Disclaimer: The information provided in this report is based on United's Eco-Skies Alliance program as it exists as of the date of this submittal. Future program offerings and features are subject to change in United's sole discretion.

Response to SBTi Call for Evidence on the Effectiveness of the Use of Environmental Attribute Certificates in Corporate Climate Targets – United Airlines' Eco-Skies Alliance Program Case Study
November 24, 2023

1. Introduction

United Airlines, Inc. (United) launched our Eco-Skies Alliance (ESA) program in 2021 which allows our corporate passenger and cargo customers to purchase scope 3 emissions reductions from United's use of sustainable aviation fuel (SAF). This program is enabled by the use of SAF certificates (SAFc), a type of environmental attribute certificates (EACs), which United issues to corporate passenger and cargo customers participating in the ESA program.

In response to the Science Based Target initiative's (SBTi's) call for evidence on the effectiveness of the use of environmental attribute certificates in corporate climate targets, United would like to highlight our ESA program as a case study of a program that helps reduce corporate greenhouse gas (GHG) emissions and promote the scale-up of SAF technologies. This response also examines the ESA program's operations to identify the following key takeaways, best practices, and future opportunities for both United and the broader SAF and SAFc market:

- United's ESA program reduced 4,790 MT CO_2e in 2021 and 23,640 MT CO_2e in 2022 through the use of SAF instead of conventional jet fuel. The growth of the program in just one year resulted in a 5x increase in emissions reductions from the use of SAF.
- The airline claims the scope 1 emissions of the SAFc providing assurance that SAF was used to displace conventional jet fuel generating measurable emissions reductions, which is critical to demonstrate actual transition to SAF for aviation travel.
- The airline either procures SAF that has been certified sustainable by the Roundtable on Sustainable Biomaterials (RSB) or International Sustainability & Carbon Certification (ISSC) or procures SAF from producers that have obtained sustainability certifications, and the ESA's allocation process and emissions and reduction calculations are verified by a third-party which increases credibility.
- There is a need for a centralized and robust SAF registry or greater consistency across the registries in development to increase the transparency and credibility of SAFcs.

2. Case Study Analysis

2.1 Introduction to United's ESA Program

In April 2021, United announced our ESA program for our corporate passenger and cargo customers to come together to meet their collective goals and build a collaborative, cross-industry program between our airline and automotive, consulting, logistics, insurance, and software companies (United, 2021). In exchange for scope 3 emissions reductions from SAF purchased by United, these corporate and cargo customers (ESA customers) have agreed to fill

the remaining price gap between conventional jet fuel and SAF, often referred to as the “green premium” (United, 2023a).

United’s ESA program currently uses a method of book-and-claim accounting in which United ‘books’ both the physical and environmental attributes associated with SAF in voluntary markets allowing for the separation of the physical and environmental attribute as the physical fuel is blended with conventional jet fuel. United then ‘claims’ the scope 1 environmental attributes (emissions reductions) once proof of product delivery is provided, displacing consumption of conventional jet fuel. In parallel, ESA customers ‘claim’ the scope 3 environmental attributes (emissions reductions) of the sustainable product they have bought once UA generates and provides the SAFcs after verifying proof of product delivery. ESA customers claim the reduced emissions associated with United’s use of SAF in their scope 3 category 4 or 6 emissions (United, 2023a). Further details about the program are in sections 2.3 and 2.4 below.

2.2 Methods of Analysis

This case study examined the emissions reductions achieved through the ESA program and the operation of the ESA program. It draws on publicly available data and information from United’s Corporate Responsibility Report (CRR), CDP (formerly known as Carbon Disclosure Project) Report, and press releases. Findings are also pulled from United’s ESA Operations: Documentation of Methodology which is distributed to ESA customers. Quantitative analysis was conducted of the ESA’s allocated SAF volumes, SAF carbon intensities and SAF emissions reductions. Further discussion and analysis of SAF market trends is informed by industry sources and guidance documents.

2.3 Results and Findings

2.3.1 Emission Reductions

The ESA program allocated 1 million gallons of SAF in 2021 and 3 million gallons in 2022 (United CRR, 2022). In 2022, the SAF allocated through the ESA program had an average life cycle carbon emission reduction of 86.9% compared to conventional jet fuel intensity of 89.0 g CO_2e/megajoule (MJ) (ICAO CORSIA, 2021). United reported to CDP 4,790 MT CO_2e of reduced scope 1 emissions in 2021 due to SAF use (United CDP, 2022). In 2022, this number was 23,640 MT CO_2e (United CDP, 2023). Because of the relationship between United’s scope 1 and scope 3 category 3 emissions and our customers’ scope 3 category 4 and 6 emissions, ESA customers were able to count the same reductions in their scope 3 category 4 or 6 emissions (see Table 1).[1]

Table 1: Emissions accounting along the SAF value chain

[1] “To prevent double counting of emissions, the GHGP corporate standard defines scope 1 and scope 2 emissions to ensure that two or more companies do not account for the same emissions within the same scope. However, the standard acknowledges that double counting within scope 3 emissions can occur when multiple entities in the same value chain account for the scope 3 emissions from a single emissions source. Scope 3 accounting facilitates the simultaneous action of multiple entities to reduce emissions throughout society. It is important to note that while a single emission may be accounted for by multiple entities as scope 3, the emissions should be reported in different scope 3 categories,” (WEF, 2022, p.16)

SAF Emissions[2]	Airline	ESA Customer
Well-to-Tank (WTT) emissions	Scope 3 Category 3	Scope 3 Category 4 or 6 *Optional per GHG Protocol's Corporate Value Chain (Scope 3) Standard*
Tank-to-Wake (TTW) emissions	Scope 1	Scope 3 Category 4 or 6

2.3.2 Third-Party Assurance

United's 2022 corporate greenhouse gas inventory was verified by ERM CVS with limited assurance. ERM CVS also provides third-party assurance of the ESA's SAF allocation process and emission and reduction calculations. The SAF carbon intensities that are used to calculate emissions reductions are reviewed as part of the SAF certification process for both ISCC and RSB. These non-governmental organizations (NGOs) operate globally recognized sustainability certification schemes and prescribe a methodology for quantifying the carbon intensity of SAF and calculating the life cycle reduction. United only uses SAF that has been certified by ISCC or RSB or was produced by an ISCC or RSB-certified producer.

2.3.3 ESA Program Operations

United provides each ESA customer a certificate that summarizes their monthly emissions from their United flights which are calculated assuming conventional jet fuel was used, their allocated SAF volume, and the associated SAF emissions reductions. To ensure accuracy and improve transparency, ERM CVS verifies United's customer emissions methodology and its SAF allocation process.

The use of book-and-claim accounting is foundational to the ESA program. The book-and-claim method used today is considered direct generation of a SAFc. The Smart Freight Centre (SFC) specifies that EACs are directly generated when there is a physical tie between the low emissions solution and the carrier generating the EAC (SFC, 2023). This is in contrast to indirect generation where a carrier calculates its emissions as if it used the low emissions fuel but does not physically use it in its operations. The SAFcs issued by United are not tied to a specific flight, rather they reflect the use of SAF across United's operations. The SAFcs are sold to ESA customers who cover the green premium associated with SAF, which makes the use of SAF cost-effective for United.

2.4 Discussion

2.4.1 Financial Implications of the ESA Program

So far in 2023, SAF has been, on average, 2.3 times more expensive than conventional jet fuel (Holger, 2023). To improve the cost-effectiveness of SAF, governments provide incentives to airlines, like United and others, to stimulate the further uptake of SAF. However, a significant price gap remains. The ESA's business model is to charge ESA customers the additional cost of

[2] Upstream fuel and energy related GHG emissions (scope 3 category 3), also called well-to-tank (WTT) emissions, refer to GHG emissions from all the life cycle stages prior to combustion. GHG emissions from combustion are often referred to as tank-to-wake (TTW) emissions. GHG emissions from all life cycle stages are referred to as well-to-wake (WTW) emissions.

SAF compared to conventional jet fuel. This model enables United to scale up its SAF usage despite the current premium, displacing a limited volume of conventional fuel within United's operations. This price model means that the ESA's SAFcs costs are correlated with the market price of SAF and therefore the actual abatement costs.

2.4.2 ESA Program Growth

Since launching in 2021, the ESA program has grown considerably in just a few years. The program started with 11 participants and has increased to 24 participants in 2023. Multiple customers have signed multi-year agreements to support their decarbonization goals. The company's ESA SAF supply started with just one supplier delivering to Los Angeles International Airport (LAX) and has expanded to two suppliers delivering to 4 airports globally at various points throughout the program, with United evaluating other airport locations to support the continued growth of the program.

United expects continued growth in the program as SAF supply continues to increase. In 2022, United signed an offtake agreement with Neste for over 50 million gallons of SAF over three years (United, May 2022). The ESA program has enabled United to exercise the rights to that SAF by providing revenues to cover the additional SAF costs over conventional jet fuel. The demand for United's SAFcs gives United confidence that it will be able to recover the additional expense of procuring SAF, helping to support the rapid year-over-year growth of United's SAF usage. Additionally, the ESA program has been a way to increase awareness and educate the corporate customers about SAF.

2.4.3 Additionality

Additionality is the concept that emission reductions from an action should be 'additional' to any reductions that would have happened without the action. In the context of United's ESA program, this means that the SAF covered by the program would not have been used by United for other reasons, such as compliance with national regulations mandating the use of SAF. Starting in 2023, United received SAF in mandated markets such as France and Sweden, however, these mandated SAF volumes are excluded from the ESA program.

2.4.4 Book-and-Claim Accounting

There are two components to book-and-claim accounting – scope 1 SAFcs and scope 3 SAFcs. SAF is booked when United receives a delivery of SAF, thus generating SAFc for both scope 1 and scope 3 emissions. Scope 1 emissions reductions are claimed when United retires SAFcs after SAF is used. In parallel, ESA customers book scope 3 SAFc through participation in the ESA program and can only claim the scope 3 emissions reductions associated with SAF once United has claimed the scope 1 emissions reductions associated with using the SAF and generated the associated scope 3 SAFc. This means there is a direct link between United's SAF use and the ESA SAFcs which ties the SAFcs to real emissions reductions. United's participation in the generation of the SAFcs improves the traceability of SAF throughout the value chain as SAF is tracked from production through delivery at an airport or aircraft. While today, United uses a mass balance chain-of-custody model, a book-and-claim model, where the SAF's environmental attributes are decoupled from the physical molecules further upstream in the supply chain, could effectively work the same as a mass balance chain-of-custody model, providing the same level of assurance that SAF is not being double counted through robust tracking and verification procedures.

This is in contrast to scenarios in which a SAF producer sells a SAFc to a corporate passenger or cargo customer without an airline's involvement. SAFcs without a scope 1 user complicate the GHG accounting; they reduce transparency associated with that SAF, increase the risk that reductions are erroneously double counted, and create a risk that there is no additionality. In contrast when an airline is included, a SAFc with a scope 1 user means there is an airline defined who will use the SAF to displace conventional jet fuel. Conventional jet fuel displacement is key to realizing emissions reductions. Further, the entity that purchases the SAF is aware of who can claim the scope 3 attributes thereby avoiding the risk that other customers mistakenly double claim them. Finally, when airlines are included in SAFcs, the visibility into the chain of custody of SAF is maintained, ensuring additionality and investment from the aviation industry.

The flexibility of the book-and-claim model is imperative given the realities of how SAF is supplied and used by airlines. SAF is currently supplied to a limited number of airports due to a small number of producers worldwide, and it must be blended with conventional jet fuel before it is used (IATA, n.d.). SAF is often blended and delivered to central airport fuel storage facilities for distribution to airport customers. The complexity and intermixing of fuel deliveries at most airport locations make tracking of SAF molecules to specific flights unfeasible. The book-and-claim model enables many corporates to participate and reduce their business trip or transportation emissions, without concerns about the actual SAF use on individual flights.

United's ESA program allows ESA customers to claim GHG emissions reductions in their scope 3 category 4 or 6 corporate inventories. SAFcs reflect consequential GHG accounting which means they quantify the change in emissions caused by using SAF instead of conventional jet fuel. ESA customers may claim that they have reduced emissions. Due to the shared nature of the emissions reductions between United's scope 1 and scope 3 category 3 emissions and the customer's scope 3 category 4 or 6 emissions, United recommends that when describing their SAF emissions reductions, ESA customers acknowledge that they are achieved jointly with United. This is consistent with the GHG Protocol's guidance around double counting (WRI and WBCSD, 2011).

2.4.5 Industry Guidance and SAF Registries

In developing the ESA program, United reviewed guidance from the GHG Protocol, Science Based Targets initiative (SBTi), the SFC, Clean Skies for Tomorrow and the World Economic Forum, RSB, and ISCC. In some cases, guidance documents differ, but United strives to align with industry guidance and best practices. United tracks and supports the development of additional guidance around SAF sustainability certifications, SAF GHG accounting, SAF book-and-claim best practices, SAFc registries, etc.

Currently, United does not participate in an external SAF registry but maintains its own internal registry to track SAF deliveries and allocations. This internal registry provides full visibility into the SAF chain of custody. United recognizes the potential benefits of a well-developed SAF registry to support consistency and transparency in the SAFc market. Multiple registry options currently exist in the market, each with a nuanced approach and guidance on how its use ranging from naming conventions to the appropriate attribute flow. Some registries are aligned with specific fuel providers, while others have been developed by NGOs. The range of options

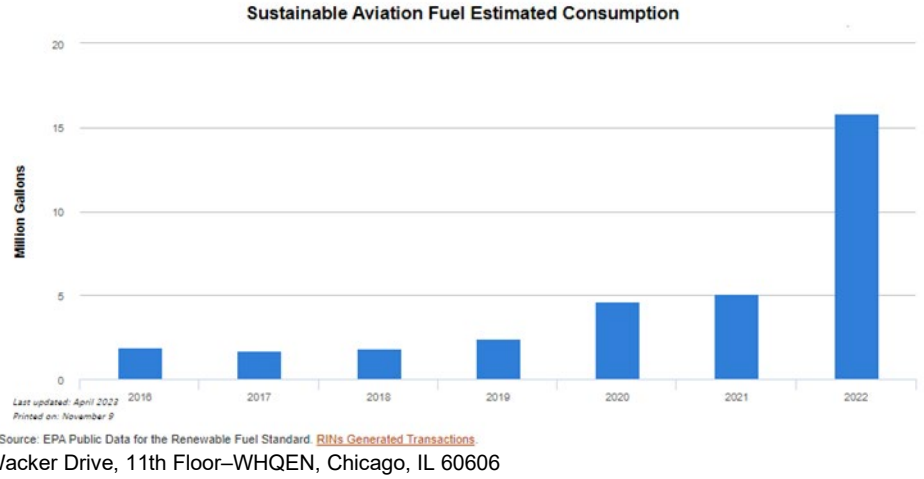
presents a complex landscape for SAFc recipients who may be unsure of which registry is the best fit for their end-use. Additionally, the underlying book-and-claim methodology, supported by NGOs such as RSB and SFC, is subject to change. While evolving best practices to account for changing market and customers trends is an important facet of any market-based measure, it is also important to communicate changes to both underlying manuals and registries in a way that is accessible to all stakeholders.

The proliferation of SAFc registries and guidance could lead to a lack of transparency, and an erosion in quality and integrity, which could undermine trust and lead to confusion. The carbon offset market offers an example where the lack of standardization has led to questions about the quality of carbon offsets sold in the market and criticism of the entire concept (UN Global Compact Network UK, 2021). United supports alignment and standardization across SAFc standards and registries to mitigate this risk. We support the development of interoperability between registries and the development of guardrails to prevent double counting and ensure additionality. United has provided feedback for RSB's book-and-claim pilot and RMI's SAFc registry.

2.4.6 Growth in SAF Supply

While United's ESA program is not the only driver of larger SAF industry trends, the program does provide a demand signal to SAF producers, especially when considered in aggregate with similar programs across the industry. Many airlines including Delta (Delta, 2023), Southwest (Southwest, 2023), Alaska (Alaska, 2023), SAS (SAS, 2023), Lufthansa (Lufthansa, n.d.), and Cathay Pacific (Cathay Pacific, 2023), have developed programs similar to ESA. All of these programs are a cost-effective way for airlines to increase their use of SAF, while simultaneously giving customers a way to reduce their GHG emissions beyond simply reducing flights. Together they demonstrate a trend of continued investments in SAF procurement which may reduce the risk of SAF producers' capital plans.

Since the start of the ESA program, both of United SAF suppliers have grown considerably. In mid-2022, World Energy announced its plans to launch new SAF hubs in Los Angeles and Houston. These projects will get World Energy more than halfway to its goal of producing 1 billion gallons of SAF by 2030, pacing ahead of schedule (World Energy, 2022). In 2019, Neste began construction to expand its Singapore refinery to be able to produce SAF (Neste, 2023a). Neste expected SAF production at their Singapore facility to begin in the summer of 2023, however, operational issues have delayed this start up until 2023Q4 or 2024Q1 (Neste, 2023b).



This growth is part of the rapid increase of the SAF market over the last two years. In the United States, estimated SAF consumption more than tripled from 5.10 million gallons (19.3 million liters) in 2021 to 15.80 million gallons (59.8 million liters) in 2022 (US EPA, 2023). Globally, the International Air Transport Association (IATA) estimates that SAF production reached 300 million liters (79 million gallons) in 2022, up from 100 million liters (26 million gallons) in 2021.

As supply has increased, the SAF price green premium has fallen, though a significant price gap remains. Through early 2021, SAF was about 3.5 times more expensive than jet fuel (Holger, 2023). In 2023, it fluctuated between 2 and 2.5 times more expensive (Holger, 2023). In recent months, the SAF premium has increased following short-term market volatility issues but still remains lower than 2022 (QCI, 2023). The lack of stable SAF supply shows that additional investments in SAF supply is needed which are enabled by programs like ESA.



3. Key Takeaways and Recommendations

The ESA program provides an example of how SAFcs can effectively be used to promote the scale-up of SAF technologies and reduce corporate greenhouse gas (GHG) emissions. This case study has identified the following takeaways, best practices, and recommendations for the broader airline, SAF, and SAFc industries to improve the effectiveness of SAFcs:

- United's ESA program reduced 4,790 MT CO_2e in 2021 and 23,640 MT CO_2e in 2022 through the use of SAF instead of conventional jet fuel.
- The airline procures SAF that has been certified sustainable by RSB or ISSC, or from producers that hold such certifications, and the ESA's allocation process and emissions and reduction calculations are verified by a third-party which increases credibility.
- The airline claims the scope 1 emissions of the SAFc providing assurance that SAF was used to displace conventional jet fuel generating measurable emissions reductions.
- In circumstances where an airline sells SAFc to a corporate customer, as opposed to where a SAF producers sells it without an airline's involvement, transparency is enhanced, the risk of double counting is reduced, additionality is ensured, and the uptake and investment in SAF by airlines is incentivized.
- As the market matures, a centralized and robust SAF registry or greater consistency across the registries in development will further enhance the transparency and credibility of SAFcs.

United's ESA program effectively delivers measurable emissions reductions through its use of SAFcs to fund the use of SAF. This case study offers examples of best practices for the industry and opportunities for improvement.

4. References

Alaska Airlines. Sustainable Aviation Fuels. 2023. Available at https://www.alaskaair.com/content/about-us/esg/saf

Cathay Pacific Airways Limited. Corporate Sustainable Aviation Fuel Programme. 2023. Available at https://www.cathaypacific.com/cx/en_US/about-us/sustainability/climate-action/corporate-sustainable-aviation-fuel-programme.html

Delta Airlines. 2022 ESG Report, p.36. 2023. Available at https://www.delta.com/content/dam/delta-www/about-delta/corporate-responsibility/delta-air-lines-ESGreport2022.pdf

Holger, Dieter. "Sustainable Aviation Fuel Leader Talks Green Premiums and Impact of Tax Incentives." Wall Street Journal, 19 July 2023. Available at https://www.wsj.com/articles/sustainable-aviation-fuel-leader-talks-green-premiums-and-impact-of-tax-incentives-22f77d81

International Air Transport Association (IATA). "2022 SAF Production Increases 200% - More Incentives Needed to Reach Net Zero." 7 December 2022. Available at https://www.iata.org/en/pressroom/2022-releases/2022-12-07-01/

IATA. Fact Sheet 2, SAF: Technical Certification. N.d. Available at https://www.iata.org/contentassets/d13875e9ed784f75bac90f000760e998/saf-technical-certifications.pdf

International Sustainability & Carbon Certification (ISCC) and Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). ISCC CORSIA 205, Life Cycle Emissions v1.1. 2021. Available at https://www.iscc-system.org/wp-content/uploads/2022/05/ISCC_CORSIA_205_Life_Cycle_Emissions_v1.1.pdf

Lufthansa. Flying Towards a Better Tomorrow. N.d. Available at https://business.lufthansagroup.com/de/en/about-us/sustainability

Neste. "Neste celebrates the opening of the Singapore expansion and establishes a sustainable aviation fuel (SAF) supply chain to Changi Airport." 17 May 2023. Available at https://www.neste.com/releases-and-news/renewable-solutions/neste-celebrates-opening-singapore-expansion-and-establishes-sustainable-aviation-fuel-saf-supply

Neste. "Production of renewable diesel restarted at the expanded part of Neste's Singapore refinery after operational shutdown." 15 August 2023. Available at https://www.neste.com/releases-and-news/renewable-solutions/production-renewable-diesel-restarted-expanded-part-nestes-singapore-refinery-after-operational

QCI. SAF Premium to Jet Fuel Spot S/mt. 17 November 2023.

SAS. Corporate Sustainability Program. 2023. Available at https://www.flysas.com/us-en/corporate-program/corporate-sustainability-program/

Smart Freight Centre. Voluntary Market Based Measures Framework for Logistics Emissions Accounting and Reporting. 2023. Available at https://smart-freight-centre-media.s3.amazonaws.com/documents/SFC_MBM_FRAMEWORK_2023__27_6_23.pdf

Southwest Airlines. Sustainable Aviation Fuels (SAF). 2023 Available at https://www.southwest.com/citizenship/planet/sustainable-aviation-fuels/

UN Global Compact Network UK. Debating Carbon Offsets. 2021. Available at https://www.unglobalcompact.org.uk/wp-content/uploads/2021/12/Carbon-offsets-25-Nov.pdf

United. CDP Climate Change. 2022. Available at https://www.cdp.net/en/formatted_responses/responses?campaign_id=79520704&discloser_id=986018&locale=en&organization_name=United+Airlines+Holdings&organization_number=19569&program=Investor&project_year=2022&redirect=https%3A%2F%2Fcdp.credit360.com%2Fsurveys%2F2022%2F6wz4wms4%2F207989&survey_id=78646008

United. CDP Climate Change. 2023. Available at https://www.cdp.net/en/formatted_responses/responses?campaign_id=83630982&discloser_id=1040938&locale=en&organization_name=United+Airlines+Holdings&organization_number=19569&program=Investor&project_year=2023&redirect=https%3A%2F%2Fcdp.credit360.com%2Fsurveys%2F2023%2Fjwbhd7d6%2F293921&survey_id=82591262

United. Corporate Responsibility Report. 2022. Available at https://crreport.united.com/

United. ESA Operations: Documentation of Methodology. November 2023.

United. “United Airlines to Lead Industry Switch to Sustainable Aviation Fuel with Global Corporations, Customers.” 13 April 2021. Available at https://www.united.com/en/us/newsroom/announcements/2021-04-13-united-airlines-to-lead-industry-switch-to-sustainable-aviation-fuel-with-global-corporations-customers-2652512900

United. “United Becomes First U.S. Airline to Sign Agreement to Purchase Sustainable Aviation Fuel Overseas.” 10 May 2022. Available at https://www.prnewswire.com/news-releases/united-becomes-first-us-airline-to-sign-agreement-to-purchase-sustainable-aviation-fuel-overseas-301543138.html

United. “United to Triple SAF Use in 2023, Adds SAF on Flights at San Francisco Airport.” 4 May 2023. Available at https://www.prnewswire.com/news-releases/united-to-triple-saf-use-in-2023-adds-saf-on-flights-at-san-francisco-airport-301815431.html

US EPA. Sustainable Aviation Fuel Estimated Consumption. April 2023. Available at https://afdc.energy.gov/data/10967

World Economic Forum (WEF). Sustainable Aviation Fuel Certificate (SAFc) Emissions Accounting and Reporting Guidelines. October 2022. Available at https://www3.weforum.org/docs/WEF_SAFc_Accounting_Guidelines_2022.pdf

World Energy. “World Energy to Build Its Second SAF Facility at Its Current Houston Ship Channel Production and Distribution Hub.” 18 August 2022. Available at https://www.prnewswire.com/news-releases/world-energy-to-build-its-second-saf-facility-at-its-current-houston-ship-channel-production-and-distribution-hub-301608727.html

World Energy. “World Energy Secures Permits; Will Completely Convert Its Southern Calif. Refinery to Create North America's Largest, World's Most Advanced Sustainable Aviation Fuel Hub.” 22 April 2022. Available at https://www.prnewswire.com/news-releases/world-energy-secures-permits-will-completely-convert-its-southern-calif-refinery-to-create-north-americas-largest-worlds-most-advanced-sustainable-aviation-fuel-hub-301531135.html

World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD). Corporate Value Chain (Scope 3) Accounting and Reporting Standard, p.108. September 2011. Available at https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf