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BOOK-AND-CLAIM SYSTEM FOR SUSTAINABLE AVIATION FUELS

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ABSTRACT

This Article provides an overview of the regulatory (legal) framework in which the decarbonisation of aviation is embedded, with a focus on European law. The Article further provides updates on EU-ETS, CORISA, RED III and the minimum quota of SAF supply in accordance with Refuel EU Aviation up to October 2023. Sustainable Aviation Fuels (SAF) will be described in detail in this Article, and it is further explained that the use of SAF could significantly contribute to aviation becoming "greener". As the availability of SAF is still rather scarce, the Article revolves around a mechanism of a global book-and-claim system to unify and scale up production and use. The general concept of book-and-claim as well as the specific one in relation to SAF is explained in the Article. Further, examples of existing book-and-claim systems are given, and the Article concludes with the benefits of a European book-and-claim system for SAF for the various stakeholders in the aviation industry.

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I. INTRODUCTION

We first provide in this Article an overview of the regulatory framework in which the decarbonisation or better defossilisation of aviation is embedded, with a focus on European law. Whether those ambitious, but necessary, targets set by the Paris Agreement and European Climate Law will be met, depends largely, at least in the coming years, on the upscaling of production and use of Sustainable Aviation Fuels (SAF). Such SAF will be described in this Article in order to emphasise that it has nothing to do with "greenwashing" but the use of SAF could significantly contribute to aviation becoming much "greener". However, the availability of SAF is still rather scarce. Therefore, means need to be found to scale up production and use. One mechanism would be the establishment of a book-and-claim system on a European authority level. The concept of book-and-claim is explained herein, examples of existing book-and-claim systems are given and an outlook on the favoured European book-and-claim system is provided at the end of this Article.

II. REGULATORY OVERVIEW

A. Paris Agreement

In order to combat climate change, the Paris Agreement[1] was adopted by 196 Parties[2] at the United Nations (UN) Climate Conference in Paris (COP 21[3]) on December 12, 2015, and entered into force on November 4, 2016.[4] It is a legally binding international treaty on climate change.[5] The agreement covers climate

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1 Paris Agreement to the United Nations Framework Convention on Climate Change, Dec. 12, 2015, T.I.A.S. No. 16-1104. The full agreement can be found here: https://unfccc.int/sites/default/files/english_paris_agreement.pdf. The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental agreement with the aim of preventing dangerous anthropogenic interference with the climate system and slowing down global warming and mitigating its consequences. *Id.* at art. 2.

2 *The Paris Agreement, What is the Paris Agreement?*, United Nations Framework Convention on Climate Change, https://unfccc.int/process-and-meetings/the-paris-agreement (last accessed January 23, 2024).

3 *UN Climate Change Conferences, Climate action*, United Nations, https://www.un.org/en/climatechange/un-climate-conferences (last accessed January 23, 2024) The first COP meeting was held in Berlin, Germany in 1995. *Id.*

4 *The Paris Agreement*, United Nations, https://www.un.org/en/climatechange/paris-agreement (last visited Jan. 16, 2024).

5 *See id.*

change, mitigation, adaptation and finance.[6] It contains three key elements. The first one is to limit global warming to well below 2, preferably to 1.5 degrees Celsius,[7] compared to pre-industrial levels (1850-1900).[8] The second is to review the countries' commitments to cutting emissions every five years. The third key element is to provide climate finance to developing countries.[9] It also included a widely acknowledged net zero global greenhouse gas (GHG) emissions aim for the second half of the 21st century.[10]

"By 2020, countries had to submit their plans for climate action known as nationally determined contributions (NDCs)."[11] "In their NDCs, the countries communicate actions they will take to reduce their GHG emissions in order to reach the goals of the Paris Agreement."[12] To better frame the efforts towards the long-term goal, the Paris Agreement also invited countries to formulate and submit by 2020 long-term low GHG emission development strategies (LT-LEDS).[13] Unlike NDCs, they are not mandatory.[14] "Nevertheless, they place the NDCs into the context of the countries' long-term planning and development priorities."[15]

On October 7, 2022, at COP 27[16] in Egypt, the International Civil Aviation Organization (ICAO) announced its Long-Term Aspirational Goal (LTAG) at its event on green innovation in aviation.[17] Following the creation of the International Aviation

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6 *See id.*

7 Or 3.6 degrees Fahrenheit respectively 2.7 degrees Fahrenheit. *Id.*

8 Tom Di Liberto, *What's in a Number? The Meaning of the 1.5-C Climate Threshold*, CLIMATE.GOV, https://www.climate.gov/news-features/features/whats-number-meaning-15-c-climate-threshold (Jan. 9, 2024).

9 *The Paris Agreement, supra* note 4.

10 *For a Livable Climate: Net-zero Commitments Must be Backed by Credible Action*, UNITED NATIONS, https://www.un.org/en/climatechange/net-zero-coalition (last visited Jan. 17, 2024).

11 Goran Dominioni & Daniel C. Esty, *Designing Effective Border Carbon Adjustment Mechanisms: Aligning the Global Trade and Climate Change Regimes*, 65 ARIZ. L. REV. 1, 2-3 (2023); *The Paris Agreement*, UNFCCC, https://unfccc.int/process-and-meetings/the-paris-agreement#:~:text=Since%202020%2C%20countries%20have%20been,compared%20to%20the%20previous%20version.

12 *The Paris Agreement, supra* note 4.

13 *Id.*

14 *Id.*

15 *The Paris Agreement*, UNFCCC, https://unfccc.int/process-and-meetings/the-paris-agreement#:~:text=Since%202020%2C%20countries%20have%20been,compared%20to%20the%20previous%20version (last visited Jan. 17, 2024).

16 *Delivering for people and the planet*, UNITED NATIONS, https://www.un.org/en/climatechange/cop27 (last visited Jan. 17, 2024).

17 *Long term global aspirational goal (LTAG) for international aviation*, ICAO, https://www.icao.int/environmental-protection/Pages/LTAG.aspx (last visited Jan. 17, 2024).

Climate Ambition Coalition at COP 26, the LTAG will guide the aviation industry towards reaching net-zero in carbon emissions by 2050 in order to support and comply with the aims of the Paris Agreement.[18]

B. European Green Deal

In line with the Paris Agreement, the European Commission (EC) concluded that the European Union (EU) needs to increase its ambition for the coming decade and update its climate and energy policy framework. Therefore, the EC announced on December 11, 2019 the European Green Deal (EGD), which sets the goal of making Europe the first climate-neutral continent by 2050.[19] It also sets the intermediate target of "reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels."[20] This objective has been communicated to the UNFCCC[21] and became binding law on July 29, 2021 under Regulation (EU) 2021/1119[22] for the Member States (also known as European Climate Law).

1. "Fit for 55"

In order to deliver on these aims, the EC presented on July 14, 2021, thirteen policy measures to make the EU's climate, energy, land use, transport and taxation policies fit for reducing net GHG emissions (so called Fit for 55)[23], which included several proposals for new or amended regulations and directives. The package includes a program called "Destination 2050", a Sustainability Roadmap for the aviation industry in the EU.[24] Whereas EU Regulations are directly binding law in each Member State, directives need to be first implemented into national law before becoming effective and, depending on the wording of the respective directive, the national implementation laws of the Member

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[18] *See id.*

[19] *The European Green Deal*, European Commission, https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en (last visited January 23, 2023).

[20] *See id.*

[21] *Id.*

[22] 2021 O.J. (L 243) 1.

[23] *Fit for 55*, European Council, https://www.consilium.europa.eu/en/policies/green-deal/fit-for-55-the-eu-plan-for-a-green-transition/ (last visited Jan. 23, 2023). The package refers to the aim of the European Union, to reduce CO_2-emmissions by at least 55% until 2030. *Id.* The EU Member States are working on new legislation to achieve the 2030-goal and make the EU climate neutral by 2050. *Id.*

[24] *A Route to Net Zero European Aviation*, Royal Netherlands Aerospace Centre and SEO Amsterdam Economics (Feb. 2021), www.destination2050.eu.

States could deviate from each other.[25] The Fit for 55 package, that combines different measures, is criticised for creating a risk of carbon leakage and a competitive distortion between EU and non-EU airlines.[26]

2. Renewable Energy Directive (RED)

A subsection of the Fit for 55 package is the "Proposal for a review of the Renewable Energy Directive[27]"[28], which was introduced by the EC. On September 12, 2023, the European Parliament voted on the amended Renewable Energy Directive (RED III).[29] Thus, at this stage, only the Council has to formally approve RED III.[30] Within 20 days after the new text has been published in the Official Journal of the EU, the new Directive would enter into force.[31] Thereafter, the EU member states have 18 months to transpose the amended Directive into national law.[32] With the Parliament's approval of the amended Renewable Energy Directive, the EU has taken another step towards a simpler and faster expansion of renewable energies in Europe. In addition, RED III increased the share of renewables in final energy consumption to 42.5% by 2030, whereby the target is even 45%, in order to achieve the climate targets and it sent an important signal both to the industry and to the international community in the run-up to COP 28.[33] According to Art. 25 of this Directive, each Member State shall set an obligation on fuel suppliers to ensure that the amount of the renewable fuels and renewable electricity supplied to the transport sector leads to a GHG intensity reduction of at least a certain percentage by 2030, compared to the baseline.[34]

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[25] *European Union Directives*, EUR-LEX, https://eur-lex.europa.eu/EN/legal-content/summary/european-union-directives.html (last visited Jan. 18, 2024).

[26] T.N. (Niall) Buissing, *EU Air Transport and the EU's Environmental Agenda Struggle: A Leap of Faith or Can a CBAM Level the Playing Field?*, 47 AIR & SPACE L. 577, 578 (2022).

[27] 2018 O.J. (L 328) 1.

[28] *Revision of the Renewable Energy Directive: Fit for 55 package*, EUROPEAN PARLIAMENT 1 (DEC. 2023), https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/698781/EPRS_BRI(2021)698781_EN.pdf.

[29] *Id.* at 10.

[30] *Id.*

[31] *Id.*

[32] *See* Press Release, Council of the EU, Renewable energy: Council adopts new rules (Oct. 9, 2023), https://www.consilium.europa.eu/en/press/press-releases/2023/10/09/renewable-energy-council-adopts-new-rules/#:~:text=Next%20steps,transpose%20it%20into%20national%20legislation.

[33] *Revision of the Renewable Energy Directive*, supra note 28, at 1.

[34] *Id.* at 6.

Such percentage was 13% according to RED II and has been increased to 14.5% in the transport sector according to RED III.[35]

C. EU-ETS

1. Overview

The European Union Emissions Trading System (EU-ETS) was the first large GHG emission-trading scheme in the world.[36] It was launched in 2005 to fight global warming and is a major pillar in the EU energy policy as outlined in Directive 2003/87/EC[37] The EU-ETS sets an EU-wide cap[38] on the total amount of GHG emissions from energy-intensive sectors including power stations and industrial plants.[39] The cap decreases over time in order to reduce overall emissions.[40] Companies receive free allowances but have to purchase additional allowances/certificates if they have more emissions than those covered by the free allowances.[41] Thus, companies trade emissions allowances, each allowance allows the respective company to emit one tonne of CO_2.[42] These allowances have to be surrendered to the governing body of the scheme.[43]

2. Aviation

CO_2 emissions from commercial and non-commercial aviation have been included in the EU- ETS since 2012[44] based on Directive

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[35] *Id.* at 10.

[36] *Development of EU ETS*, EUROPEAN COMMISSION, https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/development-eu-ets-2005-2020_en (last visited April 1, 2023).

[37] 2003 O.J. (L 275) 35-6.

[38] *National allocation plans*, EUROPEAN COMMISSION, https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/development-eu-ets-2005-2020/national-allocation-plans_en (last visited April 1, 2023); *Emissions cap and allowances*, EUROPEAN COMMISSION, https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/emissions-cap-and-allowances_en (last visited April 1, 2023).

[39] The cap on allowances was set through NAPs at the national level. *See National allocation plans*, *supra* note 38.

[40] In "Phase 4" of the EU ETS (2021-2030), the cap on emissions continues to decrease annually at an increased annual linear reduction factor of 2.2%. *See Emissions cap and allowances*, *supra* note 38.

[41] *See id.*

[42] Or the equivalent amount of other powerful greenhouse gases, nitrous oxide (N2O) and perfluorocarbons (PFCs). *Emissions cap and allowances*, *supra* note 38.

[43] *See id.*

[44] Since "Phase 3". *Emissions cap and allowances*, *supra* note 38.

2008/101/EC.[45] This means airlines flying within (but not to or from) the European Economic Area[46] have been required to monitor, report and verify their emissions and to surrender allowances against those emissions.[47] Three pillars determine the aviation cap: The allowances for aviation that are provided free of charge sum up to 82%, 3% contain a special reserve of new entrants and 15% are auctioned.[48] However, that will change (see further down below). Auctioning allowances follows the principle that the polluter shall pay in accordance with the ETS Directive and the Auctioning Regulation.[49] In numbers this means approximately 31.1 million allowances were being issued for aircraft operators in 2020, and 7.5 million aviation allowances were auctioned.[50] From 2021 on, the quantity of allowances decreased by the linear factor of 2.2 %.[51]

Free allowances were allocated to around 500 airlines from 2012 to 2020, each airline received 0.6422 allowances per 1,000 tonne-kilometres that were flown.[52]

The three EEA-EFTA countries auction their allowances within the same scheme.[53] In the United Kingdom (UK), the UK Emissions Trading Scheme (UK-ETS) replaced the EU-ETS after the BREXIT.[54] The obligations for UK aircraft operators are set out

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45 2003 O.J. (L 275) 35-6.

46 European Economic Area (EEA) i.e. the EU Member States plus Norway, Liechtenstein and Iceland. *Countries in the EU and EEA*, UNITED KINGDOM, https://www.gov.uk/eu-eea#:~:text=The%20European%20Economic%20Area%20(%20EEA,part%20of%20the%20single%20market (last visited Jan. 19, 2024).

47 *Reducing Emissions from Aviation*, EUROPEAN COMMISSION, https://climate.ec.europa.eu/eu-action/transport/reducing-emissions-aviation_en (last visited Jan. 19, 2024).

48 *Emissions Cap and Allowances*, *supra* note 38; *Further Information on the Start of Phase 4 of the EU ETS in 2021: Emission Allowances to be Issued For Aircraft Operators and the Market Stability Reserve*, EUROPEAN COMMISSION, https://climate.ec.europa.eu/news-your-voice/news/further-information-start-phase-4-eu-ets-2021-emission-allowances-be-issued-aircraft-operators-and-2020-12-11_en (last visited April 1, 2023).

49 2010 O.J. (L 302) 1.

50 2020 O.J. (C 428 I) 2.

51 2020 O.J., *supra* note 50.

52 *Allocation to the Aviation Sector*, EUROPEAN COMMISSION, https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/free-allocation/allocation-aviation-sector_en (last visited April 2, 2023).

53 *Auctioning*, EUROPEAN COMMISSION, https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/auctioning_en (last visited Jan. 19, 2024).

54 The UK ETS replaced the UK's participation in the EU ETS effective since January 1, 2021. *Participating in the UK ETS*, UNITED KINGDOM, https://www.gov.uk/government/publications/participating-in-the-uk-ets/participating-in-the-uk-ets (last visited Jan. 19, 2024).

in the "The Greenhouse Gas Emissions Trading Scheme Order 2020 No.1265"[55]

Emissions from flights to or from the EEA with an origin or destination outside the EEA are currently not included in the EU-ETS.[56] The original plan was for these emissions to be included in the scheme as well.[57] Such plans were put on hold ("stop the clock") as much opposition was raised back then from countries like the USA and China.[58] Moreover, the EU decided to support the development of a global mechanism, which resulted in the Carbon Offsetting and Reduction Scheme for International Aviation "CORSIA", (see section 0 below).[59] However, stakeholders of EU network carriers and those servicing third countries criticize an unfair disadvantage compared to non-EU carriers on these routes.[60] European Airlines argue that the EU-ETS, already puts a price on aviation emissions and that the planned revision of the Energy Tax Directive leads to double taxation.[61] The "stop the clock" suspension shall end on 31 December 2023.[62]

On December 6, 2022 the Council of the European Union (the Council) and the European Parliament (EP) reached a provisional

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[55] The Greenhouse Gas Emissions Trading Scheme Order 2020 (2020 No. 1265) (U.K.), https://www.legislation.gov.uk/uksi/2020/1265/pdfs/uksi_20201265_en.pdf.

[56] The ETS Directive generally applies to all flights which arrive at or depart from an aerodrome situated in the territory of a Member State to which the Treaty applies. 2023 O.J. (L 130) 115. But it also provides for a derogation as regards "flights to and from aerodromes located in States outside the EEA." 2023 O.J. (L 130) 129.

[57] *Aviation Emissions: The ICAO Outcome and its Impact on the EU Aviation Emissions Trading Scheme*, REED SMITH (Jan. 7, 2014), https://www.reedsmith.com/de/perspectives/2014/01/aviation-emissions-the-icao-outcome-and-its-impact.

[58] Valerie Volcovici & Barbara Lewis, *U.N. Aviation Body Agrees on Emissions Deal*, THOMSON REUTERS (Oct. 2, 2013), https://www.reuters.com/article/us-aviation-climate-idUKBRE99302A20131004; EP Briefing (EU Legislation in Progress); *Aviation's contribution to European Union climate action*, EUROPEAN PARLIAMENT, https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/698882/EPRS_BRI(2022)698882_EN.pdf (last visited April 29, 2023); 2013 O.J. (L 113) 1;2017 O.J. (L 350) 7.

[59] *Offsetting CO2 Emissions with CORSIA*, IATA, https://www.iata.org/en/programs/environment/corsia/ (last visited Jan. 22, 2024).

[60] Laurent Donceel, *The Fit for 55 Package: Summary of the Positions of Airlines for Europe*, AIRLINES 4 EUROPE (Dec. 11, 2023), https://a4e.eu/publications/the-fit-for-55-package-summary-of-the-positions-of-airlines-for-europe-a4e/.

[61] *Id.*

[62] Aki Kachi, *Pricing Carbon for Aviation in Europe*, NEW CLIMATE INSTITUTE 6 (Dec. 1, 2020), https://carbonmarketwatch.org/wp-content/uploads/2020/11/Aki-Kachi-1.pdf.

agreement on the revision of the EU-ETS rules on aviation.[63] The EP adopted the agreed text during its plenary session on April 18, 2023.[64] The Council adopted it on April 25, 2023, it was published in the Official Journal of the EU on May 16, 2023 and entered into force on June 5, 2023.[65] The Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this amended Directive by 31 December 2023.[66] Such amended Directive includes, *inter alia*, the following:[67]

a) Flights within the EEA continue to be covered by the EU-ETS, as well as flights to Switzerland and the UK.
b) The total number of aviation allowances in the EU-ETS will be capped at the level of issued certificates in 2023.
c) In addition, the number of free allowances allocated to aircraft operators will be reduced progressively, so that operators need to buy more allowances each year, i.e. a percentage of 25% in 2024, 50% in 2025 and from 2026 onwards, all aviation allowances shall be auctioned, thus need to be purchased by the aircraft operators.

"As of February 2023, the price of carbon in EU-ETS has exceeded EUR 100.00 per metric ton of CO_2, whereas a few years ago, the price was around only EUR 10.00 per ton."[68] Due to full auctioning in 2026, it is expected that the costs for CO_2 certificates/allowances will increase for airlines up to EUR 140.00 per ton.[69]According to the Annex of Directive (EU) 2023/958, the obligations apply to aircraft operators that hold an air operator certificate issued by a Member State or are registered in a Member State and produce annual CO_2 emissions greater than 10,000 tonnes from the use of aircraft with a maximum certified take-off mass greater than 5,700 kg conducting flights covered by this Annex, other than (i) those flights departing and arriving in the same Member State and (ii) those that are state flights or flights for any of the following missions: humanitarian, medical,

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[63] Revision of the EU Emissions Trading System for Aviation, as Part of the European Green Deal - Q2 2021, European Parliament 2 (Dec. 2023), https://www.europarl.europa.eu/legislative-train/carriage/revision-of-the-eu-emission-trading-system-for-aviation/report?sid=7601.

[64] *Id.*

[65] *Id.* at 3.

[66] 2023 O.J. (L 130) 122.

[67] 2023 O.J. (L130) 124.

[68] Jennifer L, *EU Carbon Prices Surge to 100 Euros*, CARBONCREDITS.COM (Feb. 21, 2023), https://carboncredits.com/eu-carbon-prices-surge-to-100-euros.

[69] Paul Butterworth, *EU 2030 Emission Target Need a Carbon Price Of ~€140/t CO_2*, CRU (Oct. 27, 2021), https://sustainability.crugroup.com/article/eu-2030-emission-targets-need-carbon-price-euro140-tco2.

military, firefighting or ferry flights enabling one of those missions at the beginning and at the end.[70]

D. CORSIA

At the meeting of the ICAO in 2016, 192 countries agreed to a Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).[71] The Decision 377/2013/EU[72] adopted by the EU in 2012 paved the way for the decision by the 38th ICAO Assembly to work on the development of a global marked-based mechanism.[73] This resulted into the agreement on CORSIA at the 39th ICAO Assembly.[74]

CORSIA is a global scheme for offsetting CO_2 emissions from international aviation.[75] Carbon offsetting is the process of purchasing carbon credits to 'offset' carbon emissions, resulting in net-zero emissions.[76] Offsetting can be done at an individual level (e.g. offsetting emissions from personal air travel) or by businesses and industries.[77] Countries/regions may also engage in offsetting to meet their climate goals under the Paris Agreement/ European Climate Law (see under 104. above).[78]

The global market-based measure of CORSIA shall ensure global uniformity rather than having several different carbon offsetting schemes around the globe, which may not be comparable and could lead to competition issues.[79]

CORSIA is implemented in three phases, starting with a pilot phase from 2021 to 2023, followed by the first phase from 2024 to 2026 and a second phase from 2027 onwards.[80]

CORSIA is a global market-based 'baseline-and-credit' mechanism.[81] ICAO's medium-term goal of Carbon Neutral

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70 2023 O.J. (L 130) Annex.

71 *Offsetting CO2 Emissions with CORSIA*, *supra* note 59.

72 2013 O.J. (L 113) 1.

73 *Aviation's Contribution to European Union Climate Action*, *supra* note 58.

74 *Id.*

75 *Offsetting CO2 Emissions with CORSIA*, *supra* note 59.

76 Will Kenton, *Carbon Credits and How They Can Offset Your Carbon Footprint*, Investopedia (Dec. 17, 2023), https://www.investopedia.com/terms/c/carbon_credit.asp.

77 *Id.*

78 *Id.*

79 *See Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)*, ICAO, https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx (last visited April 2, 2023).

80 *CORSIA States for Chapter 3 State Pairs*, ICAO, https://www.icao.int/environmental-protection/CORSIA/Pages/state-pairs.aspx (last visited Jan. 21, 2014).

81 *CORSIA*, *supra* note 79.

Growth from 2020 contained the CORSIA requirement that all participant countries monitored their baseline emissions in 2019 and 2020.[82] Now, the emissions in 2019 function as a baseline for 2021 and 2023, and only 85% of the 2019 emissions shall be the baseline for each year onwards from 2024, which are estimated to be around 439 million tons.[83] ICAO members participating in CORSIA will need to ensure that aircraft operators comply with CORSIA offsetting requirements every three years.[84] "The Monitoring, Reporting and Verification (MRV) requirements relating to the CO_2 emissions from international flights have already applied since January 1, 2019."[85] The MRV requirements however have to be distinguished from the offsetting requirements that apply since January 1, 2021.[86]

An airline may reduce its carbon offsetting requirements by using CORSIA eligible fuels (see more specifics further down below and under III 3. e) below).[87]Any remaining CO_2 offsetting requirements for the compliance period must be purchased as emission units through carbon markets and recorded within a central CORSIA registry (similar to EU-ETS).[88]

Currently (in 2023)[89] 125 states[90] are participating in CORSIA. It is anticipated that CORSIA will mitigate (i.e. offset) around 2.5 billion tonnes of CO_2 between 2021 and 2035, which means

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82 Due to the COVID pandemic, only 2019 was considered. *COVID-19 impacts and 2022 CORSIA periodic review*, ICAO, https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-and-Covid-19.aspx (last visited Jan. 21, 2024).

83 *Provisional Agreement Resulting from Interinstitutional Negotiations*, EUROPEAN PARLIAMENT COMMITTEE ON THE ENVIRONMENT, PUBLIC HEALTH AND FOOD SAFETY 14 (Feb. 13, 2023), https://www.europarl.europa.eu/RegData/commissions/envi/inag/2023/02-08/ENVI_AG(2023)742452_EN.pdf; *CORSIA Fact Sheet*, IATA 1, https://www.iata.org/en/iata-repository/pressroom/fact-sheets/fact-sheet—corsia/ (last visited Sept. 10, 2023).

84 *CORSIA Fact Sheet*, *supra* note 83.

85 Press Release, *Council Adopts Decision on Offsetting Requirements for Air Transport Emissions (CORSIA)*, COUNCIL OF THE EU (Dec. 19, 2022), https://www.consilium.europa.eu/en/press/press-releases/2022/12/19/council-adopts-decision-on-offsetting-requirements-for-air-transport-emissions-corsia/.

86 *Id.*

87 *CORSIA Eligible Fuels*, ICAO, https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-Eligible-Fuels.aspx (last visited Jan. 21, 2024).

88 An Airline Handbook on CORSIA, IATA 32 (Aug. 2019), https://www.iata.org/contentassets/fb745460050c48089597a3ef1b9fe7a8/corsia-handbook.pdf.

89 *CORSIA News*, ICAO, https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-News.aspx (last visited September 10, 2023).

90 Status of July 2023, the status is updated under the link. *CORSIA States for Chapter 3 State Pairs*, ICAO, https://www.icao.int/environmental-protection/CORSIA/Pages/state-pairs.aspx (last visited September 10, 2023).

an annual average of 164 million tonnes of CO_2.[91] Unfortunately, China, the second biggest global source of passenger aviation emissions, is currently not participating despite being an early supporter of CORSIA.[92] Russia and India have also not yet volunteered for the scheme.[93] The International Air Transport Association (IATA) forecasts suggest that China will be the world's largest aviation market as early as this year, and India, the current fastest growing aviation market, will be the third largest by 2025.[94] However, during the "second phase" (2027-2035), participation will no longer be voluntary for states, and large aviation markets such as Brazil, China and India have to participate, expanding the requirements for offsets at the latest by this time.[95]

The EU member states committed to participate in the pilot phase, which began in January 2021.[96] On December 19, 2022, the Council of the EU adopted a decision on CORSIA, which enables the member states to fulfil their first annual obligation to notify operators based in the EU of their CORSIA requirements.[97] Other CORSIA obligations are implemented in "EU law" through the revision of the "EU-ETS Directive" (as mentioned above), which needs to be transposed into the national law of the member states.[98] CORSIA applies to flights outside the EU-ETS scope and depart or arrive in countries that apply CORSIA.[99] Emissions from these flights will be offset once collective international emissions exceed 2019 levels, respectively 85% of 2019

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[91] Fact Sheet: CORSIA, IATA 1, https://www.iata.org/contentassets/ed476ad1a80f4ec7949204e0d9e34a7f/corsia-fact-sheet.pdf (last visited Jan. 21, 2024).

[92] Allison Martell & Allison Lampert, *China Denounces U.N. Aviation Emissions Plan in Blow To Industry Efforts*, REUTERS (Sept. 24, 2019), https://www.reuters.com/article/idUSKBN1W938W/.

[93] *ICAO's 2021-22 Emissions Below CORSIA Baseline*, ARGUS (Nov. 2, 2023), https://www.argusmedia.com/en/news/2505384-icaos-202122-emissions-below-corsia-baseline.

[94] *Air India, Indian Aviation Market and Tailwinds of Growth*, NDTV PROFIT (Feb. 19, 2023), https://www.bqprime.com/business/air-india-indian-aviation-market-and-tailwinds-of-growth.

[95] John Pearson & Lev Gantly, The Aircraft Leasing Community and the Carbon Markets, Vedder Price LLP & Philiplee 3 (Dec. 6, 2022), https://www.vedderprice.com/-/media/files/vedder-thinking/publications/2022/12/the-aircraft-leasing-community-and-the-carbon-markets.pdf?rev=9a2a76ae685a4e23ad53a23cf6259c60.

[96] Council Adopts Decision on Offsetting Requirements for Air Transport Emissions (CORSIA), supra note 48.

[97] *Id.*

[98] *Id.*

[99] *Fit for 55: Approved, Published and Simplified*, VERIFAVIA (June 15, 2023), https://www.verifavia.com/greenhouse-gas-verification/vn-fit-for-55-approved-published-and-simplified-2245.php#:~:text=Scope%3A,(%27clean%20cut%27).

levels (as described above).[100] The eligible offset units must originate from countries participating in the Paris Agreement and CORSIA.[101] "Offsets must be reliably accounted for in order to avoid them being counted twice.[102] To avoid market distortions, the EC will maintain the route-based approach, ensuring that airlines operating flights on the same routes are treated equally, regardless of nationality."[103]

Aircraft operators are allowed to reduce their offsetting requirements through the use of "CORSIA eligible fuels."[104] The Implementation Element "CORSIA eligible fuels" is reflected in five ICAO documents[105] referenced in Annex 16, Volume IV[106] (see further explanation on CORSIA eligible fuels below).

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[100] *CORSIA Fact Sheet*, *supra* note 83.

[101] *Aviation and the EU ETS*, GLOBAL FACTOR, https://www.globalfactor.com/en/aviation-and-the-eu-ets/ (last visited Jan. 22, 2024).

[102] *Id.*

[103] *Id.*

[104] CORSIA eligible fuels "include CORSIA sustainable aviation fuels and CORSIA lower carbon aviation fuels." *CORSIA Eligible Fuels*, ICAO, https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-Eligible-Fuels.aspx (last visited Feb. 8, 2023).

[105] *CORSIA Eligibility Framework and Requirements for Sustainability Certification Schemes (Second Edition)*, ICAO (June 2022), https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA_Eligible_Fuels/ICAO%20document%2003%20-%20Eligibility%20Framework%20and%20Requirements%20for%20SCSs%20-%20June%202022.pdf; *CORSIA Approved Sustainability Certification Schemes (First Edition)*, ICAO (November 2020), https://www.icao.int/environmental-protection/CORSIA/Documents/ICAO%20document%2004%20-%20Approved%20SCSs.pdf; *CORSIA Sustainability Criteria for CORSIA Eligible Fuels (Third Edition)*, ICAO (November 2022), https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA_Eligible_Fuels/ICAO%20document%2005%20-%20Sustainability%20Criteria%20-%20November%202022.pdf; *CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels (Fourth Edition)*, ICAO (June 2022), https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA_Eligible_Fuels/ICAO%20document%2006%20-%20Default%20Life%20Cycle%20Emissions%20-%20June%202022.pdf; *CORSIA Methodology for Calculating Actual Life Cycle Emissions Values (Third Edition)*, ICAO (June 2022), https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA_Eligible_Fuels/ICAO%20document%2007%20-%20Methodology%20for%20Actual%20Life%20Cycle%20Emissions%20-%20June%202022.pdf.

[106] The First Edition of Annex 16 — Environmental Protection, Volume IV — Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) was adopted by the Council of ICAO on June 27, 2018. *State letter AN 1/17.14 – 18/78*, ICAO 1 (July 20, 2018), https://blogs.edf.org/climate411/wp-content/blogs.dir/7/files/2018/12/ICAO-CORSIA-State-Letter-18-78-AX16-Vol-IV-Adoption-of-First-Edition.pdf. The adopted First Edition of Annex 16, Volume IV was shared with Contracting States through State letter AN 1/17.14 – 18/78 dated July 20, 2018. *Id.* The First Edition of Annex 16, Volume IV became effective on October 22, 2018, and became applicable on January 1, 2019. *Id.*

According to the new Directive (EU) 2023/958,[107] EU-ETS regulations for aviation apply for intra-European flights (including flights to and from the United Kingdom and Switzerland), while from 2022 to 2027, CORSIA applies to extra-European flights to and from third countries participating in CORSIA ('clean cut').[108] "When global aviation emissions under CORSIA reach levels above 85% of 2019-levels, European airlines will have to offset their proportionate share with corresponding carbon credits, invested in emissions reductions in countries participating in CORSIA offsetting."[109] In 2025, the EC will assess whether the implementation of CORSIA is sufficient to reduce aviation emissions in light of the objective of the Paris Agreement.[110] If CORSIA delivers on its objectives, the EC will make a proposal to the Council and Parliament to extend the clean cut.[111] If CORSIA is not sufficient, the EC will make a proposal to extend the scope of EU-ETS to all flights departing from the EEA.[112]

III. SUSTAINABLE AVIATION FUEL(S) ("SAF")

It has become common knowledge that the use of SAF is currently the main driver of complying with the above-named targets in the field of aviation. Experts estimate that the contribution of SAF to the emissions reductions needed by the aviation industry until 2050[113] could reach 65%.[114] However, as of today, only about 1% of the jet fuel produced is accounted to be SAF.[115]

A. SAF DEFINITION

As IATA defines that "SAF is the main term used by the aviation industry to describe a non-conventional (not fossil derived)

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[107] 2023 O.J. (L 130) 115.

[108] *ETS Aviation, Council and Parliament Strike Provisional Deal to Reduce Flight Emissions*, COUNCIL OF THE EU (Dec. 7, 2022), https://www.consilium.europa.eu/en/press/press-releases/2022/12/07/ets-aviation-council-and-parliament-strike-provisional-deal-to-reduce-flight-emissions/.

[109] *Id.*

[110] *Id.*

[111] *Id.*

[112] *Id.*

[113] The year 2050 is the date for achieving "net-zero" CO_2 emissions under the Paris Agreement. Paris Agreement to the United Nations Framework Convention on Climate Change, Dec. 12, 2015, T.I.A.S. No. 16-1104.

[114] *Net Zero 2050: Sustainable Aviation Fuels*, IATA 1, https://www.iata.org/en/iata-repository/pressroom/fact-sheets/fact-sheet—alternative-fuels/ (last visited Feb. 6, 2023).

[115] *What is a Book-And-Claim Platform for SAF and how does it Work?*, ONCARBON (Nov. 29, 2022), https://oncarbon.app/articles/book-and-claim-saf.

aviation fuel."[116] "SAF is the preferred IATA term for this type of fuel although when other terms such as sustainable alternative fuel, sustainable alternative jet fuel, renewable jet fuel or bio jet fuel are used, in general, the same intent is meant."[117]

> In general, we speak of two different categories of SAF:
> (1) fuels from biological/biogene resources (plant or animal material, e.g. used cooking oil, plant oils, municipal waste, waste gases, and agricultural residues – to name a few); and
> (2) synthetic fuels, so-called Power-to-Liquid fuels (P-t-L), which are based on electrical energy from renewable energy sources, water and carbon dioxide.[118]

"The chemical and physical characteristics of SAF are almost identical to those of conventional jet fuel and they can be safely mixed with the latter to varying degrees."[119] In addition, SAF may use the same supply infrastructure and do not require the adaptation of aircraft or engines. [120]Therefore, SAF could currently have a significant impact on reducing GHG emissions in aviation if it would be available in adequate quantities at prices similar to conventional jet fuel or the price difference is otherwise compensated by the governments.[121]

> The term SAF consists of three elements that are defined by IATA as follows:
> 1. Sustainability in this context is defined as something that can be continually and repeatedly resourced in a manner consistent with economic, social, and environmental aims, and conserves an ecological balance by avoiding depletion of natural resources.[122]
> 2. It is a fuel for Aviation with an alternative feedstock[123] to crude oil, thus, it is non-conventional or advanced fuel and includes any materials or substances that can be used as fuel, other than conventional, fossil-sources.[124]

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[116] *What is SAF?*, IATA 1, https://www.iata.org/contentassets/d13875e9ed784f-75bac90f000760e998/saf-what-is-saf.pdf (last visited June 8, 2023).

[117] *What is SAF?*, *supra* note 116, at 1.

[118] *What is SAF?*, *supra* note 116, at 1; *Power-to-Liquids*, AIRBUS (July 15, 2021), https://www.airbus.com/en/newsroom/news/2021-07-power-to-liquids-explained#:~:text=PtL%20is%20a%20synthetically%20produced,electrolysers%20to%20produce%20green%20hydrogen.

[119] *What is SAF?*, *supra* note 116, at 1.

[120] *Id.*

[121] *Id.*

[122] *Id.*

[123] Feedstock as in raw material from which fuels are produced. *What is SAF?*, *supra* note 116, at 1.

[124] Such as oil, coal, and natural gas. *Id.*

3. Fuel means it is jet fuel that meets the technical and certification requirements for use in commercial aircraft.[125]

Since April 2023, there have been nine already certified conversion processes for SAF.[126] Eight other conversion processes are currently still under evaluation.[127] Each SAF is certified just like conventional Jet A fuel and JET A-1 fuel, whilst JET A fuel is limited to North America and Jet A-1 fuel is used in Europe and most of the rest of the world.[128] As stated before, SAF can be used for any aircraft engine without any modifications or adaptation on the aircraft or engine becoming necessary.[129] In the aviation fuel industry, the American Society for Testing and Materials (ASTM)[130] serves as the international standard for jet fuel quality, and the same standard is applied to SAF.[131] "ASTM International is committed to the World Trade Organization's principles for international standards development"[132] and the only globally recognized fuel standard.[133] The ASTM 'Standard Specification for Aviation Turbine Fuels' therefore forms the global basis of all Jet A and Jet A-1 fuel quality specifications for each batch produced and is essential for operational safety and reliability.[134] In addition to the "regular" Specification, a special Specification for

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125 The definition can be found in: *Id.*

126 Conversion processes, ICAO, https://www.icao.int/environmental-protection/GFAAF/Pages/Conversion-processes.aspx (last access visited June 10, 2023).

127 *See id.*

128 *Sustainable Aviation Fuels Fact Sheet*, IATA 1, https://www.iata.org/contentassets/ed476ad1a80f4ec7949204e0d9e34a7f/fact-sheet-alternative-fuels.pdf (last visited Jan. 23, 2024); Aviation Fuels Technical Review, CHEVRON 2, https://www.chevron.com/-/media/chevron/operations/documents/aviation-tech-review.pdf (last visited Jan. 23, 2024).

129 *What is SAF?*, *supra* note 116, at 1.

130 "ASTM International is an international organization at which technical standards for a wide range of materials, products, processes, systems, and services are developed." *Sustainable Aviation Fuel Certification And ASTM International: What Is It & Why Does It Matter?*, SKYNRG, https://skynrg.com/sustainable-aviation-fuel-certification-and-astm-international-what-is-it-why-does-it-matter/.

131 *Sustainable Aviation Fuel Certification And ASTM International: What Is It & Why Does It Matter?*, SKYNRG, https://skynrg.com/sustainable-aviation-fuel-certification-and-astm-international-what-is-it-why-does-it-matter/ (last visited Jan. 23, 2024); ASTM D1655-22a (Standard Specification for Aviation Turbine Fuels): The specification covers purchases of aviation turbine fuel under contract and is intended primarily for use by purchasing agencies. *Standard Specification for Aviation Fuels*, ASTM, https://www.astm.org/d1655-22a.html (Aug. 25, 2023).

132 *Helping Our World Work Better*, ASTM INTERNATIONAL 4 (May 2018), https://www.astm.org/media/files/about-overview/Helping-Our-World-EN-2018.pdf.

133 *Sustainable Aviation Fuel Certification and Astm International*, *supra* note 131.

134 *Id.*

Fuel Containing Synthesized Hydrocarbons[135] has been issued, which covers the manufacture of aviation turbine fuel that consists of conventional and synthetic blending components.[136] Thus, it describes the fuel quality specifications for each qualified SAF production pathway.[137] If a new SAF production pathway shall be included in the ASTM Specification for Fuel Containing Synthesized Hydrocarbons, the fuel has to undergo extensive testing, in which the maximum blend ratio with conventional jet fuel is defined and the fuel needs to demonstrate that such blend is fit for use.[138] The key reason behind this extensive testing procedure is again safety.[139]

Moreover, SAF is a so-called "drop-in fuel", which means that it can be automatically incorporated into existing airport fueling systems without any need to modify those.[140] However, at the moment all certified SAF needs to be blended with fossil (petroleum-based) jet fuel, in most cases up to a maximum of 50%.[141] It is the intention to increase the use of SAF to 100% in the near future and there are already some promising tests, that a flight on 100% is possible.[142]

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[135] ASTM D7566-22. *Standard Specification for Aviation Turbine Fuel Containing Synthesized Hydrocarbons*, ASTM INTERNATIONAL, https://www.astm.org/d7566-22.html (Nov. 4, 2023).

[136] *Sustainable Aviation Fuel Certification and ASTM International*, *supra* note 131.

[137] *Id.*

[138] *Id.*

[139] *Id.*

[140] Thomas Pate, Todd K. Olynski, Anna Andreeva & Taylor Pullins, *From Here to There*: Challenges in meeting sustainable aviation fuel targets, WHITE & CASE (May 2, 2022), https://www.whitecase.com/insight-alert/here-there-challenges-meeting-sustainable-aviation-fuel-targets.

[141] *Id.*

[142] *Gulfstream Makes Industry-First 100% Sustainable Aviation Fuel Flight*, ALEXANDER CRAKER (December 2022), https://www.alexandercraker.com/industry-news/gulfstream-makes-industry-first-100-sustainable-aviation-fuel-flight; Linnea Ahlgren, *GE Aerospace Runs a B787-10 Engine on 100% SAF*, SIMPLE FLYING (Jan. 4, 2023), https://simpleflying.com/ge-aerospace-runs-a-boeing-787-10-engine-on-100-saf/; *Pioneering German-Norwegian Cooperation will Make Regional Norwegian Aviation a World Leader in the Transition to Climate-Neutrality*, DEUTSCHE AIRCRAFT (March 14, 2022), https://www.deutscheaircraft.com/news/pioneering-german-norwegian-cooperation-will-make-regional-norwegian-aviation-a-world-leader-in-the-transition-to-climate-neutrality.

B. Examples of Current SAF

1. Fairs

At the Air Show 2022 in Berlin (Internationale Luft- und Raumfahrtausstellung "ILA")[143] for the first time, both exhibitor and customer aircraft had the opportunity to use SAF.[144] The SAF offered was supplied by TotalEnergies in collaboration with the German Business Aviation Association (GBAA) and the Interessengemeinschaft der regionalen Flugplätze e.V. (IDRF)[145] from hydroprocessed esters and fatty acids (HEFA), and enables a reduction of GHG emissions of over 80%. [146]The offer was available to all ATI fuel card holders and it was limited to a maximum of 2,000 litres.[147]

During the AERO fair in Friedrichshafen, Germany this year (19 to 22 April 2023), the GBAA and air bp also offered to exhibitors and customers to fuel their aircraft with SAF.[148] Such SAF was available in a total amount of 23,000 litres and was a mixture of 35% SAF and 65% fossil Jet A-1 fuel. The sale was subject to availability. The net price for one litre was EUR 3,05.

2. INERATEC

INERATEC GmbH is worldwide the biggest pilot project for production of P-t-l and shall be located in Frankfurt-Höchst.[149] The P-t-L facility shall produce up to 2.500 tonnes of e-fuels[150] per year[151] from 2024 on.[152]The construction of this facility was possible due to an investment of more than EUR 30,000,000.00.[153] The

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143 ILA 2022 took place from June 22, 2022, to June 26, 2022. Press Release, *SAF feiert Permiere auf ILA*, IDRF (June 3, 2022), https://www.idrf.de/presseartikel/saf-feiert-premiere-auf-ila/.

144 *Id.*

145 To be translated as "Association of regional airports" (free translation by the author).

146 *SAF feiert Permiere auf ILA*, *supra* note 143.

147 *Id.*

148 Press Release, *Flying high at AERO*, BP (May 2023), https://www.bp.com/en/global/air-bp/news-and-views/air-bp-news/flying-high-at-aero.html.

149 Press Release, *Groundbreaking For E-Fuel Production Plant in Frankfurt*, INERATEC (April 19, 2023), https://www.ineratec.de/en/news/groundbreaking-e-fuel-production-plant-frankfurt.

150 SAF, Marine and other e-fuels for automotive transport.

151 Which equals 4,350,000.00 litres.

152 *Groundbreaking For E-Fuel Production Plant in Frankfurt*, *supra* note 149.

153 *See id.*

construction of the site has started in April 2023.[154] In the third quarter of 2023, the start of commissioning at the site is targeted, in the beginning of 2024 the transition into plant operation shall follow.[155] INERATEC aims to replace 5% of European crude oil demand with synthetic fuels and chemicals by 2035.[156] 50% of the e-fuel capacities produced in Frankfurt will be available for the aviation industry.

3. Neste

The Finnish headquartered company Neste, who produces the largest amounts of SAF worldwide, has currently an annual production capacity of 100,000 tonnes (approximately 34 million gallons) and claims that by the end of 2023, it will have the capacity to produce some 1.5 million tonnes (515 million gallons) of SAF annually.[157] Neste's SAF is made from renewable waste and residue raw materials, like used cooking oil.[158] According to Neste, SAF delivered by it produces around 80% fewer carbon emissions over its lifecycle than traditional jet fuel.[159] Thus, its SAF reduces GHG emissions by up to 80% compared to fossil jet fuel.[160]

4. Montana Renewables LLC

As of late February 2023, Montana Renewables LLC claims to be the largest SAF producer in North America and expects to maintain that status when a planned expansion is completed next year.[161] They are advertising 12,000 barrels per day (BPD) of renewable feedstock, which is about 180 million gallons per year. [162]Of that total, however, most is renewable diesel.[163] The SAF

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154 *See id.*

155 *See id.*

156 *Conference Presentation on the Business Concepts*, KEROGREEN Annex (Sept. 30, 2022), https://www.kerogreen.eu/downloads/D7.6_conference%20presentation%20on%20business%20concepts_KEROGREEN_final.pdf.

157 *Fly More Sustainably with Sustainable Aviation Fuel and Reduce Air Travel Emissions Immediately*, NESTE, https://www.neste.com/products/all-products/saf#9fc49ab6 (last visited August 1, 2023).

158 *Id.*

159 *Id.*

160 *Id.*

161 *Calumet's Montana Renewables Became the Largest SAF Producer in North America in Q2*, GREEN CAR CONGRESS (July 28, 2023), https://www.greencarcongress.com/2023/07/20230728-calumet.html.

162 *Id.*

163 *Id.*

portion that is sold at Montana Renewables LLC is 30 million gallons per year.[164]

"Engineering and procurement is underway for a 2024 expansion to process 20,000 BPD, with the ability to flex between all renewable diesel or all SAF, as there is a huge, backed-up demand for SAF."[165] Moreover, they claim that they have the capability to offer SAF at a price parity with renewable diesel, which those producers with older generation technology are not able to offer.[166] Montana Renewable's cost advantage is partly due to its decision to deploy the latest technology from Haldor Topsoe in its renewable diesel retrofit and the (US) Inflation Reduction Act[167] (IRA) has cleared the way for expansion to be economic.[168]

According to the United States Environmental Protection Agency (EPA), the IRA is the most significant climate legislation in U.S. history, offering funding, programs, and incentives to accelerate the transition to a clean energy economy and will likely drive significant deployment of new clean electricity resources, whereby most provisions of that Act became effective on 1 January 2023.[169] The Act includes an Investment Tax Credit (ITC) and a Production Tax Credit (PTC), which allows taxpayers to deduct a percentage of the cost for renewable energy systems from their federal taxes.[170] These credits are available to taxable business entities and certain tax-exempt entities eligible for direct payment of tax credits; however, specific projects are eligible for either the ITC or PTC, but not both.[171]

Montana Renewables LLC states that the IRA helps so that the production of SAF will be able to compete with renewable diesel as both fuels are now eligible for the blenders credit for advanced biofuel.[172] "When the Clean Fuel Production Credit begins in 2025, SAF will be eligible for a tax incentive starting

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164 *Id.*

165 Susanne Retka Schill, *SAF in the Big Sky State*, SAF MAGAZINE (Vol. 1, Issue 1, 2023), https://advancedbiofuelsusa.info/saf-in-the-big-sky-state.

166 *Id.*

167 H.R. Res. 5376, 117th Cong. (2022) (enacted).

168 Schill, *supra* note 165.

169 *Summary of Inflation Reduction Act provisions Related to Renewable Energy*, UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (EPA), https://www.epa.gov/green-power-markets/summary-inflation-reduction-act-provisions-related-renewable-energy (last visited Aug. 1, 2023).

170 *Summary of Inflation Reduction Act Provisions Related to Renewable Energy*, *supra* note 169. SEC. 40B. Sustainable Aviation Fuel Credit of the IRA. *Id.*

171 *Summary of Inflation Reduction Act provisions related to renewable energy*, *supra* note 169.

172 Susanne Retka Schill, supra 165.

at USD 1.25 per gallon, increasing with each point of improved carbon reductions better than the 50% reduction threshold to a maximum of USD 1.75 per gallon."[173] Montana Renewables LLC produces its SAF from canola (which is known to be refined into rapeseed oil) and received the EPA approval in December 2022.[174]

5. LanzaTech/LanzaJet

LanzaTech announced a partnership with Swedish power company Vattenfall to use CO_2 from its heating plant as feedstock for SAF as well as with SkyNRG to develop a project called FLITE (Fuel via Low Carbon Integrated Technology), which is planned to produce 30,000 tonnes of SAF per year from waste-based ethanol.[175] SkyNRG is working alongside organizations such as the World Economic Forum[176] to make sure that a globally accepted reporting system for SAF is developed.[177] In addition, LanzaJet[178] has the project DRAGON (Decarbonizing and Reimagining Aviation for the Goal of Netzero)[179], which is expected to be collocated with a steel mill in Wales, using steel mill emissions to produce jet fuel. LanzaTech's investors and funders include All Nippon Air-

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[173] *Id.*

[174] *Id.*

[175] Katie Schroeder, *Against the Odds*, SAF MAGAZINE (Nov. 13, 2023), https://safmagazine.com/articles/against-the-odds.

[176] According to its own presentation, "The World Economic Forum is the International Organization for Public-Private Cooperation. The Forum engages the foremost political, business, cultural and other leaders of society to shape global, regional and industry agendas. [. . .] The Forum strives in all its efforts to demonstrate entrepreneurship in the global public interest while upholding the highest standards of governance. Moral and intellectual integrity is at the heart of everything it does." *Our Mission*, WORLD ECONOMIC FORUM, https://www.weforum.org/about/world-economic-forum (last visited Aug. 1, 2023).

[177] *Sustainable Aviation Fuel is Ready to Scale up Thanks to this New Framework: SAFC*, SKYNRG, https://skynrg.com/sustainable-aviation-fuel-is-ready-to-scale-up-thanks-to-this-new-framework-safc/ (last visited Aug. 1, 2023).

[178] LanzaJet is an Illinois based developer of sustainable fuel technologies. LANZAJET, https://www.lanzajet.com/about (last visited Jan. 25, 2024).

[179] "The LanzaJet Project DRAGON will undertake the Front-End Engineering Design (FEED) of a facility in Port Talbot, South Wales that will produce over 100 million litres per year of ATJ Synthetic Paraffinic Kerosene (ATJ-SPK). The feedstock for the facility will be waste-based, low carbon ethanol, procured from a variety of waste sources, and the facility will have the ability to also use ethanol produced from local steel mill waste gases via LanzaTech's gas fermentation platform. The ATJ-SPK produced will provide >70% GHG emission savings versus traditional jet fuel. Using a 30% blend target, the 100 million litres of ATJ-SPK will yield about 330 million litres per annum of blended SAF." *Project DRAGON Decarbonizing and Reimagining Aviation for the Goal Of Netzero*, DEMOPLANTS21, https://demoplants21.best-research.eu/projects/info/3976/VEcQZJ (last visited Aug. 1, 2023).

ways, British Airways, Mitsui & Co., Suncor Energy, Shell, and the Microsoft Climate Innovation Fund.[180] The company went public and began stock trading on February 10, 2023.[181]

C. Regulatory Incentives by States/Regions to Increase SAF Supply and Use

Below, we state a few examples of regulatory incentives for the increase of SAF supply, whereby the below is by no means a complete list.

1. SAF Grand Challenge (USA)

The "Sustainable Aviation Fuel Grand Challenge" is the result of the U.S. Department of Energy (DOE), the U.S. Department of Transportation (DOT), the U.S. Department of Agriculture (USDA), and other federal government agencies.[182] These Departments are working together to develop a comprehensive strategy for scaling up new technologies to produce SAF on a commercial scale.[183] A government-wide Memorandum of Understanding[184] (MOU) was launched that will attempt to reduce the cost, enhance the sustainability, and expand the production and use of SAF.[185] It contains the goals of achieving a minimum of a 50% reduction in life cycle GHG emissions compared to conventional fuel; and meeting the aim of supplying sufficient SAF to meet 100% of aviation fuel demand by 2050.[186]

Through the MOU, the DOE, the DOT and the USDA intend to accelerate the research, development, demonstration, and deployment needed for the ambitious government-wide commitment to scale up the production of SAF to 35 billion gallons per

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[180] LANZAJET, *supra* note 178.

[181] *LanzaTech Global, Inc. Begins Trading on Nasdaq Stock Exchange*, LanzaTech (Feb. 10, 2023), https://ir.lanzatech.com/news-releases/news-release-details/lanzatech-global-inc-begins-trading-nasdaq-stock-exchange.

[182] *Sustainable Aviation Fuel Grand Challenge*, U.S. Office of Energy Efficiency and Renewable Energy, https://www.energy.gov/eere/bioenergy/sustainable-aviation-fuel-grand-challenge (last visited May 25, 2023).

[183] *Id.*

[184] *Memorandum Of Understanding Sustainable Aviation Fuel Grand Challenge*, U.S. Dept. of Energy, U.S. Dept. of Transportation, and U.S. Dept. of Agriculture (Sept. 8, 2021), https://www.energy.gov/sites/default/files/2021-09/S1-Signed-SAF-MOU-9-08-21_0.pdf.

[185] Sustainable Aviation Fuel Grand Challenge, *supra* note 182.

[186] *See id.* Thus, more ambitious than the 63% or 85% stated by the EU, see below under 0.

year by 2050.[187] A near-term goal of 3 billion gallons per year is established as a milestone for 2030 by the Biden administration, what stands for 14% of the US demand for US airlines in 2019.[188]

> The roadmap lays out six action areas spanning all activities with the potential to impact the SAF Grand Challenge objectives of first expanding SAF supply and end use, second reducing the cost of SAF, and third enhancing the sustainability of SAF.[189] These six pillars include Feedstock Innovation, Conversion Technology Innovation, Building Supply Chains, Policy and Valuation Analysis, Enabling End Use, and Communicating Progress and Building Support.[190]

The Biden administration announced three major policies to advance the production and use of SAF.[191] The first one is the California Low Carbon Fuel Standard (CA-LCFS), which shall reduce GHG emissions in the whole transport sector.[192] The policy applies a system which puts a value on carbon reduction that is generated from renewable fuels.[193] SAF is under this Act recognized to generate credits.[194]

The second is the U.S. Renewable Fuel Standard (RFS), which intendedly was created to require a minimum of renewable fuel for ground transport, in particular renewable diesel.[195] SAF is, under this Act, allowed to generate compliance units, to be able to compete with ground transport.[196] However, an obligation to use SAF is not imposed.[197]

The third is the U.S. Sustainable Skies Act, which is aiming to raise incentives for the use of SAF.[198] A credit of up to USD 2.0 per gallon is given for blenders that supply SAF.[199] Further, this Act aims to increase the facilities that produce SAF with a grant of

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187 *Sustainable Aviation Fuel Grand Challenge*, *supra* note 98a.

188 *Id.*

189 SAF Grand Challenge Roadmap, U.S. DEPARTMENT OF ENERGY ix (Sept. 2022), https://www.energy.gov/sites/default/files/2022-09/beto-saf-gc-roadmap-report-sept-2022.pdf.

190 *Id.*

191 *Fact Sheet: EU and US policy approaches to advance SAF production*, IATA 1, https://www.iata.org/contentassets/d13875e9ed784f75bac90f000760e998/fact-sheet—-us-and-eu-saf-policies.pdf (last visited May 25, 2023).

192 *Fact Sheet*, *supra* note 191, at 1.

193 *Id.*

194 *Id.*

195 *Id.*

196 *Id.*

197 Fact Sheet, *supra* note 191, at 1-2.

198 *Id.*

199 *Id.*

USD 1,000,000,000.00 over five years.[200] In 2021, the demand for SAF in the US was 5 million gallons, which is three times higher than in 2017.[201] US airlines committed for a production of 130 million gallons SAF for 2025. In that context, the IRA mentioned above should be noted.

2. UK

The UK's "Jet Zero" strategy has set a government target for 10% SAF usage by 2030 and has allocated £165 million until March 2025 towards its "Advanced Fuels Fund."[202] There are also ongoing plans to introduce further support for SAF uptake, possibly via a government-backed contract for difference scheme that will set an agreed price for SAF in the UK.[203]

3. Singapore

On 14 February 2022, the Civil Aviation Authority of Singapore launched the International Advisory Panel (hereinafter: "IAP") in order to help support the development of the Singapore Sustainable Air Hub Blueprint.[204] This consists of 20 international industry, tech and knowledge leaders discussing the international effort of making international aviation more sustainable and accessible for everybody and Singapore's potential contribution to this.[205] In September 2022, the IAP submitted its report, which is a blueprint for a decarbonisation roadmap for Singapore's air hub with a medium-term target for 2030 and a longer-term for 2050.[206] Methods, which are required to achieve these targets, are reported as well.[207] The report further contains recommendations for airports, air traffic management and airlines.[208] In relation to

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[200] *Id.*

[201] *SAF Grand Challenge Roadmap*, *supra* note 191, at 3.

[202] Mark Bisset, Maciko Chan & William Ferris, *COP 27: Are Sustainable Aviation Fuels the Future of Net-Zero Aviation?*, CLYDE & CO. (March 3, 2023), https://connectedworld.clydeco.com/post/102i78z/cop-27-are-sustainable-aviation-fuels-the-future-of-net-zero-aviation.

[203] *Id.*

[204] Singapore Takes Key Step Forward to Develop Sustainable Air Hub, CIVIL AVIATION AUTHORITY OF SINGAPORE, https://www.caas.gov.sg/who-we-are/newsroom/Detail/singapore-takes-key-step-forward-to-develop-sustainable-air-hub/ (last visited Aug. 19, 2023).

[205] *Singapore Takes Key Step Forward to Develop Sustainable Air Hub*, *supra* note 204.

[206] *Id.*

[207] *Id.*

[208] *Id.*

the latter, a roadmap shall be implemented to secure long-term supply of SAF.[209] Further, a "buyer's club" of SAF shall be established to create a demand.[210] In addition, an offtake mechanism to SAF shall be introduced, and a carbon offset market in the aviation sector shall be built[211] Further, it shall be ensured that Singapore is an early adopter of aircraft technology.[212]

4. EU

In the EU, one part of the Fit-for-55-package, already mentioned above, is the ReFuelEU Aviation Initiative[213], aiming to increase the production and uptake of SAF. For that purpose, the EC has presented a draft Regulation according to which aviation fuel suppliers shall ensure that all aviation fuel made available to aircraft operator at each Union airport contains a minimum share of SAF, including a minimum share of p-t-l.[214] The specific minimum quota are set out in a timetable (Annex I).[215]

The exact minimum quota was heavily debated, however, on April 26, 2023 the EP and Council of the EU announced to have finally reached a deal.[216] The text now has to be formally approved by Member States in the Council, before entering officially into force as an EU Regulation with immediate effect within the Member States.[217] This last step will likely be completed without significant hurdles, as the Council and EP had already found a compromise during a long trialogue process which was then announced on April 26,2023.[218] The minimum quota agreed on that date are shown in the following timetable:

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[209] Jess Brownlow, *The IAP "Developing a Sustainable Air Hub in Singapore" Blueprint*, WORLD AVIATION FESTIVAL (Sept. 27, 2022), https://worldaviationfestival.com/blog/airlines/the-iap-developing-a-sustainable-air-hub-in-singapore-blueprint/.

[210] Brownlow, *supra* note 209.

[211] *Id.*

[212] *Id.*

[213] The proposal was last amended July 7, 2022. 2023 O.J. (C 47) 298.

[214] Council Directive 2023/2405, art. 4, 2023 O.J. (L) 6.

[215] Council Directive 2023/2405, Annex I, 2023 O.J. (L) 29.

[216] Press Release, *European Green Deal: new law agreed to cut aviation emissions by promoting sustainable aviation fuels*, EUROPEAN COMMISSION (April 26, 2023), https://ec.europa.eu/commission/presscorner/detail/en/ip_23_2389.

[217] *Id.*

[218] *Id.*

	2025	2030	2032	2035	2040	2045
SAF	2 %	6 %	6 %	20 %	34 %	42 %
P-t-L	0	1.2 %	2 %	5 %	10%	15%

The percentage of SAF in 2050 shall be 70% with a sub-quota of 35% P-t-L.[219] On September 13, 2023 the EP approved such quota.[220] Member Stats shall notify penalties to the EC by December 31, 2023, if quota are not reached.[221] A transitional period of 5 years is foreseen to allow aviation fuel suppliers to adjust to these new requirements.[222] During this phase, aviation fuel containing higher shares of SAF may be used to compensate for lower shares of SAF or for the reduced availability at certain airports.[223] However at the moment, it is unclear how exactly such levelling/compensation shall be actually performed. In addition to the European initiative, some European nations (like France, Italy and Germany) had already adopted earlier national laws for future minimum quota of SAF.[224] However, the EC has clarified that any national law regulating the supply of SAF will have to be withdrawn, as ReFuel EU Aviation will be the only European mandate for aviation fuel suppliers.[225]

Moreover, Art. 5 of the ReFuelEU Aviation Regulation[226] includes a refuelling obligations for aircraft operators whereby

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[219] Erin Voegele, *MEPs Approve SAF Mandate, Limit Eligible Feedstocks*, ETHANOL PRODUCER MAGAZINE (Sept. 13, 2023), https://ethanolproducer.com/articles/meps-approve-saf-mandate-limit-eligible-feedstocks.

[220] Voegele, *supra* note 219.

[221] E.g. penalty in Germany: EUR70.00/GJ * 44 GJ/t (lower heating value (LHV FT- kerosene according to RED II) = EUR 3,080/t. Council Directive 2023/2405, art. 12, 2023 O.J. (L) 21.

[222] Council Directive 2023/2405, sec. 44, 2023 O.J. (L) 10.

[223] Council Directive 2023/2405, sec. 45, 2023 O.J. (L) 11.

[224] Bundes-Immissionsschutzgesetz [Federal Immission Protection Act], Sept. 26, 2002, ELEKTRONICSCHER BUNDESANZEIGER [EBANZ], I at 3830. E.g. in Germany, Section 37a para. 2, para. 4a and sec. 37c para. 2 of the Federal Immission Protection Act (*Bundes-Immissionsschutzgesetz*) was newly inserted by the Act on the Further Development of the Reduction of Greenhouse Gas Emissions Quota (*Gesetz zur Weiterentwicklung der Treibhausgasminderungs-Quote*). Christine Kranich & Nils Zimmer, *Germany: How is SAF implemented in the legislation of EU member states?*, EBAA (May 21, 2021), https://www.ebaa.org/industry-updates/how-is-saf-implemented-in-the-legislation-of-eu-member-states-germany/.

[225] Press Release, *Refueleu Aviation Initiative: Council Adopts New Law to Decarbonise the Aviation Sector*, EUROPEAN COUNCIL (Oct. 9, 2023), https://www.consilium.europa.eu/en/press/press-releases/2023/10/09/refueleu-aviation-initiative-council-adopts-new-law-to-decarbonise-the-aviation-sector/.

[226] Council Directive 2023/2405, art. 5, 2023 O.J. (L) 16.

the yearly quantity of aviation fuel uplifted by a given aircraft operator at a given EU airport shall be at least 90% of the yearly aviation fuel required, in order to avoid contra-productive 'fuel tankering' in other regions of the world.[227] This regulation applies to aircraft operators with more than 500 passenger flights or more than 52 all-cargo flights in a year.[228]

The ReFuelEU Aviation regulation however does not distinguish between EU-carriers and non-EU-carriers, so it remains unclear how the actual risk of 'fuel tankering' shall be avoided. Such obligation on airlines is, however, backed by the incentives pursuant to new recital 15 as well as Article 3c – paragraph (b) of the amended EU-ETS Directive[229], which are provided to airlines for the early use of SAF:

> For the period from 1 January 2024 until 31 December 2030, a maximum of 20 million of the total quantity of allowances shall be reserved in respect of commercial aircraft operators, on a transparent, equal treatment and non-discriminatory basis for uplifting SAF under Art. 4 (1) of the Refuel EU Aviation Regulation.
>
> […]
>
> Those allowances shall be allocated by the Member States in the same manner as a contract for difference, covering the remaining price differential between fossil kerosene and SAF for individual aircraft operators, in proportion to the amount of SAF used and reported under ReFuelEU Regulation, in order to incentivise early movers and to support the creation of a Union market for SAF. An additional 20 million allowances should be reserved when flights departing from the EEA to third countries are part of the EU-ETS scope for the same time period."[230]

When calculating the price differences, the EC shall take into account the report published by EASA pursuant to Art. 12 of the ReFuelEU Aviation Regulation.[231] The EC shall publish in the Official Journal details of the average cost difference between fossil

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[227] *Id.*

[228] Council Directive 2023/2405, art. 3, 2023 O.J. (L) 13.

[229] Directive (EU) 2023/958 of the European Parliament and of the Council of May 10, 2023 amending Directive 2003/87/EC, supra 20, as regards aviation's contribution to the Union's economy-wide emission reduction target and the appropriate implementation of a global market-based measure (2023) Official Journal L 130/115.

[230] 2023 O.J. (L 130) 122; *Revision of the EU Emissions Trading System for Aviation*, European Parliament 22-3 (June 8, 2022), https://www.europarl.europa.eu/doceo/document/TA-9-2022-0230_EN.pdf.

[231] *Proposal for a Regulation of the European Parliament and of the Council on ensuring a level playing field for sustainable air transport*, EUROPEAN COMMISSION

kerosene, taking into account incentives from the price of carbon and from harmonized minimum levels of taxation on fossil fuels, and the relevant eligible aviation fuels on a yearly basis for the previous year.[232]

Thus, from the above it is clear, that although the free aviation EU-ETS allowances shall be reduced in 2024 and 2025 (followed by full auctioning from 2026 onwards), there will be still some free allowances available for commercial aircraft operators in relation to use, respectively purchase of, SAF.

The quantity of such allowances shall be proportionate to the total GHG emissions saved according to the treatment of those fuels under the RED III and the delegated acts referred to in Article 14 (1) of that Directive. The Directive is legally binding since June 2021 but has been recently amended as mentioned above.

The actual share of the price differential covered thereunder depends on the fuel type:[233]

Advanced biofuels, hydrogen	70 %
Renewable fuels of non-biological origin ("RFNBO")	95 %
Other fuels (e.g. HEFA)	50 %

Thus, the EU provides an incentive for aircraft operators to use RFNBO as well as biomass-based SAF certified as compliant with the sustainability framework of RED III by taking over a certain percentage of the price difference to fossil fuels and attributing to them "zero emissions" under the scheme.[234] This means i.e. the airline does not have to surrender any emissions allowances when SAF is used instead of fossil jet fuel, and the higher price of SAF (compared to conventional jet fuel) is compensated by the "new SAF allowances" under the revised EU-ETS Directive.[235]

According to RED II, Member States may count SAF towards the achievement of their national renewable energy targets, on the condition that they comply with the sustainability criteria listed in that Directive.[236] A specific multiplier of 1.2 is applied

art. 12 (July 14, 2021), https://eur-lex.europa.eu/resource.html?uri=cellar:00c59688-e577-11eb-a1a5-01aa75ed71a1.0001.02/DOC_1&format=PDF.

[232] 2023 O.J. (L 130) 123.

[233] 2023 O.J. (L 130) 123.

[234] Briefing, Jaan Soone, *ReFuelEU Aviation initiative*, EUROPEAN PARLIAMENT 2, https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/698900/EPRS_BRI(2022)698900_EN.pdf (last visited Jan. 30, 2024).

[235] Soone, *supra* note 234, at 2.

[236] *Id.*

to the supplied quantity of non-food- and-feed-based SAF, meaning that they contribute 20% more of their energy content in accounting towards the renewable energy targets.[237] The EU requirements for qualifying the use of SAF as an advantage or to count towards minimum quota, are much stricter than in the US, e.g. in order to qualify biofuels as renewable energy sources they have to achieve at least 70% reduction of GHG emissions against fossil fuels (see Art. 2 of RED III), whereas under the IRA and CORSIA it is lower (see below).[238]

For SAF to be eligible under CORSIA, it must adhere, until December 31, 2023, only to the following two criteria:

1. achieve net GHG emissions reductions of at least 10% compared to the baseline life cycle emissions values for aviation fuel on a life cycle basis; and
2. not be made from biomass that is either obtained from land converted after 01 January 2008 that was primary forest, wetlands, or peat lands or contributes to degradation of the carbon stock in primary forests, wetlands, or peat lands as these lands all have high carbon stocks.[239]

For SAF to be eligible under CORSIA on and after January 1, 2024, it must adhere to additional criteria, which are set out below. Moreover, the second criteria stated above, has been widened to include obtained or "extracted not only from land but as well aquatic ecosystems such as coral reefs, kelp forests, seagrass meadows, estuaries, tidal salt marshes or mangrove forest."[240]

The additional criteria are as follows:

1. Practices will be implemented to monitor, mitigate and compensate any material incidence of non-permanence resulting from carbon capture and sequestration activities;
2. It will maintain or enhance water quality and availability;
3. It will maintain or enhance soil health;
4. It will minimize negative effects on air quality;
5. It will maintain biodiversity, conservation value, and ecosystem services;
6. It will promote responsible management of waste and use of chemicals;

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[237] *Id.*

[238] Soone, *supra* note 234, at 6.

[239] *CORSIA Sustainability Criteria for CORSIA Eligible Fuels*, ICAO 2 (Nov. 2022), https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA_Eligible_Fuels/ICAO%20document%2005%20-%20Sustainability%20Criteria%20-%20November%202022.pdf.

[240] *CORSIA Sustainability Criteria for CORSIA Eligible Fuels*, *supra* note 239, at 3.

7. It will respect human and labour rights;
8. It will respect land rights and land use rights, including indigenous and/or customary rights;
9. It will respect prior formal or customary water use rights;
10. It will contribute to social and economic development in regions of poverty; and
11. It will promote food security in food insecure regions.[241]

For Low Carbon Aviation Fuel (LCAF) the same as stated above applies and one additional criterion, namely that the production of CORSIA LCAF should minimize seismic acoustic and vibrational impacts.[242]

As stated before, CORSIA allows airlines to reduce their offsetting requirements using CORSIA eligible fuels.[243] However, until recently, no airline across the world has actually used CORSIA-certified fuel.[244] Neste's recent delivery of SAF to American Airlines at San Francisco airport in May 2022, which was certificated as CORSIA eligible fuel by the International Sustainability and Carbon Certification[245] (ISCC) makes this a first in aviation history.[246] Currently, two certification schemes are approved by the ICAO Council as meeting the requirements. These are the above named ISCC and Roundtable for Sustainable Biomaterials[247] (RSB). For the above-described pilot project, the decision was made to pursue an ISCC certification as Neste had worked with ISCC on similar certifications.[248]

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241 *CORSIA Sustainability Criteria for CORSIA Eligible Fuels*, *supra* note 239, at 3-5.

242 *Id.* at 8-9.

243 Press Release, *Neste Delivers Aviation Industry's First Ever CORSIA Certified Sustainable Aviation Fuel to American Airlines*, NESTE (July 12, 2022), https://www.neste.com/releases-and-news/renewable-solutions/neste-delivers-aviation-industrys-first-ever-corsia-certified-sustainable-aviation-fuel-american.

244 *Id.*

245 *Id.*

246 "The International Sustainability and Carbon Certification (ISCC) is an independent multi-stakeholder initiative and certification system supporting sustainable, fully traceable, deforestation-free and climate-friendly supply chains." *See Who We Are*, ISCC, https://www.iscc-system.org/about/who-we-are/ (last visited Sept. 10, 2023).

247 *See also* Book & Claim Explained: What is Book & Claim?, SKYNRG, https://skynrg.com/book-claim-explained-what-is-book-and-claim/#:~:text=The%20Book%20%26%20Claim%20model%20is,before%20entering%20a%20power%20outlet (last visited Sept. 9, 2023).

248 *See, e.g.*, *ISCC EU 203 Traceability and Chain of Custody*, ISCC 59 (July 1, 2021), https://www.iscc-system.org/wp-content/uploads/2022/05/ISCC_EU_203_Traceability_and_Chain-of-Custody-v4.0.pdf.

The ISCC system is a global sustainability certification system for renewable products and their supply chains.[249] Today, almost 6,000 companies in more than 130 countries use the ISCC system to demonstrate sustainability and credible GHG emissions reductions along their supply chains.[250] ISCC is widely applied for the certification of alternative fuels, including SAF, with most major producers and suppliers being part of the ISCC system.[251]

ISCC was recognized as a Sustainability Certification Scheme ("SCS") under CORSIA by the ICAO Council at the end of 2020.[252] ISCC CORSIA certification ensures compliance with the CORSIA Sustainability Criteria for CORSIA eligible fuels.[253] More than 20 companies have been certified under the ISCC CORSIA certification standard[254] More certifications are in the pipeline, as a growing number of companies across SAF supply chains show interest in CORSIA certification.

D. Other SAF Benefits

1. Assist Developing Nations

The growth of crops that are needed for the SAF production may be suitable on land that is unviable for food crops.[255] This can provide economic benefits to countries or regions that have such marginal or unviable land for food agriculture, but which may be suitable to grow crops for the SAF production.[256] Some regions also have other sources of feedstock such as municipal waste.[257] This could be a solution to actually benefit from a new industry but at the same time not endanger the region's ability of food production.[258] The engagement in the SAF crop production

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[249] ISCC Works Towards a Sustainable World, ISCC, https://www.iscc-system.org/ (last visited Jan. 30, 2024).

[250] *See* ISCC Works Towards a Sustainable World, *supra* note 249.

[251] ISCC Works Towards a Sustainable World, *supra* note 249.

[252] *CORSIA Approved Sustainability Certification Schemes*, ICAO (Nov. 20), https://www.icao.int/environmental-protection/CORSIA/Documents/ICAO%20document%2004%20-%20Approved%20SCSs.pdf.

[253] *CORSIA Approved Sustainability Certification Schemes*, *supra* note 252.

[254] Juliane Pohl, *ISCC Update*, ISCC (Oct. 18, 2022), https://www.iscc-system.org/wp-content/uploads/2022/11/2_ISCC-TC-SEA_ISCC_Update_Juliane-Pohl.pdf.

[255] *What is SAF?*, *supra* note 116, at 3.

[256] *Id.*

[257] *Beginners's Guide to Sustainable Aviation Fuel, 4th Edition*, Air Transport Action Group 10 (April 2023), https://aviationbenefits.org/media/168027/atag-beginners-guide-to-saf-edition-2023.pdf; *What is SAF?*, *supra* note 116.

[258] *What is SAF?*, *supra* note 116, at 3.

could lead to employment growth and at the same time, if applicable; encourage the improvement of waste management.[259] It is common for waste to be an environmental problem in developing countries.[260] Engaging in SAF industry may have the positive side effect of processing waste, while at the same time reducing CO_2 emissions.[261]

If by these incentives, the production goes up, it can promote the cycle of unlocked additional demand, which again leads to an increase of SAF users, not only airlines themselves, but also costumers of air carriers, by bridging a significant price premium for the demanded SAF.[262]

2. Reduction of NO_x

SAF not only reduces CO_2 emissions, but due to the fact that it burns cleaner (as it contains fewer aromatic compounds) than fossil fuel, it reduces as well non- CO_2 emissions that come from nitrous oxides and contrail-induced cloud cover (NO_x). Through reduction of contrails, that have an even worse impact on the climate than CO_2 emissions, actually two-thirds of the climate impacts of air transport are due to non-carbon-dioxide effects and only one-third from CO_2 emissions.[263]

Therefore, the EC decided that from January 1, 2025 onwards, aircraft operators have to report once a year on the NO_x aviation effects occurring.[264] For this purpose, the EC shall adopt by August 31, 2024 an implementing act in order to include NO_x in a MRV framework.[265] By January 1, 2028, based on the results of the application of the MRV framework of NO_x, the EC shall submit a

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259 *Id.*

260 *Id.*

261 *Id.*

262 Thomas Bock & Antoine Habersetzer, *A Book and Claim Approach for SAF - aireg's perspective on basic design principles*, AVIATION INITIATIVE FOR RENEWABLE ENERGY IN GERMANY E. V. ("AIREG") 5, https://aireg.de/wp-content/uploads/2022/06/bc-papier_v01-5.pdf (last visited Sept. 9, 2023).

263 Jasper Faber, Julius Kiraly, David Lee, Bethan Owen & Aoife O'Leary, *Potential for reducing aviation non- CO2 emissions through cleaner jet fuel*, CE DELFT (Feb. 2022), https://cedelft.eu/wpcontent/uploads/sites/2/2022/03/CE_Delft_210410_Potential_reducing_aviation_non-CO2_emissions_cleaner_jet_fuel_FINAL.pdf; *New study reveals: Global air transport contributes 3.5 percent to global warming*, DEUTSCHES ZENTRUM FÜR LUFT- UND RAUMFAHRT ("DLR") (Sept. 3, 2020, https://www.dlr.de/en/latest/news/2020/03/20200903_global-air-transport-contributes-3-5-percent-to-global-warming#:~:text=Global%20air%20transport%20accounts%20for,being%20the%20most%20significant%20factor.

264 2023 O.J. (L 130) 127.

265 *Id.*

report and, where appropriate, a legislative proposal after having first carried out an impact assessment to mitigate such effects by expanding the scope of the EU-ETS to include NOx.[266]

Thus, the use of more SAF is not only beneficial for the reduction of CO_2 emissions but as well for reduction of NOx emissions, which have an even worse impact on the climate than CO_2.

E. The Need to Further Increase Production and Uptake of SAF

Notwithstanding the above-mentioned examples of actual SAF supply and benefit, as of today SAF accounts for only about 1% of the jet fuel produced worldwide.[267] Therefore, in order to actually reach the minimum quota, which are established in Europe, and to reach the even more ambitious climate protection goals of the Paris Agreement, the production and uptake need to be increased significantly. In that context, it also needs to be considered that the ramping up of p-t-l production will take some time as it still is a very costly process.[268] On the other side, the biomass that is available for SAF production and simultaneously acceptable under EU-ETS/RED III and CORSIA, may be used as well for production of alternative fuels for use in other transportation sectors and even for other industries, like e.g. the chemical industry, which needs to decarbonized as well.

If all sustainable feedstock, like e.g. municipal waste, agricultural residues and cooking oil waste, were dedicated solely to SAF production, annual production levels of about 390 billion of litres of SAF by 2040 could be achieved. Statistical projections indicate that this amount will also be needed.[269] However, it is not to be expected that all sustainable feedstock will be used solely for SAF production. Therefore, more needs to be done in order to increase the production and use of SAF.[270] A way forward is a (global) book-and-claim system for SAF, which shall be explained in the chapter below.[271]

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[266] *Id.*

[267] *What is a Book-And-Claim Platform for SAF and how does it Work?*, *supra* note 115.

[268] A real scaling of the production for p-t-l- is estimated by Impact on Sustainable Aviation e.V. may be achieved the earliest within 10 years.

[269] *Projected use of sustainable aviation fuels (SAF) worldwide from 2025 to 2050, by type*, STATISTA (Oct. 2021), https://www.statista.com/statistics/1267846/sustainable-aviation-fuel-worldwide/.

[270] *What is a book-and-claim platform for SAF and how does it work?*, *supra* note 115.

[271] *Id.*

IV. BOOK-AND-CLAIM

A. Scaling up SAF Production by use of Book-and-Claim

As the production of SAF is still limited today, possible buyers and end users often cannot access it through the existing supply chain network.[272] SAF is currently produced and supplied in a few countries and airports (currently only 60 airports worldwide distribute SAF).[273] This makes the needed fuel often out of reach for commercial airlines, business aviation operators, and their private or corporate customers[274] Only very few providers offer location searches for SAF provision facilities.[275]

Thus, if airlines want to offer SAF to their passengers or use it to reduce their financial obligations under EU-ETS and CORSIA, they cannot get SAF onto their aircraft without costly and emissions-generating, and thereby counterproductive, logistics.[276] Thus, even though private and corporate persons may wish to pay the extra premium that SAF entails and have the funds to do so in order to boost their ESG[277] commitments and account for their GHG emissions, it is simply not available for the particular flights. Moreover, many of the big European and US commercial airlines have committed to using about 10% SAF in their operation by 2030, whereas Latin America's LATAM has set its target only at

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[272] *Id.*

[273] *Production Facilities*, ICAO Environment, https://www.icao.int/environmental-protection/GFAAF/Pages/Production-Facilities.aspx (last visited June 8, 2023).

[274] *What is a Book-And-Claim Platform for SAF and how does it Work?*, *supra* note 62.

[275] 4Air has created an interactive map to help find locations with SAF supply; today the map only includes destinations with physical SAF supply, the map is continuously updated as new locations are verified by 4AIR or new announcements are made; users will be directed to the FBO's website in order to enquire about the quantities available at the respective airport. *Where can I find Sustainable Aviation Fuel (SAF)?*, 4AIR, https://www.4air.aero/saf-map (last visited June 8, 2023).

[276] *What is a book-and-claim platform for SAF and how does it work?*, *supra* note 115.

[277] ESG is the term for "Environmental, Social and Governance" that stands for a set of aspects, which should be considered when investing in companies. It takes into account environmental, social and corporate governance issues. *#1 What is ESG?*, Deloitte, https://www2.deloitte.com/ce/en/pages/global-business-services/articles/esg-explained-1-what-is-esg.html (last visited Jan., 31, 2024) For the environmental aspect, see also the GHG Protocol, which supplies the world's most widely used GHG accounting standard and distinguishes between direct emissions (scope 1) and indirect emissions (scope 3). GHG Protocol, https://ghgprotocol.org/ (last visited Oct. 5, 2023).

5%, not due to lack of will but because of the "obstacles to getting its hands on more."[278]

Therefore, a block-chain based book-and-claim system is a solution to overcome that hurdle and would boost the production of SAF.[279] Following the scaling up of SAF production, the costs of SAF will, as a logical consequence, be reduced over time[280] Moreover, a book-and-claim concept may also be suitable for airlines in order to reduce their obligations under EU-ETS and CORSIA.[281] The general concept of book-and-claim and its specific one in relation to SAF is described below. Further, existing systems will be mentioned, however, in order to achieve all what could be achieved with a widely used book-and-claim system, that is immune against fraud and "greenwashing", it should be a system administered by a government entity with a certain scope in relation to participants and jurisdictions (see 0. Conclusion). Whereby a worldwide system would, of course, be best, however, very difficult to establish, hence, we recommend such a system, at least for now, on an EU level.

B. General Description of Book-and-Claim System

The book-and-claim system decouples a sustainability claim that results from the use of a resource from the location where the resource was physically consumed.[282] Technically speaking, book-and-claim is a chain of custody model that allows to separate the environmental benefits, from the physical product and to transfer them via a dedicated registry in the form of a book-and-claim unit or certificate. In other words, book-and-claim is a model in which the administrative record flow does not necessarily connect to the physical flow of material or product throughout the supply chain.[283]

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[278] Press Release, *LATAM Seeks to Reach 5% Sustainable Fuel Use by 2030, Favouring Producers Throughout South America*, LATAM Airlines Group (April 6, 2022, 8:30), https://www.latamairlines.com/us/en/press-room/releases/latam-sustainable-aviation-fuel.

[279] *Could Blockchain and Book-And-Claim Systems Help to Achieve Rapid Upscaling of SAF?*, Energy Institute (May 10, 2022), https://knowledge.energyinst.org/new-energy-world/article?id=127345.

[280] *Id.*

[281] Sarfaraz Hussain, *Shaping the Future of Aviation: CORSIA, SAF, and the Book and Claim Paradigm*, CCARBON (June 14, 2023), https://www.ccarbon.info/article/shaping-the-future-of-aviation-corsia-saf-and-the-book-and-claim-paradigm/.

[282] *What is a Book-And-Claim Platform for SAF and how does it Work?*, *supra* note 115.

[283] *RSB Book and Claim Programme*, Roundtable on Sustainable Biomaterials Association, https://rsb.org/programmes/book-and-claim/ (last visited Sept. 9, 2023).

A similar model has been already in extensive use in the green electricity market for decades, which let to lowered overall emissions, as even people who are located far away from e.g. wind turbines are still able to buy electricity generated by the turbines and thereby increasing demand for wind energy.[284] The supply followed, leading to lowered overall emission per one unit of electricity consumed.

C. SAF Book-and-Claim

Regarding the book-and-claim of SAF, the concept would be similar: While the purchaser of the SAF is not technically flying on SAF, its purchase demonstrates market demand and supports the development of SAF supply globally[285] In turn, the purchaser may claim its SAF emissions reduction purchase towards its GHG reduction goals[286] In other words, book-and-claim for SAF allows aircraft operators to buy "SAF certificates" and offer those certificates to their customers.[287] In addition, airlines may reduce their own obligations under EU-ETS and also under CORSIA, without being geographically tied to the SAF production facility or SAF supplier.[288]

Each transaction booked under such a system needs to be recorded with a unique identifier[289] The SAF producer reserves the booked amount of SAF and forwards it to a physical fuel distribution network.[290] Thus, the person making the booking and purchasing of SAF will not use it on the aircraft with which it performs the flight, because its departure location is not near any SAF supplier.[291] Instead, the SAF is piped into the fuel system of a different airport and an aircraft located at that airport (which is near a SAF production facility) will use such SAF (which was bought from elsewhere in the world).[292] Still, the person who purchased the SAF should be able to use such purchase in order to

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[284] *Book and Claim Explained: What is Book and Claim?*, SKYNRG, https://skynrg.com/book-claim-explained-what-is-book-and-claim/#:~:text=The%20Book%20%26%20Claim%20model%20is,before%20entering%20a%In20power%20outlet (last visited Sept. 9, 2023).

[285] *Book & Claim for SAF-FAQs*, RSB, https://rsb.org/wp-content/uploads/2021/11/21-11-08-Book-Claim-FAQ-.pdf (last visited Feb. 1, 2024).

[286] *Id.*

[287] *Id.*

[288] *Id.*

[289] *What is a Book-And-Claim Platform for SAF and how does it Work?*, *supra* note 115.

[290] *Id.*

[291] *Id.*

[292] *Id.*

reduce its carbon footprint or for reporting requirements under Greenhouse Gas Protocol.[293] In addition, the commercial airline who purchased (but did not use) should be able to reduce its obligations under CORSIA or EU-ETS (as applicable)[294]

In such a book-and-claim system it is important to ensure full traceability so there is no risk of double counting or any other fraud.[295] However, the same SAF should enable (i) a supplier to comply with its supply obligations under ReFuelEU Aviation; and (ii) an airline to reduce either its obligations for purchasing emission allowances (EU-ETS) or its offsetting requirements (CORSIA). This may be achieved through a trustworthy third party that runs the system and guarantees the credibility of the process, backed by independent verification or even better, by a public authority.[296] If it is ensured that the SAF bought by someone in the book-and-claim system, is actually used by customers who are simply paying for jet fuel and do not get to claim credit towards using SAF, there should be no double-counting.

Unfortunately, as of today, there is no global certification for a SAF book-and-claim system. However, the environmental integrity of SAF within a book-and-claim system could be ensured by only allowing SAF compliant with widely accepted frameworks, such as in the EU RED,[297] in the US the LCFS systems[298] or CORSIA requirements to be registered as tradable units.[299]

Ideally, tradable units could be allowed to comply with more than one regulatory framework, giving more flexibility to the system, provided the respective SAF meets the sustainability criteria required under each framework.[300] At the same time, the system should allow for positive market dynamics through healthy competition between feedstock/raw materials, production pathways and producers within the system.[301]

Trading between end-users (i.e. outside the transport industry) should be prohibited to avoid artificial shortages and speculation of tradable units.[302] At the same time, tradable units should have

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293 *Id.*; Bock, supra note 262, at 4.

294 *Book & Claim for SAF - FAQs, supra* note 285.

295 *Id.*

296 *Book & Claim for SAF - FAQs, supra* note 285.

297 2018 O.J. (L 328) 1.

298 *Low Carbon Fuel Standard*, California Air Resources Board, https://ww2.arb.ca.gov/sites/default/files/2020-09/basics-notes.pdf (last visited Sept. 9, 2023).

299 Bock, *supra* note 262, at 4.

300 *Id.*

301 *Id.*

302 *Id.*

a certain expiry date to ensure they are not accumulated, and production and use occur within a given timeframe.[303] For instance, the expiry date could be set at 12 to 24 months after SAF blending and certification.[304]

In relation to a tradable unit for SAF, aireg e.V.[305] suggested that it should represent a metric ton of SAF and include, at a minimum, the following associated sustainability information:

1. Unique identifier of tradeable unit;
2. Date and country of issuance of tradable unit;
3. Unique identifier of underlying proof of sustainability ;
4. SAF production pathway;
5. Feedstock type;
6. Producer, production date and production site of SAF;
7. Date and site of blending/certification point of SAF;
8. Life-Cycle GHG Value of SAF;
9. Additional information as required by any applicable regulatory policy.[306]

The sustainability information related to the tradable SAF unit should be transferred and claimed only together as in line with best practice for renewable electricity claims.[307] However, a barrier in relation to the use of SAF by airlines is the administrative effort resulting from the current methodology to account for emission reductions associated with the actual use of SAF under EU-ETS[308] In the article cited in the previous sentence, the authors concluded that the book-and-claim concept stands out as an easy-to-implement, field proven and robust system against fraud, therefore, they further elaborate, that:

> The existing supply infrastructure for aviation fuels can be used unrestrictedly, a wide range of aircraft operators could access SAF without having to physically possess the fuel itself and the administrative burden is greatly reduced. Furthermore, the concept can

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303 Bock, *supra* note 262, at 4.

304 In the energy sector the guarantees of origin must be used twelve months after production of the corresponding amount of energy and if not used within that time frame, they will be subsequently devalued. *Best Practice Recommendations*, RE DISS II 2 (Sept. 30, 2015), https://www.aib-net.org/sites/default/files/assets/facts/residual-mix/222-RE-DISS_Best_Practice_Recommendations_v2.4_Final.pdf.

305 Bock, *supra* note 262, at 3.

306 *Id.* at 4.

307 *Id.*

308 *See* Jan Pechstein, Nils Bullerdiek & Martin Kaltschmittm, *A "Book and Claim"-Approach to Account for Sustainable Aviation Fuels in the EU-ETS – Development of a Basis Concept*, Science Direct abstract (Jan. 2020), https://www.sciencedirect.com/science/article/abs/pii/S0301421519306019.

> make use of synergies, i.e., adapting software and using certificates (e.g. guarantees of origin (GoOs)) from existing book and claim concepts while fraud protection is ensured by national customs. As aviation fuel for commercial flights is exempted from excise tax, it is subject to tax supervision based on a uniform system throughout the EU. For this purpose, detailed data on fuel stocks and movements are recorded. If these data were shared with the EU-ETS authorities, the administrative effort could be further minimized. Based on these findings, this Article proposes an advanced methodology to account for SAF in the EU-ETS based on the book and claim principle.[309]

In relation to the protection ensured by national customs, the authors refer to the excise or energy tax supervision by national customs (e.g. using the supranational binding Excise Movement and Control System (EMCS)).[310] It should be noted though, that the EC intends to eliminate the energy tax exemption for commercial flights. However, the system is existent and such supervision will most probably prevail as Member States want to take action to prevent unnoticed fuel withdrawals in order to avoid untaxed fuel from being used for energy-tax relevant purposes.[311]

By redeeming a certificate acquired through book-and-claim, it should be possible for an aircraft operator to declare the equivalent quantity of Jet A/Jet A-1 as SAF, regardless of its true origin, and thereby reducing the number of emission allowances that must be acquired and surrendered under EU-ETS or reducing the offsetting requirements under CORSIA.[312]

When the EP voted on 7 July 2022 to support the EC's ReFuelEU Aviation initiative to introduce an obligation to uplift an increasing percentage of SAF for all flights leaving the EU, it amended the EC's draft rules to include

i. "more ambitious blending levels;"
ii. "a higher sub-mandate for synthetic fuels;" and
iii. "elements of a book-and-claim system"

to "enable fuel suppliers to provide, and airlines to uplift, SAF in the most cost-effective manner and to avoid imposing an 'undue burden' on air transport operations at small airports or airports in remote parts of the EU."[313]

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309 Pechstein, *supra* note 308, at 10.
310 *Id.* at 9.
311 *Id.* at 7.
312 *Id.*
313 2023 O.J. (C 47) 298.

In that context the following was stated in Amendment 98 of the proposal for such a Regulation (Art. 13 – para. 1a (new)):

> By 1 January 2025, the Commission shall adopt delegated acts in accordance with Article 13a to supplement this Regulation by laying down detailed arrangements for the SAF flexibility mechanism, guaranteeing a level playing field and a high level of environmental integrity, as well as minimising the risk of fraud, irregularities and double claiming. Such detailed arrangements, incorporating elements of a book & claim scheme, may enable the setting up of a system of tradability of SAF, including detailed rules regarding the registration, allocation, accounting and reporting of the supply and uptake of SAF.[314]

Such a book-and-claim system would be very beneficial for airlines as such a system ensures that only SAF (as certified under RED III or CORSIA, as applicable) is purchased. Thus, it would eliminate the burden on the airline of obtaining itself such proof, which is currently very cumbersome and could be done only by airlines of a certain size that have the capacity for performing such additional tasks. If a central well-trusted book-and-claim registry (administered by an EU governmental entity) has been established, the airline does not have the obligation itself (to ensure and provide proof to the respective authority, that the SAF purchased actually complies with the sustainability criteria under EU-ETS or CORSIA) but the system ensures itself that only SAF meeting the respective criteria will be entered into the book-and-claim system. Thus, when the airline purchases such SAF in the book-and-claim system, it is already clear that it fulfils the applicable sustainability criteria.

Currently business aviation is the biggest customer for all SAF suppliers as the book-and-claim mechanism was developed in that sector.[315] Owners and passengers on such jets are more keen to pay the additional price for SAF and use the purchase of SAF (even if not used by themselves) in order to reduce their own carbon footprint and make that visible to its business partners and financiers.

The EBAA has also stated in a press release that although EBAA advocated the inclusion of a book-and-claim system within the scope of the legislation, such a system regrettably did not found

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[314] 2023 O.J. (C 47) 345.

[315] *European Business Aviation Backed Amendment on "SAF Book and Claim" Introduced by European Parliament*, EUROPEAN BUSINESS AVIATION ASSOCIATION (July 14, 2022), https://www.ebaa.org/press/saf-book-and-claim/ (last access September 9, 2023).

its way in the legislation yet and now business aviation is facing the following challenges[316]

As business aviation operators face ongoing challenges in securing a steady supply of SAF, partly due to the competition with airlines which possess stronger bargaining power when dealing with fuel suppliers, a Book & Claim system would allow operators to purchase SAF even if it is not available in their re-fuel location. This, in turn, would contribute to a virtuous cycle by boosting both the supply and demand for SAF. Moreover, the definition of 'Union airport' as an airport with passenger traffic higher than 800,000 a year poses additional challenges for business aviation as SAF availability at smaller airports, to which business aircraft fly to, will be very limited if not inexistent. EBAA expressed concern that due to these elements, Business aviation operators will face considerable challenges in meeting decarbonisation objectives.[317]

D. Market Overview of existing Book-and-Claim systems

ICAO has provided an overview[318] of SAF reporting and accounting initiatives (e.g. book-and-claim systems) of various aviation stakeholders, whereby only two provide guidance/methodology, a registry *and* verification. These two systems are introduced as follows.

1. Roundtable on Sustainable Biomaterials (RSB)

Roundtable on Sustainable Biomaterials (RSB) has developed a book-and-claim certification approach.[319] In close collaboration with stakeholders and industry experts, e.g. Air bp, United Airlines, Microsoft, the Sustainable Aviation Buyers Alliance ("SABA")), RSB is currently piloting with SAF transactions.[320] Air bp has supplied SAF in Scandinavia already starting in 2016

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316 *Refuel EU Set Ambitious SAF Mandate but Opens Book-And-Claim Dilemma for Business Aviation*, EBAA (Sept. 27, 2023), https://www.ebaa.org/industry-updates/refuel-eu-sets-ambitious-saf-mandate-but-opens-book-claim-dilemma-for-business-aviation/ .

317 *Id.*

318 *Supporting Policies to Promote the Development and Deployment of Cleaner Energy for Aviation –Opportunities And Challenges - ICAO Environmental Regional Seminars April 13 to May 8, 2023*, ICAO Environment 29, https://www.icao.int/Meetings/RS2023/Documents/1 - Supporting Policies.pdf (last visited June 8, 2023).

319 *RSB Book and Claim Programme*, *supra* note 283.

320 *Id.*

for regulatory reporting.[321] Microsoft was the first US company to fund SAF emissions reductions in partnership with airlines, and United was the first airline globally to use SAF on an ongoing basis.[322] That system can be used with jet fuel purchases currently only in France, Germany, Spain, Switzerland, the UK and the US.[323]

The RSB Book-and-Claim system consists on one hand of the RSB Book & Claim Manual, which is a procedure describing the rules which allow a company to register, transfer and retire credits in the RSB Book-and-Claim system.[324] On the other hand, it contains the RSB Book & Claim Registry, which is a system for the use of the transaction data of the respective process.[325] The Registry requires that all users[326] are registered within the system.

> Users that register ("book") credits into the RSB Book-and-Claim Registry must hold a valid RSB Chain of Custody (Trader) certificate against the RSB Global certification scheme. This allows their Book-and-Claim transactions to be independently verified by an auditor to ensure traceability and no double counting. Those that "trade" or "retire" (claim) credits in the RSB Book-and-Claim Registry need only to be registered within the system as users.[327]

The SAF producer who "books" the SAF into the RSB Book-and-Claim Registry must hold a valid RED or CORSIA certificate.[328]

Meanwhile RSB has issued its third version of the Book-and-Claim Manual and states that it is perfectly positioned to lead in the development of book-and-claim by building on its "best-in-class sustainability framework, which has been recognised by RED and CORSIA".[329] RSB has been operating a foundational

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[321] *Book & Claim for SAF - FAQs*, supra note 285.

[322] *Book & Claim for SAF - FAQs*, RSB 4, https://rsb.org/wp-content/uploads/2021/11/21-11-08-Book-Claim-FAQ-.pdf (last visited Feb. 1, 2024).

[323] But RSB (with its partners) is exploring additional locations. *Book & Claim for SAF - FAQs*, RSB 4, https://rsb.org/wp-content/uploads/2021/11/21-11-08-Book-Claim-FAQ-.pdf (last visited Feb. 1, 2024).

[324] *Id.*

[325] *Id.*

[326] This means suppliers who book SAF, customers who claim it, and potential third parties who trade the credits. *Book & Claim for SAF - FAQs*, RSB 3, https://rsb.org/wp-content/uploads/2021/11/21-11-08-Book-Claim-FAQ-.pdf (last visited Feb. 1, 2024).

[327] *Id.*

[328] *Id.*

[329] *RSB Book and Claim Programme*, *supra* note 283.

registry since 2021, which is currently being upgraded to a web-based application and is expected to be launched in 2023.[330]

2. International Sustainability and Carbon Certification ("ISCC")

ISCC[331] is listed in the above-mentioned ICAO paper as one organization that has – like RSB - commenced a book-and-claim initiative, which implements guidance/methodology, a registry and verification. Despite this, ISCC actually states that a third chain of custody option known as book-and-claim is not allowed under RED, because with book-and-claim the traceability characteristics and the actual material flow cannot be provided.[332] Whether that is actually the case with the RSB book-and-claim system may be doubted. RSB actually states that the airlines with and without physical access to SAF can already operate 100% SAF flights whereby up to 50% physically via "mass balance" and the remaining share virtually through book-and-claim.[333] However, ISCC further states that any trade of sustainable material under ISCC always refers to a specific batch of sustainable material and a sustainability declaration is issued for each delivery of sustainable material. This declaration is linked to a specific amount of physical sustainable material[334] and, therefore, the issuance and trading of sustainability declarations without the link to an equivalent amount of physical sustainable material is considered as book-and-claim and thus not allowed under ISCC.[335]

V. CONCLUSION

In order to comply with the legally binding Paris Agreement and the European Climate Law and to fulfil the ambitious targets for the aviation sector, it is necessary that the production and use of SAF is substantially scaled up, as otherwise, those targets will not be achieved. Therefore, aircraft operators should be enabled

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[330] *RSB Book & Claim Manual Set to Accelerate Aviation Decarbonisation*, RSB (April 5th, 2023), https://rsb.org/2023/04/05/rsb-book-claim-manual-set-to-accelerate-aviation-decarbonisation/.

[331] *See Who We Are*, *supra* note 127.

[332] *ISCC EU 203 TRACEABILITY AND CHAIN OF CUSTODY*, ISCC 59 (July 1, 2021), https://www.iscc-system.org/wp-content/uploads/2022/05/ISCC_EU_203_Traceability_and_Chain-of-Custody-v4.0.pdf.

[333] *Book & Claim for SAF - FAQs*, RSB 1, https://rsb.org/wp-content/uploads/2021/11/21-11-08-Book-Claim-FAQ-.pdf (last visited Feb. 1, 2024).

[334] *ISCC System Updates*, ISCC (Nov. 21, 2022), https://www.iscc-system.org/updates/21-november-2022/.

[335] *Id.*

(by the governments) to use SAF purchases through a book-and-claim system in order to reduce their obligations under CORSIA, respectively EU-ETS.

In relation to EU-ETS, the airlines should also be able to cover the extra premium payable for SAF by using the newly introduced "SAF allowances", even if such SAF was purchased through a book-and-claim system. If implemented, such opportunities should be broadly communicated, so that aircraft operators have an incentive to actually purchase SAF and thereby contribute to the scaling up of production. Governments have raised concerns that if the SAF is purchased by one of its airlines but not used by it (as purchased through book-and-claim), such purchase could not count towards the national GHG reduction quota under RED III of that country.[336] However, if airlines are part of the book-and-claim system, each country should be able to account for the purchases of SAF by the airlines incorporated in its country and thereby account for its GHG reduction obligations. Otherwise, we do not see how the SAF production and uptake could be scaled-up in substantial amounts as it is actually necessary, in particular, if considering the difficulties in obtaining financing (no one wants to be the first) for SAF production facilities and the competition in relation to feedstock in order to decarbonise, respectively, defossilise also other transport sectors and even other industries.

At least the EC is now planning to launch a study on book-and-claim for SAF.[337] Moreover, Art. 15 in the ReFuel EU Aviation Regulation stipulates in relation to the "flexibility mechanism" that:

> By 1 July 2024, the Commission shall… assess possible improvements or additional measures to the existing SAF flexibility mechanism, such as establishing or recognising a system of SAF tradability. This would enable fuel supply within the Union without requiring a physical connection to a supply site. The objective is to further streamline the supply and utilisation of Sustainable Aviation Fuel (SAF) for aviation during the flexibility period**,** incorporating elements of a Book & Claim system.[338]

This can only be seen as the policymakers finally taking a look into the right direction in order to foster SAF production and use, which is so urgently needed to combat climate change in

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[336] Bock, *supra* note 262, at 4.

[337] *EU To Seek Views On 'Book-And-Claim' For SAF*, Aviation Week Network (April 5, 2023), https://aviationweek.com/air-transport/safety-ops-regulation/eu-seek-views-book-claim-saf.

[338] Oscar Henderson, *SAF'S Invisible Hand*, SAF Investor (Nov. 17, 2023), https://www.safinvestor.com/opinion/143550/safs-invisible-hand/.

aviation. It should be one (master) book-and-claim registry for SAF which is available for all EU member states in order to avoid double counting, by having booked SAF into several registries. A book-and-claim system administered by a government entity on an EU level should be able support multiple legislative instruments, such as the SAF minimum quota of suppliers (ReFuelEU Aviation[339]), the obligations of airlines under EU-ETS and CORSIA, and the obligations of the EU countries under RED III, by facilitating and simplifying the compliance processes. The current patchwork of legislation-specific requirements imposes a significant burden on SAF suppliers and its users (the airlines). Even the flexibility mechanism under ReFuelEU Aviation[340] reduces the burden of supplying SAF to all airports only up to the end of 2034 and it is not clear how such flexibility mechanism should be actually applied. A book-and-claim system used for the whole EU, would certainly help to administer such flexibility. Such an EU-wide book-and-claim system would need to be introduced by an EU-Regulation or a Directive, the latter would then have to be implemented into national law within a set time frame. This would ensure that only one system with the mentioned benefits exists. A cooperation with a private company via a call for tenders would guarantee that EU law is respected in choosing a provider for such a blockchain-based system. At a second stage, such system could be integrated into a worldwide book-and-claim system for SAF, which in turn could be implemented on ICAO level as it was done with CORSIA.

Moreover, such a book-and-claim system will not only assist fuel suppliers and airlines to comply with their legal requirements, it would also benefit airline customers by simplifying their environmental claims related to SAF under voluntary reporting regimes.[341] If the book-and-claim system would have an interface to the RED registries of the EU member states, it would also assist the EU member states with their compliance obligations in relation to reducing the GHG emission in each member state. Moreover, a form of book-and-claim system (with traded sustainability certificates) already exists under RED (see Guarantees of Origin for bio-methane fed into the natural gas grid). Also, the Union Database for Biofuels (UDB) may assist in the establishment of

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339 *See supra* III. 3. 0.

340 *See supra* III. 3. 0.

341 *See, e.g.*, GHG PROTOCOL, *supra* 277.

such a book-and claim system for SAF.[342] The UDB was established to improve the traceability of gaseous and liquid fuels in the transportation sector (in order to avoid double counting and mitigating the risks for irregularities and fraud).[343] Article 31a (1) of RED III states that the EC shall ensure that a Union database is set up to enable the tracing of liquid and gaseous renewable fuels and recycled carbon fuels.[344] Moreover, Article 31a (2) elaborates further:

> Member States shall require the relevant economic operators to enter in a timely manner accurate information into that database on the transactions made and the sustainability characteristics of the fuels subject to those transactions, including their life-cycle greenhouse gas emissions, starting from their point of production to the moment it is consumed in the Union. Information on whether support has been provided for the production of a specific consignment of fuel, and if so, on the type of support scheme, shall also be included in the database. Where appropriate to improve traceability of data along the entire supply chain, the Commission is empowered to adopt delegated acts in accordance with Article 35 to further extend the scope of the information to be included in the Union database to cover relevant data from the point of production or collection of the raw material used for the fuel production. Member States shall require fuel suppliers to enter the information necessary to verify compliance with the requirements laid down in Article 25(1), first subparagraph, into the Union database.[345]

Thus, the SAF book-and-claim system could be based on the above mentioned, already existing administration infrastructures. Also other stakeholders in the aviation industry (like aircraft leasing companies and airports) have an interest in reporting emissions reductions from SAF and they would as well benefit from such a system, if the airlines could provide to them (acceptable) proof of their SAF purchases by supplying an excerpt from a central registry as proof of purchase and the associated GHG

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[342] *About*, European Union, https://wikis.ec.europa.eu/display/UDBBIS/Union+Database+for+Biofuels+%28UDB%29+-+About (last visited Feb. 2, 2024).

[343] *Id.*

[344] *REPORT on the proposal for a directive of the European Parliament and of the Council amending Directive (EU) 2018/2001 of the European Parliament and of the Council, Regulation (EU) 2018/1999 of the European Parliament and of the Council and Directive 98/70/EC of the European Parliament and of the Council as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652*, European Parliament (July 18, 2022), https://www.europarl.europa.eu/doceo/document/A-9-2022-0208_EN.pdf.

[345] *Id.*

emissions reduction. In addition, the airline can pass on such certificates showing the GHG emissions reduction to its customers (to enable Scope 3 reduction claims for passengers, freight forwarders and shippers).

Therefore, we are advocating for the swift introduction of an (at least) EU-wide book-and-claim system for SAF, administered by a governmental entity of the EU as it would allow mandatory and voluntary SAF reporting with significantly less administrative effort according to various industry standards and regulations. Second, it would improve transparency, ensure verifiability, and increase confidence in environmental claims related to SAF and thereby scaling up production and use of SAF. Last but not least, it would reduce the risk of fraud (e.g., double counting) across the system due to a chain of custody system, based on the use of unique certificates.