAF across the world strive for these same values of climate ambition, environmental integrity, human rights, and social equity.

Adopting measures to verify that the negative environmental and social consequences of certain feedstocks are properly addressed throughout the value chain would also ensure a level playing field between alternative fuel pathways. To ensure proper implementation and interpretation of the certification requirements in a domestic U.S. performance standard context, the Treasury should require, with documentation, that any tax-credited SAF complies with ICAO's Sustainability Criteria for CORSIA SAF and other relevant traceability requirements.

The ICAO sustainability framework works as an umbrella standard that relies on ICAO-approved independent Sustainability Certification Schemes (SCS) for its implementation. These organizations define the sustainability certification requirements including the indicators and metrics to evaluate compliance with the criteria, set the requirements for certification bodies, auditors and accreditation bodies, and monitor the effectiveness of the assurance system. To become ICAO-approved SCS must undergo a thorough evaluation process and meet a comprehensive set of requirements in line with ICAO's eligibility framework and requirements for SCS.

The ICAO umbrella standard approach and the SCS application[7] and evaluation procedure model provide a convenient springboard for the Treasury to easily implement a similar or enhanced framework including its own eligibility framework for SCS under § 40B independently of ICAO's.

(7) Section 40B(c)(4) requires that the transfer of the qualified mixture into an aircraft occur in the United States. What types of verification exist to show that the qualified mixture is transferred to the fuel tank of an aircraft in the United States?

There are two main options. First, in the case of mass-balance traceability ending at the blending point, consider that all SAF blended in the United States is transferred to a fuel tank of an aircraft in the United States. This option requires two cross-checks: (a) the SAF-fossil jet fuel blend is not exported together with the proof of sustainability, and (b) SAF blended is not claimed by an end-user other than an air carrier. Second, alternatively, Treasury could request that the mass-balance traceability be expanded beyond the blending point, all the way to the airport fuel farm. In both cases the SCS should play a critical role collecting and reporting information to the Treasury. To that end the Treasury should provide detailed guidance on the necessary information. These approaches build on existing requirements for SCS in the ICAO framework and are compatible with the ICAO CORSIA SAF framework.

.01 <u>General comments</u>:

The Treasury and the IRS request comments on whether any issues related to the SAF credit provided in the notice in reference and require clarification or additional guidance.

[7] The SCS application form is available at: https://www.icao.int/environmental-protection/CORSIA/Documents/SCS-Evaluation/SCS_Application_Form-Version2(May2021).xlsx

We focus here on practical actionable instruments to ensure the Treasury and IRS can deliver a high-integrity SAF sustainability framework within the short timeframes available for developing guidance. First, we unfold detailed guidance necessary to prevent the negative environmental and social consequences of certain feedstocks that result in indirect land use change emissions. Second, we provide additional guidance to ensure high integrity of SAF claims.

1) *Guidance to prevent the negative environmental and social consequences of certain feedstocks that result in indirect land use change emissions*

It is crucial for a successful decarbonization of aviation that a robust methodology is applied to avoid unintended consequences on ecosystems and communities and undermining emissions reduction targets. Relying on first-generation biofuels to rapidly develop the SAF market would be misguided, counterproductive, and would create an expensive and risky distraction from long-term aviation decarbonization.

Without proper safeguards, those biofuels could trigger substantial land-use impacts and food price inflation that affect the most vulnerable populations around the world, and disadvantage U.S. industry in new markets for low-carbon aircraft and hydrogen-based fuels such as e-fuels. The technologies used to produce first-generation biofuels simply do not provide a technological steppingstone to the critical biofuels and e-fuels necessary to drive deeper decarbonization.

EDF would like to highlight that the existing approach – which involves estimating and accounting for greenhouse gas (GHG) emissions from indirect land-use change (ILUC) emissions – should evolve as quickly as possible into an approach that factors in the need to avoid unintended consequences on ecosystems, livelihoods, and communities to ensure the sustainability of SAF. This implies both identifying feedstocks with ILUC risk and then implementing measures to mitigate such risk. As the risk of ILUC concerns feedstocks beyond only the land-based portfolio, Treasury should ensure that all feedstocks used to produce biofuels have low ILUC risk to ensure their sustainability. Particular attention is warranted here because ILUC can not only cancel out emissions reductions but also undermine the purpose of the sustainability certifications.

The modeling approach for estimating default ILUC emissions for ICAO CORSIA or GREET incorporates the following three main market-mediated responses: (i) new agricultural land, (ii) yield increases, and (iii) reduced food and feed demand (including reduced food consumption). Therefore, the default ILUC values represent a theoretical estimation of the GHG emissions from new agricultural land – including from deforestation –needed to meet residual feedstock demand after considering (1) the amount of feedstock demand that would be satisfied by means of yield increases, and (2) the reduction in feedstock demand resulting from higher food and feed prices.

While ICAO CORSIA approach adequately identifies feedstocks with ILUC risk, it does not adequately account for the subsequent chain of consequences such as biodiversity loss, or the hunger, food insecurity and malnutrition that higher feedstocks prices could cause. Accounting for the GHG emissions derived from ILUC alone while ignoring the broader environmental and social impacts is not consistent with the sustainability principles that should guide action.

Important to note, these market-mediated responses do not necessarily take place at the domestic scale. In most cases, they take place at the global scale. For instance, diverting food and feed crops in the United States to produce bioenergy could result in (a) forest land being destroyed in the Amazon Rainforest to make up for the reduced food supply in the United States and/or (b) food staples price surges that bring hunger and malnutrition across vulnerable communities in Central America, which could eventually become a driver for forced migration.

Safeguards exist to minimize the risk of ILUC under the ICAO SAF regulation and subsequently also under that of the IRA. In this context, land-based fuel producers –including food and feed fuel producers— have the option to implement measures covered under the low ILUC risk practice module (see Section 5 in ICAO document "CORSIA Methodology for Calculating Actual Life Cycle Emissions Values") [8] to prevent ILUC and, consequently, claim zero ILUC values. This approach is a key component to the risk-based approach to LUC in the SAF lifecycle emissions methodology.

The Treasury should ensure that any such claims are based on a robust implementation of the low LUC risk methodology (to ensure, e.g., that the counterfactual scenarios are representative of reality) and that only new practices are granted zero ILUC values. This can be achieved by recognizing RSB's ground-breaking Low ILUC Risk Biomass Criteria and Compliance Indicators.[9] Further guidance on how to implement this approach with integrity can be found in EDF's High-Integrity SAF Handbook[10] (see Appendix D.1 of EDF's high-integrity SAF Handbook for a detailed description).

While the combination of the language in the IRA and ICAO's CORSIA SAF framework noted above include the critical guardrails to prevent the deployment of unsustainable aviation fuels, significant guidance is necessary to ensure proper implementation and interpretation. Therefore, Treasury should provide the additional guidance and/or eligibility requirements that aim to:

i. *Ensure that land-based feedstocks that cause or contribute indirectly to the loss of natural habitats, including forests, grassland, or wetlands, are not eligible for generating RINs.*

- Feedstocks with a significant induced land-use change (ILUC) risk should not be entitled to generate tax credits unless measures are adopted to reduce that risk. As noted above, the ICAO CORSIA SAF framework already has operational methodologies to recognize robust land management practices that reduce the risk of ILUC. Only land-based feedstocks that comply with them should be entitled to generate SAF tax credits.
- The 50% reduction threshold in lifecycle GHG emissions in the IRA was intended to prevent eligibility of those pathways that pose a high risk for ecosystems and vulnerable communities. Therefore, any attempt to reduce lifecycle emissions by means of, e.g., avoided emissions, carbon capture and storage or removal credits to compensate for ILUC GHG emissions and meet the 50% reduction threshold is at odds with the need to prevent negative impacts on ecosystems and vulnerable communities and should not be allowed.
- Perennial energy crops with default negative ILUC values (net carbon sequestration) rely on the assumption that such feedstocks have been grown on marginal land. Fuel producers would need to demonstrate compliance with that assumption using ICAO CORSIA methodology for demonstrating low land use change risk. Then, for estimating the carbon sequestration, fuel producers would need to follow the direct land use change methodology in ICAO document "CORSIA Methodology for Calculating Actual Life Cycle Emissions Values".[11] No soil organic carbon sequestration (SOC) nor biomass

[8] https://www.icao.int/environmental-protection/CORSIA/Documents/ICAO document 07 - Methodology for Actual Life Cycle Emissions.pdf
[9] https://rsb.org/wp-content/uploads/2018/05/RSB-STD-04-001-ver-0.3-RSB-Low-iLUC-Criteria-Indicators.pdf
[10] https://www.edf.org/sites/default/files/2022-08/EDF HIGH-INTEGRITY SAF HANDBOOK.pdf
[11] Ibid.

sequestration should be recognized until a robust methodology has been developed and approved.

- Similarly, perennial energy crops such as sugarcane with default positive ILUC values (net carbon release) should not use SOC and biomass sequestration to compensate ILUC emissions from, e.g., indirect forest and pastureland conversion, and thereby meet the 50% lifecycle emissions goal. As a general rule, the estimated SOC and biomass sequestration credit needs to be subtracted from the default ILUC values applicable to such perennial energy crops in accordance to the breakdown of the ILUC value estimates available in ICAO supporting document "CORSIA Eligible Fuels – Life Cycle Assessment Methodology".[12] But as noted above, feedstocks with a significant induced land-use change risk should not be entitled to generate RINs unless measures are adopted to reduce that risk. If that is the case, fuel producers need to follow the direct land use change methodology for estimating any carbon sequestration credit. However, no SOC sequestration nor biomass sequestration should be recognized until a robust methodology has been developed and approved.

ii. *Ensure that feedstocks that are entitled to claim zero ILUC values such as used cooking oil and tallow do not contribute indirectly to the loss of ecosystems, food insecurity, malnutrition and hunger.*

- The ICAO CORSIA SAF framework assumes that these feedstocks have zero ILUC emissions. Therefore, to claim zero ILUC values, SAF producers would need to demonstrate that their feedstocks are entitled to claim zero ILUC values through certification. For example, in a mixture of edible tallow and inedible tallow traditionally used for energy purposes, only the inedible fraction should be entitled to claim zero ILUC values. The ICAO CORSIA methodology is subject to interpretation on this matter and EPA should provide clear guidance on eligibility requirements. Where a fuel producer claims zero ILUC values, the producer should prove that claim by demonstrating compliance with RSB's low ILUC Risk Biomass Criteria (RSB-STD-04-001) or equivalent. When a fuel producer cannot demonstrate low displacement emissions other than from ILUC, the fuel producer should estimate and add the displacement emissions[13] to the life-cycle value. For estimating these displacement emissions, fuel producers should use RSB's Methodology for Displacement Emissions (RSB-STD-04-002)[14] or equivalent. Where a feedstock is shown to have ILUC risk, it should be automatically ineligible.

2) *Additional guidance to ensure high integrity of SAF claims*

It is crucial for a successful decarbonization of aviation to avoid granting RINs for supposed reductions inconsistent with United Nations Framework Convention on Climate Change (UNFCCC)'s Paris Agreement reporting and accounting framework. Such questionable "reductions" could undermine the integrity of the RINs and create an expensive distraction from long-term aviation decarbonization. To that end, EPA should provide additional guidance or eligibility requirements that aim to:

---

[12] https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA_Eligible_Fuels/CORSIA_Supporting_Document_CORSIA Eligible Fuels_LCA_Methodology_V5.pdf

[13] Not all displacements result in displacement emissions, e.g., when the displacement occurs in a sector that is covered under a cap-and-trade system.

[14] RSB Methodology for Displacement Emissions (2018) available at: https://rsb.org/wp-content/uploads/2018/12/18-12-13_RSB-STD_04-002-Methodology-for-displacement-effects.pdf

i. *Ensure that tax credits are only generated for SAF that effectively contributes to reduce emissions in a manner consistent with United Nations Framework Convention on Climate Change (UNFCCC)'s Paris Agreement reporting and accounting framework.*

- To ensure integrity, the Treasury should exclude emissions credits such as landfill emissions credits (LEC) from municipal solid waste (MSW) based SAF pathways from being embedded in the lifecycle emissions value. ICAO's LEC methodology assumes emissions as a function of a 100-year life-cycle business as usual scenario that is not re-evaluated to match real world evolving conditions, granting emissions reductions that would only have happened –if at all— over the 100 years after MSW-based SAF use. See Appendix D.2 of EDF's high-integrity SAF Handbook[15] for a detailed description.

ii. *Ensure that SAF pathways involving large quantities of natural gas properly capture representative regional or local upstream methane emissions in the lifecycle emissions rates.*

- There are several SAF production pathways that involve large quantities of natural gas being used as process energy (see for instance the corn-based ethanol to jet pathway for which the process energy from natural gas amounts to around 60% of the bioenergy in the jet fuel) and/or as a feedstock for hydrogen production. While large quantities of natural gas use result in large lifecycle emissions, some SAF producers are envisioning using CCS to address them and stay competitive. However, SAF with significant natural gas input are also subject to upstream emissions: methane leaks from venting, flaring and fugitive emissions from natural gas production. Upstream emission estimates derived from data reported in inventories and used for lifecycle analyses have traditionally led to significant underestimation of total emissions from the oil and gas sector, with the greatest divergence in the production segment.[16] A large body of peer-reviewed literature has documented this failure to fully capture methane emissions, primarily attributing the divergence to the failure to account for intermittent, large emission events. Over the last decade, research by EDF and others has quantified the significance of methane emissions caused by oil and gas production and the persistent underestimation of fugitive and abnormal process emissions.[17] Accounting for these emission events can increase methane emissions estimates by 60-70% on average at the national level.[18] However, the variance by production basin varies significantly and emissions from production could, e.g., increase methane emissions estimates threefold for natural gas from certain production basins. These methane emissions should therefore also be considered in the lifecycle analysis, i.e., the Treasury needs to make sure that the lifecycle values applying to SAF pathways involving large quantities of natural gas fully capture methane emissions accounting for regional differences.
- Therefore, it is important that upstream methane emissions rates are as accurate as possible, particularly given the range of methane leakage rates associated with different regional energy sources and the extent to which this can affect overall lifecycle emissions. GREET currently applies a nominal upstream methane leakage of 1% in the bottom-up/top-down hybrid approach (which is based on updating the EPA's GHGI using Alvarez

---

15 Ibid.
16 See, e.g., Ramon A. Alvarez et al., Assessment of methane emissions from the U.S. oil and gas supply chain, 361 Sci. 186, 187 (July 13, 2018).; Rutherford et al., Closing the Methane Gap in US Oil and Natural Gas Production Emissions Inventories, 12 Nature Comms. 4715 (2021), https://www.nature.com/articles/s41467-021-25017-4#citeas.
17 EDF, Methane Research Series: 16 Studies, https://www.edf.org/climate/methane-research-series-16-studies.
18 Alvarez et al., *supra* note 16.

et al. and Rutherford et al. studies[19]). However, Alvarez et al. finds a national average leak rate of 2.3%. Additionally, other recent empirical studies have indicated much larger values for certain wet-gas production basins.[20] The upstream methane leak rate is a major contributor to overall lifecycle pathways utilizing natural gas as a feedstock. Treasury should consider pathways toward incorporating basin-specific methane estimates, including working with DOE to update current GREET estimates based on the best available data from published academic studies or verified third party measurement platforms utilizing established methodologies.

[19] Ibid., supra note 16.
[20] *See, e.g.*, Lin et al., *Declining methane emissions and steady, high leakage rates observed over multiple years in a western US oil/gas production basin*, 11 Sci. Reports 22291 (2021), https://www.nature.com/articles/s41598-021-01721-5 (finding a steady leak rate of 6-8% over six years in the Uinta Basin); Chen et al., *Quantifying Regional Methane Emissions in the New Mexico Permian Basin with a Comprehensive Aerial Survey*, Environ. Sci. Technol. 2022, 56, 7, 4317–4323 (2022), https://doi.org/10.1021/acs.est.1c06458 (finding a 9% leak rate in the New Mexico Permian).