D3.4 – Social assessment of selected SAF options

Task 3.1.3: Social aspects/Social acceptance

WP3: Assessments for cost-effectiveness and sustainability

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EXECUTIVE SUMMARY

The transition to Sustainable Aviation Fuels (SAFs) holds the potential for environmental benefits but also presents significant social sustainability challenges. SAF production can impact land rights, labor conditions, gender equity, and global economic dynamics, especially in feedstock-supplying regions of the Global South. Without rigorous governance, the deployment of SAF risks reinforcing historical exploitation patterns.

Social Life Cycle Assessment (SLCA) serves as a critical framework for assessing SAF's social and socio-economic impacts across its lifecycle. Unlike traditional environmental assessments, which primarily consider ecological effects, SLCA addresses labor rights, community well-being, and gender equality. SLCA is essential to prevent achieving environmental benefits at the cost of social harm, particularly in vulnerable regions where feedstocks are cultivated.

Land acquisition for SAF feedstock, such as palm oil and soy, has led to significant conflicts over land rights, often displacing indigenous communities without their consent. This aspect highlights the power imbalances between multinational corporations and local populations, where economic interests often overshadow customary land rights. Effective governance strategies, including participatory planning and FPIC, are essential to mitigate these risks and ensure equitable benefits.

Labor practices in SAF production can be exploitative, particularly in developing regions. Issues such as child labor, gender disparities, and unsafe working conditions are prevalent. Addressing these inequalities requires incorporating international labor standards, promoting women's equitable participation, and implementing gender-sensitive strategies in SAF projects.

The development of SAF often perpetuates inequalities between the Global North and South, as wealthier nations rely on resource extraction from poorer regions. Establishing equitable systems requires mechanisms for fair benefit-sharing and technology transfer alongside governance structures to prevent exploitative practices.

Research on societal perceptions of SAF reveals low levels of public awareness, affecting acceptance and willingness to pay. Understanding consumer concerns -shaped by demographic factors, environmental awareness, and stakeholder trust- is fundamental for increasing support for SAF.

Willingness to pay for SAF varies widely based on geographic regions and economic contexts. Higher premiums are generally seen in affluent areas with strong environmental awareness, while consumers in developing regions prioritize affordability. Tailored marketing strategies and government incentives are crucial for supporting increased consumer WTP.

Effective governance of SAF involves establishing comprehensive policy frameworks at international, national, and corporate levels. Global frameworks like CORSIA must include social safeguards to ensure protection for vulnerable populations. National policies should support local capacity-building and technology transfer, enabling equitable SAF development.

A sustainable SAF future necessitates integrating social justice principles and prioritizing community-led initiatives. Research should also encompass social dimensions, enhancing understanding of social impacts alongside technical challenges. Ultimately, SAF must connect climate mitigation efforts with social equity, fostering inclusive development pathways that address environmental and social needs.

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1. Introduction

The present report aims to examine the societal issues related to Sustainable Aviation Fuels (SAF) throughout the relevant supply chains, thus revealing the hot spots of the SAF production chain and providing information during the early stages of system design. The outcomes of this report will set the basis for the social sustainability assessment of the proposed SAF systems and products (T.3.2.4 of ICARUS project), including the exploration of the societal perspectives of the involved stakeholders and the analysis of the social impacts of the value chain through the social life cycle approach.

In this respect, the present report consists of the following chapters: Chapter 2 deals with SAF social sustainability and equity implications, while Chapter 3 addresses the societal perceptions toward SAF and relevant fuels, applications and technologies; Chapter 4 deals with consumer Willingness to Pay (WTP) for SAF, while Chapter 5 examines governance, policies, and equity in relevance to SAF deployment; finally, Chapter 6 discusses future pathways and innovation in SAF, while Chapter 7 provides the conclusions of the report.

2. Social Sustainability and Equity Implications of SAF

The transition to Sustainable Aviation Fuels (SAFs) presents significant opportunities for reducing aviation's environmental footprint, but it also raises critical social sustainability challenges. SAF production affects land rights, labor conditions, gender equity, and global economic dynamics, particularly in regions supplying feedstocks (German et al., 2011; IUCN, 2014). Without careful governance, SAF deployment risks reinforcing historical patterns of exploitation, especially in the Global South (Sharno and Hiloidhari, 2024). This chapter explores the social dimensions of SAFs through extensive use of the available literature, ensuring a comprehensive understanding of equity implications in global supply chains.

2.1 Social Life Cycle Assessment (SLCA) in SAF Supply Chains

Social Life Cycle Assessment (SLCA) is a critical methodological framework that enables the identification, evaluation, and management of social and socio-economic impacts throughout the lifecycle of Sustainable Aviation Fuels (SAFs) (Anderson et al., 2022). Unlike environmental LCAs that primarily focus on carbon emissions, resource use, and ecological effects, SLCA expands the lens to capture labor rights, human health and safety, community well-being, gender equality, and cultural heritage (Sharno and Hiloidhari, 2024). In SAF contexts, SLCA is essential for ensuring that environmental benefits are not achieved at the expense of social harm, especially when projects are situated in vulnerable regions.

In the SAF industry, supply chains often cross international borders, transferring potential social risks from fuel-consuming countries to feedstock-producing countries (German et al., 2011). For example, feedstock cultivation in Southeast Asia for HEFA fuels has been linked to the displacement of indigenous communities, and FT pathways involving municipal waste in Latin America raise concerns regarding informal laborers who depend on waste picking (IUCN, 2014; Kostidi and Lyridis, 2024). Through SLCA, these human-centered impacts can be measured and incorporated into sustainability certifications, such as those provided by the Roundtable on Sustainable Biomaterials (RSB), which sets global standards for social performance (Dua and Guzman, 2024).

Table 1: S-LCA Categories

Impact Category	Indicator Example	Potential Risk	Reference
Labor Rights	Fair wages, child labor	Worker exploitation	Sharno & Hiloidhari, 2024
Community Health	Access to clean water	Pollution from processing	German et al., 2011
Gender Equality	Women's participation	Gender-based exclusion	Anderson et al., 2022
Land Use Rights	FPIC compliance	Forced displacement	IUCN, 2014

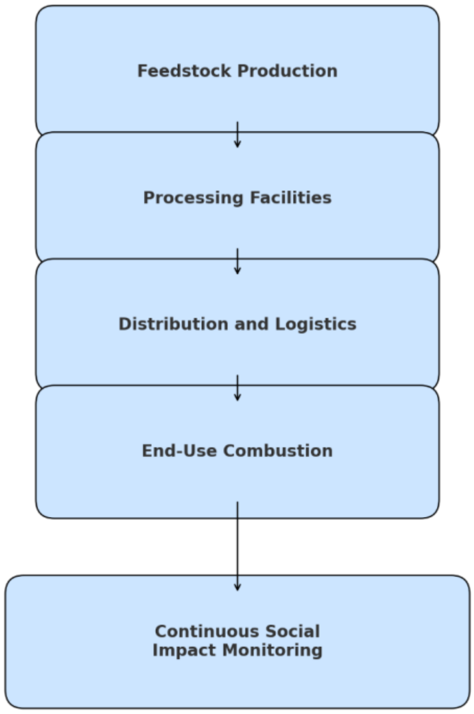

Figure 1. SLCA Framework in SAF Development

2.1.1 Analysis of SLCA in SAF

Implementing SLCA in SAF development provides a proactive approach to mitigate social harms before they materialize. In practice, this means that SAF projects must engage local communities from the outset, ensuring that consent is obtained through free, prior, and informed consent (FPIC) protocols (German et al., 2011). FPIC is especially crucial in regions where land tenure systems are informal, and customary rights may be overlooked during land acquisition for feedstock cultivation (Lai and Karakaya, 2024).

Public-private partnerships (PPPs) can also enhance the effectiveness of SLCA by pooling resources for social investments, such as building local infrastructure, supporting education, and ensuring equitable revenue distribution from SAF operations (Caraveo Gomez Llanos et al., 2024). These efforts align with increasing consumer demand for ethical supply chains, as identified in studies showing a growing public preference for socially responsible aviation services (Xu et al., 2022).

Integrating SLCA into policy frameworks ensures that governments and international bodies consider social outcomes alongside carbon reduction targets. For example, the European Union's Renewable Energy Directive (RED II) incorporates SLCA elements into its sustainability criteria, but enforcement varies across member states (Zheng et al., 2024). Strengthening these regulatory mechanisms globally would create consistent expectations for social performance.

SLCA also fosters transparency, helping prevent greenwashing by ensuring that sustainability claims are backed by verified social data (Watson et al., 2024). Airlines and SAF producers can use SLCA findings to communicate the real-world benefits of their operations, from improved labor conditions to enhanced community services.

2.2 Impacts on Land Rights and Community Displacement

Land acquisition for Sustainable Aviation Fuel (SAF) feedstock cultivation has become a significant driver of land rights conflicts, particularly in developing regions. Studies show that large-scale SAF feedstock operations, especially those involving crops like palm oil and soy, can displace indigenous communities and smallholder farmers, disrupting livelihoods and social cohesion (German et al., 2011; IUCN, 2014). These displacements often occur without free, prior, and informed consent (FPIC), exacerbating tensions between communities and developers (Lai and Karakaya, 2024).

One key challenge is the unequal power dynamics between multinational corporations and local populations. In many cases, governments prioritize foreign investment over protecting customary land rights, leaving communities vulnerable to forced displacement and inadequate compensation (Grimme, 2023). The impacts extend beyond land loss, including cultural disruption, loss of traditional knowledge, and reduced food security (Vertès et al., 2020).

Table 2: Land Rights Risks in SAF Feedstock Production

Region	Feedstock	Risk	Consequences	Source
Southeast Asia	Palm Oil	Displacement of indigenous groups	Loss of livelihood, conflict	German et al., 2011
South America	Soy	Deforestation and land grabbing	Biodiversity loss, migration	IUCN, 2014
Sub-Saharan Africa	Jatropha	Large-scale land leases	Reduced local food production	Sharno and Hiloidhari, 2024

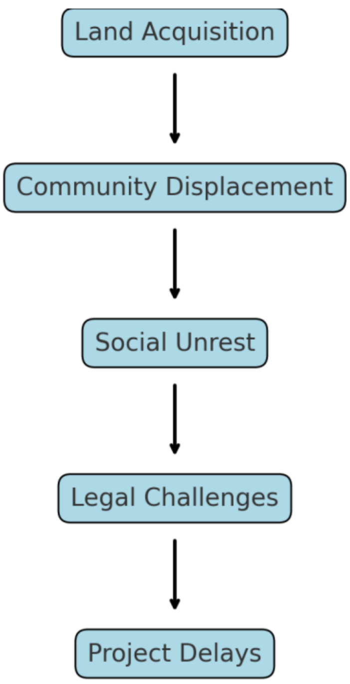

Figure 2. Land Use Conflict Cycle in SAF Development

2.2.1 Analysis of Land Rights Issues

Table 2 illustrates the geographic and feedstock-specific land rights risks inherent in SAF production. The global distribution of these risks reveals a pattern of externalizing social costs onto the Global South to satisfy the decarbonization demands of wealthier nations (Bardon & Massol, 2025). This dynamic reinforces historical inequalities, making it essential to integrate strong land governance principles into SAF supply chains.

Figure 2 visualizes the cyclical nature of land use conflicts. Once displacement occurs, communities often resist, leading to legal disputes, protests, and, in some cases, the suspension of SAF projects. These delays increase operational costs, damage developers' reputations, and undermine SAF's sustainability credentials (Lai and Karakaya, 2024).

Effective strategies to mitigate land rights impacts include participatory land-use planning, legal recognition of customary land rights, and the use of FPIC to ensure communities have a meaningful role in decision-making (German et al., 2011). Projects that integrate these practices have demonstrated fewer conflicts and greater local support, enhancing project longevity and social license to operate (Kostidi and Lyridis, 2024).

Additionally, shifting toward feedstocks that do not require large land areas, such as municipal waste and algae, can reduce pressure on rural communities (Raman et al., 2024). However, even these alternatives need careful governance to prevent new forms of resource competition, particularly in waste economies where informal workers rely on access to materials (Caraveo Gomez Llanos et al., 2024).

To create equitable SAF supply chains, international frameworks and national policies must enforce social safeguards, ensuring that land-based feedstock production does not come at the cost of indigenous rights and community stability (Dua & Guzman, 2024). Transparent reporting, community benefit-sharing agreements, and grievance mechanisms can also support fair outcomes, balancing the global drive for sustainable aviation with local rights and well-being.

2.3 Labor Conditions and Gender Equity

The expansion of Sustainable Aviation Fuel (SAF) production presents significant challenges regarding labor conditions and gender equity across global supply chains. SAF feedstock cultivation, particularly in developing regions, often depends on labor-intensive agricultural practices, raising concerns about fair wages, labor exploitation, workplace safety, and the marginalization of women in both formal and informal sectors (Sharno and Hiloidhari, 2024). These concerns are exacerbated in regions with weak labor protections and limited regulatory oversight (German et al., 2011).

Table 3: Labor and Gender Risks in SAF Supply Chains

Region	Labor Concern	Gender Inequality Issue	Consequence	Source
Sub-Saharan Africa	Child labor in feedstock farming	Women's exclusion from decision-making	Cycle of poverty	Sharno and Hiloidhari, 2024
Southeast Asia	Poor workplace safety	Gender-based wage gaps	Health hazards, inequality	Anderson et al., 2022
Latin America	Informal labor exploitation	Lack of maternity protections	Job insecurity	German et al., 2011

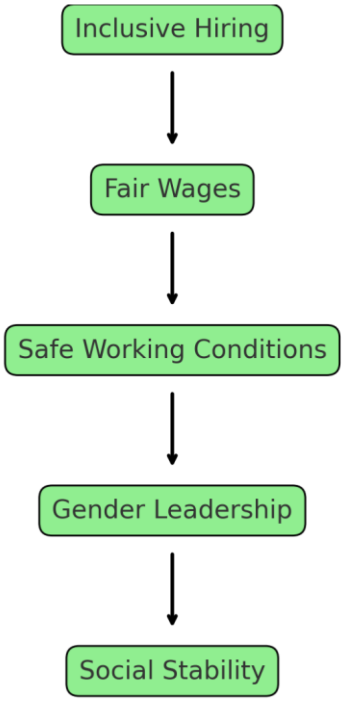

Figure 3. Gender and Labor Equity Integration in SAF

2.3.1 Analysis of Labor Conditions and Gender Equity

Table 3 highlights regional labor risks and gender equity challenges within SAF supply chains. SAF projects that fail to address these issues risk perpetuating existing inequalities and undermining local socioeconomic development (Anderson et al., 2022). Workers involved in SAF feedstock cultivation often experience long hours, low wages, and unsafe conditions, especially in countries with poorly enforced agricultural labor laws (Sharno and Hiloidhari, 2024). In some cases, child labor has been documented in feedstock-producing regions, reflecting systemic governance gaps (German et al., 2011).

Gender disparities compound these labor issues. Women, who frequently represent a significant portion of the agricultural workforce, are often relegated to low-paying roles with limited job security and are excluded from leadership positions in SAF production projects (Anderson et al., 2022). Without targeted interventions, SAF supply chains risk replicating patriarchal labor structures that concentrate decision-making power among men while marginalizing women's contributions (Sharno and Hiloidhari, 2024).

Efforts to improve labor conditions must incorporate international labor standards, such as those established by the International Labour Organization (ILO), to safeguard workers from exploitation and ensure access to fair wages, safe working environments, and the right to collective bargaining (Caraveo Gomez Llanos et al., 2024). Integrating robust labor protections into SAF certification systems can further ensure social responsibility across the supply chain (Dua and Guzman, 2024).

For gender equity, SAF projects should actively implement gender mainstreaming strategies that promote women's participation in decision-making roles, support access to education and training, and close wage gaps (Anderson et al., 2022). Women-led cooperatives in feedstock production have successfully enhanced both economic outcomes and social cohesion, reinforcing the value of inclusive practices (Grimme, 2023).

2.3.2 Case Study: Gender Equity in SAF Feedstock Cooperatives

In Kenya, women-led cooperatives cultivating jatropha for biofuel production have emerged as a groundbreaking model for promoting gender equity within SAF feedstock supply chains. Historically, women in rural Kenya have been marginalized in agricultural decision-making processes and have faced significant barriers to land ownership, credit access, and fair labor participation (Sharno and Hiloidhari, 2024). Recognizing these systemic inequalities, several communities have organized women-led cooperatives focused on sustainable jatropha cultivation as an avenue for both economic empowerment and social inclusion.

These cooperatives operate on principles of shared governance, transparent financial management, and equitable resource distribution. By pooling resources, women collectively negotiate better market prices for their crops, purchase farming inputs at reduced costs through group buying, and reinvest profits into community services such as health clinics and schools. Participation in these cooperatives has directly contributed to an increase in household incomes, reducing economic vulnerability and supporting long-term community resilience (Sharno & Hiloidhari, 2024).

Beyond economic benefits, these cooperatives have elevated women's roles in local leadership structures. Women who previously had little say in regional agricultural policies now actively participate in policymaking forums, advocating for gender-sensitive agricultural support programs and land tenure reforms (Anderson et al., 2022). This shift has created a ripple effect, inspiring other marginalized groups to seek representation in local governance, thus fostering more inclusive decision-making across the region.

Training and capacity-building initiatives have further bolstered the success of these cooperatives. Through partnerships with NGOs and government agencies, women members receive education on sustainable agricultural practices, business management, and legal rights regarding land ownership and labor protections (German et al., 2011). These skills enable cooperative members to maintain high productivity while minimizing environmental impacts, positioning them as leaders in sustainable feedstock production for SAF.

The cooperative model has also contributed to gender-sensitive innovations in agricultural technologies. For instance, members have collaborated with researchers to develop low-cost, ergonomic tools tailored to women's physical needs, reducing work-related injuries and increasing efficiency (Grimme, 2023). By centering women's experiences in technology design, the cooperative has created a more supportive and sustainable working environment.

The impact of these cooperatives extends beyond the immediate communities. Regional networks of women-led cooperatives have formed alliances, creating economies of scale and enabling collective bargaining with SAF producers and international buyers. This has enhanced their market power and ensured that gender equity remains a priority in SAF procurement contracts (Caraveo Gomez Llanos et al., 2024).

This Kenyan case has been recognized internationally as a best practice model for integrating gender equity into biofuel production systems, offering valuable lessons for SAF projects worldwide. It demonstrates that social sustainability in SAF production is not merely an aspirational goal but an achievable outcome when women are empowered as equal stakeholders in supply chains.

The Kenyan women-led cooperative model underscores the critical role of grassroots organization, capacity building, and supportive policy frameworks in achieving gender equity. As SAF supply chains expand globally, replicating such models in other regions can drive broader social transformation, ensuring that the benefits of sustainable aviation extend to all, particularly those historically excluded from the economic gains of industrial development.

2.3.3 The Path Forward

Achieving fair labor conditions and gender equity in SAF production requires multi-level governance and persistent advocacy. Policies must prioritize vulnerable workers and promote equitable participation in SAF value chains. Consumer awareness and demand for ethically produced SAF can further incentivize compliance, making social equity a competitive advantage in the sustainable aviation market (Xu et al., 2022).

International collaborations, including financial support for gender-focused development programs and labor rights monitoring, can enhance social outcomes while fostering inclusive, resilient SAF supply chains. By addressing labor rights and gender equity in tandem, SAF development can become a vehicle for transformative social progress, benefiting workers, communities, and the global climate alike.

2.4 Global Equity and North-South Dynamics

SAF development risks perpetuating inequities between the Global North and South. High-income countries seeking to decarbonize aviation often rely on feedstock imports from lower-income regions, shifting environmental and social burdens abroad (Bardon and Massol, 2025). This dynamic reinforces historical patterns of resource extraction and raises questions about the fairness of global SAF markets.

Equitable SAF systems require benefit-sharing mechanisms that compensate producing countries for environmental services and resource use (Dua and Guzman, 2024). Financial transfers, capacity-building programs, and technology sharing can help rebalance these relationships (Watson et al., 2024).

Additionally, governance structures must prevent exploitative trade practices. International agreements, such as CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation), aim to standardize sustainability criteria, but enforcement mechanisms remain weak (Lau et al., 2024). Addressing this requires stronger multilateral cooperation and inclusive policy design (Ansell, 2023).

Case studies from biofuel sectors show that when local communities retain control over production, they achieve greater economic resilience and social benefits (German et al., 2011). Replicating such models in SAF supply chains is crucial for ensuring the Global South benefits from aviation decarbonization.

2.5 Point of View on the Social Sustainability of SAF

Social sustainability is fundamental to the legitimacy and success of SAF transitions. By addressing land rights, labor conditions, gender equity, and global fairness, SAFs can contribute to more inclusive and resilient aviation systems. Leveraging international standards, local participation and robust governance will be key to realizing these goals. With thoughtful planning and execution, SAF can serve as a climate solution and a catalyst for social transformation across global value chains.

3. Societal Perceptions toward SAF and Relevant Fuels, Applications and Technologies

3.1 Research on Societal Perceptions toward SAF, Aviation Biofuels, and Relevant Topics

The relevant literature was reviewed to identify and analyze previous research exploring societal perceptions of SAF. To identify the relevant literature, combinations of keywords from two different groups were used; one group included keywords focusing on the technical aspect under investigation (e.g., SAF, sustainable aviation fuels, low carbon aviation fuels, green aviation fuel, aviation biofuels), and the other groups consisting of words representing societal aspects (e.g., social acceptance, awareness, willingness, perceptions, acceptance, willingness to pay, behavior consumer citizen). It should be noted that as only a small number of research has focused on the examination of societal perceptions of SAF, the performed literature review was expanded to a broader range of relevant fuels, applications and technologies in order to identify the themes running across societal perceptions toward sustainable/ green solutions in the aviation sector.

In this respect, apart from the pieces of research examining specifically SAF (also including biofuels, low carbon fuels, e-fuels, and CO_2-based fuels used in aviation), studies focusing on a) sustainable and green aviation, b) biofuels (excluding aviation applications) and c) carbon offset programs in aviation, were also taken into consideration. The research focusing specifically on SAF and sustainable and green aviation will be presented in more detail. As the main scope of the present work is to set the basis for a Social Sustainability Assessment, specific attributes of the identified literature are considered in order to define the previous work performed on the specific topic and recognize particular research gaps that can be addressed within the ICARUS project activities (i.e., ICARUS project: Task T.3.2.4); hence, the attributes examined include the scope, the methods (taking into account the study design, the sample/population, the methodology, the theoretical framework, and the outcome measures), and the main findings of each study. On the other hand, relevant elements of the studies dealing with biofuels (apart from those used in aviation) and carbon offset programs in aviation will be presented in brief, as the first group is included in the analysis in order to identify features associated explicitly to societal perceptions of biofuels that can also apply to SAF. In contrast, the second group is relevant in terms of the determinants of air travelers' perceptions and behavior (e.g., travel behavior, frequency of travel, flight characteristics).

3.2 Research on Societal Perceptions toward SAF

3.2.1 Scope of the Research on Societal Perceptions toward SAF

The earliest pieces of relevant research examining SAF (also including biofuels, low carbon fuels, e-fuels, and CO_2-based fuels used in aviation) examined perceptions and behaviors toward the use of biofuels in aviation (Goding, 2016; Filimonau and Högström, 2017; Lynch et al., 2017; Filimonau et al., 2018; Goding et al., 2018). The first relevant study explicitly mentioning SAF was presented by Ahmad et al. (2019), examining public acceptance of SAF as a measure to mitigate carbon emissions in the aviation sector. A small number of studies explicitly focusing on SAF [including low-carbon aviation fuels (LCAF) and eSAF], or including it among other sustainable options, followed, examining passengers', industry's and communities' perceptions and behaviors (de Alba et al., 2020; Gerich, 2021; McCollum et al., 2021; Baddeley, 2022; Hinkel, 2022; Xu et al., 2022; Stenius, 2023; Hui et al., 2024; Hylan et al., 2024; Schomakers et al., 2024; van Santen, 2024; Rush et al., 2025). In parallel, a sub-set of research has been directed toward societal perceptions of CO_2-based fuels for aviation (Engelmann, 2020; Simons et al., 2021; Arning et al., 2023; Engelmann et al., 2024).

3.2.2 Methods Applied by the Research on Societal Perceptions toward SAF

The vast majority of the research has focused on citizens' and businesses' perceptions, thus covering the corresponding socio-political and market (from the demand side) societal dimensions [as classified by Wüstenhagen et al. (2007)]. Specifically, the relevant research has approached citizens (Lynch et al., 2017; Filimonau et al., 2018; Ahmad et al., 2019; Engelmann et al., 2020; Simons et al., 2021; Baddeley, 2022; Arning et al., 2023; Stenius, 2023; Engelmann et al., 2024; Schomakers et al., 2024), air passengers as individuals (de Alba et al., 2020; Gerich, 2021; Xu et al., 2022; Hui et al., 2024; Hylan et al., 2024) or as companies (Goding, 2016; Goding et al., 2018), tourists (Filimonau and Högström, 2017), and students (Hinkel, 2022).

On the other hand, only two studies were identified to focus on the supply side of the market dimension, and only one study was identified on the community dimension. Specifically, McCollum et al. (2021) examined farmers' willingness to adopt oilseed crops like canola and rapeseed under various contract conditions for SAF production, while van Santen (2024) focused on aviation industry stakeholders' (airlines, experts/advisors and producers/manufacturers) preferences towards sustainable aviation technologies [electrofuel n-octane, liquid hydrogen (LH_2) with PEM fuel cells, and HEFA biofuel]. The only study addressing the community dimension has been performed by Rush et al. (2025), focusing on community engagement in the development of bioenergy projects from cellulosic urban waste feedstock in Hawaii for SAF; the study comprised of local residents and key stakeholders, including community groups, leaders, local officials, industry groups, schools, and advocacy groups.

The methods applied to collect the necessary input in the above studies included surveys (internet-based, face-to-face) (Goding, 2016; Filimonau et al., 2018; Ahmad et al., 2019; de Alba et al., 2020; Engelmann et al., 2020; Gerich, 2021; McCollum et al., 2021; Simons et al., 2021; Xu et al., 2022; Arning et al., 2023; Stenius, 2023; Engelmann et al., 2024; Hui et al., 2024; Hylan et al., 2024; Rush et al., 2025), interviews (Filimonau and Högström, 2017; Engelmann et al., 2020; Gerich, 2021; van Santen, 2024; Rush et al., 2025), and other methods such as focus group discussions (Lynch et al., 2017) and town meetings (Rush et al., 2025).

Particular studies have based their research structure and design on economic, business, behavioral and economic psychology theories and theoretical models. Indicatively, applied frameworks and models include welfare economics (Goding, 2016), utility maximization (McCollum et al., 2021), the Theory of Consumption Values (de Alba et al., 2020), the Mere Exposure Effect Theory (de Alba et al., 2020), the Theory of Reasoned Action (de Alba et al., 2020), and the Theory of Planned Behaviour (Xu et al., 2022; Hui et al., 2024). In this respect, the main variables measured within the context of the corresponding group of studies are presented in the following table.

Table 4: Variables Measured within the Literature Relevant to Societal Perceptions toward SAF

Variables	**References**
acceptance/ attitudes/ intentions	Filimonau and Högström, 2017; Ahmad et al., 2019; Engelmann et al., 2020; McCollum et al., 2021; Simons et al., 2021; Arning et al., 2023; Stenius, 2023; Hui et al., 2024; Hylan et al., 2024; Schomakers et al., 2024; Rush et al., 2025
Willingness to Pay (WTP)	Goding, 2016; Goding et al., 2018; de Alba et al., 2020; Gerich, 2021; Baddeley, 2022; Hinkel, 2022; Xu et al., 2022; Stenius, 2023; Hui et al., 2024
awareness/ knowledge	Filimonau and Högström, 2017; Lynch et al., 2017; Filimonau et al., 2018; Ahmad et al., 2019; Stenius, 2023; Schomakers et al., 2024
perceived benefits	Filimonau and Högström, 2017; Lynch et al., 2017; Filimonau et al., 2018; Ahmad et al., 2019; Simons et al. 2021; Xu et al., 2022; Arning et al., 2023; Engelmann et al., 2024; Schomakers et al., 2024; van Santen, 2024

perceived risks/ barriers	Filimonau and Högström, 2017; Lynch et al., 2017; Filimonau et al., 2018; Ahmad et al., 2019; Engelmann et al., 2020; Simons et al. 2021; Xu et al., 2022; Arning et al., 2023; Engelmann et al., 2024; Hylan et al., 2024; Schomakers et al., 2024; van Santen, 2024
social trust	Ahmad et al., 2019; Hinkel, 2022; Xu et al., 2022
subjective norms/ moral norms	Hui et al., 2024; Schomakers et al., 2024
perceived behavioral control	Hui et al., 2024
affective evaluation	Simons et al. 2021
innovation cautiousness	Arning et al., 2023
flying habits	Stenius, 2023; Hui et al., 2024; Schomakers et al., 2024
airline attributes (credibility, trustworthiness)	Hinkel, 2022
eco-labels	Hinkel, 2022
socioeconomic and demographic characteristics	Goding, 2016; Ahmad et al. 2019; Engelmann et al., 2020; Arning et al., 2023; Hui et al., 2024

3.2.3 Results of the Research on Societal Perceptions toward SAF

A wide range of results have emerged through this set of research, mainly in terms of awareness, WTP, attitudes, acceptance and their determining factors. First of all, it is evident that there is a limited level of awareness/ knowledge of SAF and aviation biofuels (Filimonau and Högström, 2017; Lynch et al., 2017; Filimonau et al., 2018; Ahmad et al., 2019; de Alba et al., 2020), highlighting the need for public awareness campaigns (Filimonau and Högström, 2017; Filimonau et al., 2018). The perceived benefits of these fuels include sustainability, environmental friendliness, safety, economic growth and energy security (Lynch et al., 2017; Ahmad et al., 2019; Engelmann et al., 2020; Engelmann et al., 2024; van Santen, 2024); on the other side, perceived risks include higher costs, safety concerns, trust issues, competition for agricultural land, deforestation, and skepticism towards "greenwashing" (Lynch et al., 2017; Filimonau et al., 2018; Ahmad et al., 2019).

Concerning the factors that can affect attitudes, intentions and acceptance, these include environmental awareness (Lynch et al., 2017; Arning et al., 2023), environmental concerns (Schomakers et al., 2024), benefit perceptions (Lynch et al., 2017; Simons et al., 2021; Arning et al., 2023), risk perceptions (Engelmann et al., 2020; Simons et al., 2021; Arning et al., 2023; Engelmann et al., 2024), trust toward stakeholders (SAF producers, scientific community, policymakers) (Ahmad et al., 2019), interests (Arning et al., 2023), affective evaluation (Simons et al., 2021) and flight shame (Arning et al., 2023).

Referring to WTP, results indicate a moderately positive (Goding, 2016; Goding et al., 2018; Hinkel, 2022; Xu et al., 2022; Stenius, 2023) willingness to pay in relation to a base price. Besides, the results of Goding et al. (2018) specify that the demonstrated level of WTP would be insufficient to cover the costs of a 50/50 bio-jet fuel blend. The determinants affecting WTP include demographic factors (Baddeley, 2022; Xu et al., 2022; Hui et al., 2024), awareness (Baddeley, 2022), environmental attributes (e.g., environmental awareness/ concerns, environmental policies) (Goding, 2016; Goding et al., 2018;

de Alba et al., 2020; Baddeley, 2022; Hui et al., 2024), cost-related attributes (Goding, 2016; Goding et al., 2018; Stenius, 2023; Hui et al., 2024), market attributes (technology deployment, technological innovation) (Gerich, 2021), transparency and credibility (Stenius, 2023; Hui et al., 2024), flight characteristics (e.g. flight destination, flight duration, flying frequency) (Goding, 2016; Gerich, 2021; Baddeley, 2022), novophilia (Baddeley, 2022), social trust (Xu et al., 2022), perceived risks (Baddeley, 2022; Xu et al., 2022; Hylan et al., 2024), and attitude (Xu et al., 2022; Hui et al., 2024; Hylan et al., 2024).

3.3 Research on Societal Perceptions toward Sustainable and Green Aviation

3.3.1 Scope of the Research on Societal Perceptions toward Sustainable and Green Aviation

As mentioned above, this set of research focuses on societal perceptions toward sustainable and green aviation, as well as similar topics, always in the context of aviation. In this respect, the identified studies focus on green aviation (Ragbir et al., 2021), green airlines (Akan et al., 2022), green air travel (Yraola and Mendiola, 2024), green initiatives (Korba et al., 2023; Crouse et al., 2024), green innovations (Chiambaretto et al., 2024), sustainable aviation (Rice et al., 2020; Keiser et al., 2023; Yıldız and Başakcı, 2024), sustainable development in air transportation (Rajiani and Kot, 2018), sustainability challenges and innovations (Stiebe, 2023), environmental impacts of flying (Ojala, 2019), air carriers' GHGs (Ölçen and Önler, 2022), lower-emission flights (Carroll et al., 2022; Crosby et al., 2024), environmentally friendly flights (Baumeister, 2017; Hwang and Lyu, 2020), air travel's impact on climate change (Gössling and Dolnicar, 2023), climate policy options for aviation (Kantenbacher et al., 2018), carbon emission policies (Tang et al., 2024), transformed air travel behavior (Jacobson et al., 2020), electric aircrafts (Bakır and Itani, 2024), eco-friendly airplanes (Han et al., 2019), development of green airports (Winter et al., 2021), and airlines' environmentally friendly services (Vongtharawat et al., 2019).

3.3.2 Methods Applied by the Research on Societal Perceptions toward Sustainable and Green Aviation

The collected research has explicitly focused on the socio-political and market (from the demand side) societal dimensions [as classified by Wüstenhagen et al. (2007)]. Specifically, the relevant research was directed at consumers (Rajiani and Kot 2018; Ojala, 2019; Rice et al., 2020; Ragbir et al., 2021; Winter et al., 2021; Akan et al., 2022; Chiambaretto et al., 2024; Crouse et al., 2024; Yıldız and Başakcı, 2024), air passengers (Baumeister, 2017; Kantenbacher et al., 2018; Han et al., 2019; Vongtharawat et al., 2019; Hwang and Lyu, 2020; Jacobson et al., 2020; Carroll et al., 2022; Ölçen and Önler, 2022; Keiser et al., 2023; Korba et al., 2023; Bakır and Itani, 2024; Crosby et al., 2024; Tang et al., 2024; Yraola III and Mendiola, 2024), and general aviation stakeholders, including private pilots, student pilots, flight instructors, and flight school administrators (Stiebe, 2023). No research relevant to the above-mentioned topics was identified to address the market's supply side or community dimensions.

The methods applied to collect the necessary input in the above studies included surveys (Baumeister, 2017; Kantenbacher et al., 2018; Rajiani and Kot, 2018; Han et al., 2019; Ojala, 2019; Vongtharawat et al., 2019; Hwang and Lyu, 2020; Rice et al., 2020; Ragbir et al., 2021; Winter et al., 2021; Akan et al., 2022; Carroll et al., 2022; Ölçen and Önler, 2022; Keiser et al., 2023; Korba et al., 2023; Stiebe, 2023; Bakır and Itani, 2024; Chiambaretto et al., 2024; Crosby et al., 2024; Crouse et al., 2024; Tang et al., 2024; Yıldız and Başakcı, 2024; Yraola III and Mendiola, 2024), interviews (Jacobson et al., 2020; Yıldız and Başakcı, 2024), and focus group discussions (Yıldız and Başakcı, 2024).

Most studies have been guided by behavioral, social psychology and environmental psychology theories and theoretical models. The most commonly applied is the Theory of Planned Behaviour (Han et al., 2019; Hwang and Lyu, 2020; Winter et al., 2021; Akan et al., 2022; Korba et al., 2023; Bakır and Itani, 2024; Chiambaretto et al., 2024; Yraola III and Mendiola, 2024), while other frameworks and models put to use include the Theory of Reasoned Action (Vongtharawat et al., 2019; Hwang and Lyu, 2020; Yıldız and Başakcı, 2024), the Norm Activation Model (Han et al., 2019), the Random Utility Theory (Chiambaretto et al., 2024; Crosby et al., 2024) and the Diffusion of Innovation theory (Rajiani and Kot, 2018). Against this background, the elements examined within this set of studies are presented in the following table.

Table 5: Variables Measured within the Literature Relevant to Societal Perceptions toward Sustainable and Green Aviation

Variables	**References**
acceptance/ attitudes/ intentions/ perceptions	Kantenbacher et al., 2018; Rajiani and Kot, 2018; Han et al., 2019; Ojala, 2019; Vongtharawat et al., 2019; Hwang and Lyu, 2020; Jacobson et al., 2020; Winter et al., 2021; Ölçen and Önler, 2022; Akan et al., 2022; Gössling and Dolnicar, 2023; Keiser et al., 2023; Korba et al., 2023; Crouse et al., 2024; Chiambaretto et al., 2024; Bakır and Itani, 2024; Yraola III and Mendiola, 2024; Yıldız and Başakcı, 2024
Willingness to Pay (WTP)	Baumeister, 2017; Rice et al., 2020; Winter et al., 2021; Ragbir et al., 2021; Akan et al., 2022; Ölçen and Önler, 2022; Keiser et al., 2023; Korba et al., 2023; Chiambaretto et al., 2024; Crosby et al., 2024; Tang et al., 2024; Yraola III and Mendiola, 2024
awareness/ knowledge	Ojala, 2019; Ragbir et al., 2021; Ölçen and Önler, 2022; Keiser et al., 2023; Korba et al., 2023; Crouse et al., 2024
socioeconomic and demographic characteristics	Kantenbacher et al., 2018; Vongtharawat et al., 2019; Rice et al., 2020; Ölçen and Önler, 2022; Keiser et al., 2023; Korba et al., 2023; Stiebe, 2023; Chiambaretto et al., 2024; Crouse et al., 2024
flight attributes (e.g., ticket prices, CO_2 emissions, flight duration, energy used, seat selection, departure time, baggage allowance, in-flight services, number of connections)	Baumeister, 2017; Vongtharawat et al., 2019; Rice et al., 2020; Carroll et al., 2022; Keiser et al., 2023; Chiambaretto et al., 2024; Crosby et al., 2024
flying behavior	Kantenbacher et al., 2018; Ojala, 2019; Vongtharawat et al., 2019
perceived benefits/drivers	Gössling and Dolnicar, 2023; Bakır and Itani, 2024
perceived barriers/risks	Ojala, 2019; Jacobson et al., 2020; Stiebe, 2023; Bakır and Itani, 2024
social norms	Han et al., 2019; Akan et al., 2022; Gössling and Dolnicar, 2023; Bakır and Itani, 2024; Yraola III and Mendiola, 2024
perceived behavioral control	Akan et al., 2022; Gössling and Dolnicar, 2023; Bakır and Itani, 2024; Yraola III and Mendiola, 2024
affect (emotions)	Han et al., 2019; Ragbir et al., 2021; Winter et al., 2021; Crouse et al., 2024
perceived value	Rajiani and Kot, 2018; Winter et al., 2021; Crouse et al., 2024; Yraola III and Mendiola, 2024

CO2 / eco-labels	Baumeister, 2017; Carroll et al., 2022
environmental/ climate change beliefs/ perceptions/ concerns	Kantenbacher et al., 2018; Han et al., 2019; Winter et al., 2021; Akan et al., 2022; Stiebe, 2023; Bakır and Itani, 2024; Crouse et al., 2024
prior experience	Stiebe, 2023
performance expectancy	Tang et al., 2024

3.3.3 Results of the Research on Societal Perceptions toward Sustainable and Green Aviation

The results obtained from this group of studies mainly address attitudes, intentions, WTP, and their determining factors. The factors that can affect attitudes, intentions and acceptance include demographic and socioeconomic characteristics (Kantenbacher et al., 2018; Ojala, 2019; Ölçen and Önler, 2022; Stiebe, 2023), flight attributes (Baumeister, 2017; Kantenbacher et al., 2018; Ojala, 2019; Gössling and Dolnicar, 2023), environmental/climate attitudes/ perceptions (Baumeister, 2017; Kantenbacher et al., 2018; Han et al., 2019; Vongtharawat et al., 2019; Akan et al., 2022; Crouse et al., 2024), environmental knowledge (Jacobson et al., 2020; Bakır and Itani, 2024), CO_2/ eco-labelling (Baumeister, 2017; Carroll et al., 2022), various economic, social, environmental factors (green image, green trust) (Hwang and Lyu, 2020; Jacobson et al., 2020; Bakır and Itani, 2024; Yıldız and Başakcı, 2024), social norms (Han et al., 2019; Jacobson et al., 2020; Akan et al., 2022; Gössling and Dolnicar, 2023; Bakır and Itani, 2024), perceived behavioral control (Akan et al., 2022; Bakır and Itani, 2024), perceived values (Rajiani and Kot, 2018; Jacobson et al., 2020; Crouse et al., 2024), and affect (Jacobson et al., 2020; Crouse et al., 2024).

Results indicate positive WTP for the various applications/ technologies under examination (Carroll et al., 2022; Ölçen and Önler, 2022; Crosby et al., 2024). The determinants affecting WTP include demographic and socioeconomic characteristics (Rice et al., 2020; Ölçen and Önler, 2022; Korba et al., 2023; Chiambaretto et al., 2024; Tang et al., 2024), flight attributes (Rice et al., 2020; Chiambaretto et al., 2024; Crosby et al., 2024), environmental concerns and perceptions (Winter et al., 2021; Carroll et al., 2022), pro-environmental attitudes and behaviors (Akan et al., 2022; Korba et al., 2023; Chiambaretto et al., 2024), trust in the aviation industry (Chiambaretto et al., 2024), eco-label information (Baumeister, 2017), social norms (Tang et al., 2024; Yraola III and Mendiola, 2024), perceived behavioral control (Yraola III and Mendiola, 2024), perceived value (Winter et al., 2021; Yraola III and Mendiola, 2024), affect (Ragbir et al., 2021; Winter et al., 2021) and performance expectancy (Tang et al., 2024).

3.4 Research on Societal Perceptions toward Biofuels (Excluding Aviation Applications)

Studies focusing on societal perceptions toward biofuels (excluding aviation applications) have been examined; these studies cover the three societal dimensions (Wüstenhagen et al., 2007) and are presented below accordingly. Societal perceptions toward biofuels (excluding aviation) are included in the present analysis to identify features associated explicitly with societal perceptions of biofuels that can also apply to SAF.

3.4.1 Socio-political Acceptance of Biofuels

Socio-political acceptance refers to the general public, stakeholders, and policymakers' opinions on biofuel implementation (Wüstenhagen et al., 2007). On the one side, part of the previously performed work indicates that there is public support towards biofuels in relation to fossil fuels or other RES

(Bolsen and Cook, 2008; Wegener and Kelly, 2008; Mariasiu, 2013; Longstaff et al., 2015; Jäger et al., 2017; Paris et al., 2020; Rostan, n.d.). Conversely, some studies indicate either low or conditional public acceptance (e.g., depending on economic and environmental aspects) (Lahmann, 2005; Kubik, 2006; University of Wisconsin-Madison, 2009; Savvanidou et al., 2010). Results are mixed when referring to the examination of public awareness of biofuels, indicating either sufficient (Van de Velde et al., 2009; Simkó, 2010; Delshad et al., 2010) or insufficient (Rohracher et al., 2003; Adelle and Withana, 2008; Wegener and Kelly, 2008; Savvanidou et al., 2010; Cacciatore et al., 2012; Dragojlovic and Einsiedel, 2014; Balogh et al., 2015; Jäger et al., 2017) levels of awareness, depending on the different biofuel types.

The research identified the various determinants of biofuel's socio-political acceptance, as presented in the following table.

Table 6: Determinants of Socio-political Acceptance of Biofuels based on Literature Review

Variables	**References**
perceived benefits (economically affordable and environmentally friendly) and risks (harmful to the environment, unsafe, and expensive)	Kubik, 2006; Delshad et al., 2010; Amin et al., 2017; Paris et al., 2020
prior experience with biofuel use	ASG Renaissance, 2004
ideological affiliation	Cacciatore et al., 2012; Fung et al., 2014
trust of key players (industry, scientists, policymakers)	Varela Villarreal et al., 2020
values and beliefs	Varela Villarreal et al., 2020
attitudes towards technology	Amin et al., 2017
citizen engagement in energy policies	Longstaff et al., 2015
regional characteristics (i.e., countries with high biomass use are more favorable than countries with low use)	Rohracher, 2010
socioeconomic characteristics	Van de Velde et al., 2011; Jäger et al., 2017; Paris et al., 2020

3.4.2 Community Acceptance of Biofuels

The two stages of biofuel acceptance on the community dimension include feedstock collection and biofuel production. Since the outcomes vary depending on the specific conditions of each case, it is impossible to make firm conclusions on community acceptance. Hence, the relevant research identifies either acceptance (Soland et al., 2013; Bertsch et al., 2016; Lee et al., 2017; Rostan, n.d.) or opposition toward such projects (Amigun et al., 2011; Schumacher and Schultmann, 2017).

The factors identified to affect community acceptance are presented in the following table.

Table 7: Determinants of Community Acceptance of Biofuels based on Literature Review

Variables	**References**
socioeconomic characteristics	Lee et al., 2017

project location/ distance from the facility	Schumacher and Schultmann, 2017; Dobers, 2019; Rostan, n.d.
project size	Rostan, n.d.
place attachment	Dobers, 2019
support towards RES	Schumacher and Schultmann, 2017
perceived benefits (e.g., economic effects, environmental friendliness, effective resource use)	Selfa et al., 2011; Soland et al., 2013; Kortsch et al., 2015; Lee et al., 2017; Schumacher and Schultmann, 2017
perceived risks (e.g., financial concerns, environmental pollution, smell, traffic, noise, land availability, infrastructure development, distortion of the communities' social fabric	Amigun et al., 2011; Selfa et al., 2011; Kortsch et al., 2015; Schumacher and Schultmann, 2017; Rostan, n.d.
trust towards the plant operator	Amigun et al., 2011; Soland et al., 2013; Schumacher and Schultmann, 2017
received information	Soland et al., 2013
participation options/ relationships with the company	Soland et al., 2013; Rostan, n.d.

3.4.3 Market Acceptance of Biofuels

Biofuel market acceptance can be seen in two ways: either as the integration of biofuels into transportation or as the readiness to engage in the supply chain, which includes roles as feedstock suppliers or as producers and prosumers. The results are mixed when referring to individuals' preferences, indicating either positive (Solomon and Johnson, 2009; Jensen et al., 2010; Petrolia et al., 2010; Savvanidou et al., 2010; Dominguez and Olivares, 2012; Loureiro et al., 2013; Pouliot, 2013; Salvo and Huse, 2013; Lanzini et al., 2016; Lim et al., 2017; Shin and Hwang, 2017; Mamadzhanov et al., 2019) or negative WTP (Pouliot, 2013; Salvo and Huse, 2013; Li and McCluskey, 2014; Kallas and Gil, 2015; Shin and Hwang, 2017), in comparison to conventional fuels.

The determinants of individuals' preferences for biofuels are presented in the following table.

Table 8: Determinants of Market Acceptance of Biofuels based on Literature Review

Variables	References
socioeconomic characteristics (i.e., gender, age, income, education, region)	Dominguez and Olivares, 2012; Paris et al., 2020
level of information/ knowledge on biofuels	Savvanidou et al., 2010; Zhang et al., 2011; Lanzini et al., 2016; Moula et al., 2017; Mamadzhanov et al., 2019
biofuel types	Lanzini et al., 2016
feedstock types	Jensen et al., 2010; Moula et al., 2017
feedstock origin (production location)	Bae, 2014
biofuel prices	Ma et al., 2014
biofuel availability	Zapata and Nieuwenhuis, 2009; Giraldo et al., 2010; Kallas and Gil, 2015; Gracia et al., 2018

environmental advantages compared to fossil fuels	Varela Villarreal et al., 2020
environmental and energy safety concerns	Phalan, 2009; Zhang et al., 2011; Mamadzhanov et al., 2019
perceived adverse effects (e.g. food price increases)	Kallas and Gil, 2015; Shin and Hwang, 2017
sustainability certification	Giraldo et al., 2010; Gracia et al., 2018
purchasing behaviors	Lanzini et al., 2016
attitudes towards innovation adoption	Zailani et al., 2019
overall social context	Wegener and Kelly, 2008

In addition to consumers' willingness to adopt biofuels, market acceptance can also encompass individuals' interest in participating in the supply chain, either as feedstock suppliers or as producers and prosumers. Various factors influence individuals' attitudes toward biofuels, including their perceptions of biogas, personal innovativeness, facilitating conditions, and the specifics of land lease agreements (Emmann et al., 2013). Other factors include self-efficacy, perceived benefits, general beliefs about fossil fuels and biofuels, and cues to action (Bakhtiyari et al., 2017). Additionally, socioeconomic characteristics (age, family size, education), land availability, knowledge, subsidies, training, and experience also play a role (Meidiana et al., 2020). Finally, awareness of consequences, a sense of responsibility, and environmental concerns further influence attitudes (Wang et al., 2020).

3.5 Research on Societal Perceptions toward Carbon Offset Programs in Aviation

A wide range of studies focusing on societal perceptions toward carbon offset programs in aviation have been identified, focusing on market acceptance from the demand side. The relevant topic is included in the present analysis to explore the determinants of air travelers' perceptions and behavior (e.g., travel behavior, frequency of travel, flight characteristics) that can also apply in an SAF-related analysis. The studies examined different aspects of air passengers' acceptance levels, including awareness, attitudes, intentions, behaviors, and Willingness to Pay. The determinants of these topics can be classified as follows:

Socioeconomic demographic and characteristics

- age, gender, occupation, income, education, and citizenship (Brouwer et al., 2008; Dodds et al., 2008; Chang et al., 2010; Mair, 2011; Lu and Shon, 2012; Choi and Ritchie, 2013; Cliffe, 2014; Cheung et al., 2015; Jou and Chen, 2015; Wulfsberg et al., 2016; Fatihah and Rahim, 2017; Hinnen et al., 2017; Khand, 2018; den Daas, 2020; Favero, 2020; Lee and Koo, 2020; Rotaris et al., 2020; Shaari et al., 2020; Kothe, 2022; Schleich and Alsheimer, 2022; Shaari et al., 2022; Wendt, 2023; Kallela, 2024; Macario, 2024; Wu et al., 2024; Zhou et al., 2024; Lu and Shon, n.a.; Tolanuwat and Jangsiriwattana, n.a.)

Travel behavior and experience

- travel behavior/ frequency of travel (Brouwer et al., 2008; Lu and Shon, 2012; Choi and Ritchie, 2013; Choi and Ritchie, 2014; Jou and Chen, 2015; Fatihah and Rahim, 2017; Choi et al., 2018; Bösehans et al., 2020; den Daas, 2020; Favero, 2020; Rotaris et al., 2020; Henle, 2022; Shaari et al., 2022; Lu and Shon, n.a.)
- travel experiences (Lee and Koo, 2020; Wu et al., 2024)

Flight/trip characteristics

- purpose of travel, airfare, travel class, destination, distance, type, number of passengers, and ancillary services (Lu and Shon, 2012; Choi and Ritchie, 2013; Choi and Ritchie, 2014; Hinnen et al., 2017; Choi et al., 2018; Favero, 2020; Rotaris et al., 2020; Berger et al., 2021; Ma et al., 2021; Berger et al., 2022; Shaari et al., 2022; Macario, 2024; Zhou et al., 2024; Lu and Shon, n.a.)

Carbon offset program attributes

- cost, credibility, provider, administration costs, transparency, effectiveness, program choice, type, certification, payment methods, quality subsidies, incentive mechanisms (Lu and Shon, 2012; Choi and Ritchie, 2013; Choi and Ritchie, 2014; Cheung et al. 2015; Jou and Chen, 2015; Tyers, 2016; Zhang et al., 2019; den Daas, 2020; Favero, 2020; Rotaris et al., 2020; Lee and Koo, 2020; Shaari et al., 2020; Ma et al., 2021; Ritchie et al., 2021; Berger et al., 2022; Henle, 2022; Kothe, 2022; Schleich and Alsheimer 2022; Truong-Dinh et al., 2023; Wendt, 2023; Kallela, 2024; Macario, 2024; Wu et al., 2024; Zhou et al., 2024; Wu et al., 2025)

Perceived benefits of the carbon offset program

- improving everyday life, public health, financial aspects, biodiversity, air quality, economic, health, and educational benefits (Zhang et al., 2019; Cordes, 2020; Kothe, 2022; Þorsteinsdóttir, 2023)

Awareness/ understanding of the carbon offset program

- program awareness/ understanding (Dodds et al., 2008; Chang et al., 2010; Lu and Shon, 2012; Cliffe, 2014; Jou and Chen, 2015; Zhang, 2019; Favero, 2020; Shaari et al., 2020; Shaari et al., 2021; Kothe, 2022; Shaari et al., 2022; Þorsteinsdóttir, 2023; Kallela, 2024; Macario, 2024; Lu and Shon, n.a.)
- prior knowledge and experience with the program (Choi and Ritchie, 2013; Lu et al., 2018; Zhang et al., 2019; Shaari et al., 2021; Kothe, 2022)
- provided information/ communication concerning the program (Cordes, 2020; den Daas, 2020; Ritchie et al., 2021; Schleich and Alsheimer, 2022; Wendt, 2023; Kallela, 2024)

Airline-related elements

- trust in the airlines (Ma et al., 2021; Þorsteinsdóttir, 2023; Truong-Dinh et al., 2023; Deng et al., 2024; Kallela, 2024; Macario, 2024; Wu et al., 2024)
- airlines' credibility (expertise and trustworthiness) (Zhang et al., 2019)
- airlines' altruistic motives (Truong-Dinh et al., 2023)
- airlines' moral obligation (Brouwer et al., 2008)
- airlines' marketing reputation (Favero, 2020)

Environmental-related elements

- environmental knowledge/ awareness (Brouwer et al., 2008; Wulfsberg et al., 2016; Fatihah and Rahim, 2017; Lu et al., 2018; Cordes, 2020; Lee and Koo, 2020; den Daas, 2020; Tao et al., 2021; Shaari et al., 2021; Henle, 2022; Schleich and Alsheimer 2022; Park et al., 2024)
- environmental concerns (Brouwer et al., 2008; Mair, 2011; van Birgelen et al., 2011; Wulfsberg et al., 2016; Zhang, 2019; Bösehans et al., 2020; Favero, 2020; Ma et al., 2021; Kortsch and Händeler, 2024)
- environmental behavior/ attitude (Mair, 2011; van Birgelen et al., 2011; Hinnen et al., 2017; den Daas, 2020; Truong-Dinh et al., 2023; Wendt, 2023; Kortsch and Händeler, 2024)
- environmental consciousness (Rotaris et al., 2020; Wendt, 2023)
- climate change knowledge/ awareness (Khand, 2018; Shaari et al., 2022; Þorsteinsdóttir, 2023)

- climate change attitude (Choi and Ritchie, 2014; Cliffe, 2014; Khand, 2018; Zhou et al., 2024)

Behavioral-related elements

- attitudes (Chen, 2013; Choi and Ritchie, 2014; den Daas, 2020; Tao et al., 2021; Park et al., 2024; Tolanuwat and Jangsiriwattana, n.a.)
- social norms (Tyers, 2016; Tao et al., 2021; Schleich and Alsheimer, 2022; Truong-Dinh et al., 2023; Kortsch and Händeler, 2024; Park et al., 2024; Tolanuwat and Jangsiriwattana, n.a.)
- perceived behavioral control (Tao et al., 2021; Kortsch and Händeler, 2024; Park et al., 2024; Tolanuwat and Jangsiriwattana)
- personal norms (Chen, 2013; Favero, 2020; Tao et al., 2021; Kortsch and Händeler, 2024; Park et al., 2024)

Psychological and value-related factors

- affect (Chen, 2013)
- desires (Chen, 2013)
- anticipated guilt (Bösehans et al., 2020)
- moral elevation (Deng et al., 2024)
- awareness of consequences (Kortsch and Händeler, 2024)
- value orientations (Kortsch and Händeler, 2024)
- responsibility (Choi and Ritchie, 2013; Cordes, 2020; Favero, 2020; Shaari et al., 2020; Henle, 2022; Deng et al., 2024)
- responsibility for future generations (Brouwer et al., 2008)
- environmental protection responsibility (Dodds et al., 2008)

3.6 Point of View on the Societal Perceptions toward SAF

There is a growing and diverse body of research examining societal perceptions of SAF and related technologies, yet it reveals numerous gaps and areas requiring further investigation. Although awareness of SAF remains limited among the general public, studies indicate that perceived benefits compete with concerns regarding costs and safety. It is evident that public acceptance of SAF, along with biofuels and other green aviation technologies, hinges mainly on a combination of demographic factors, environmental awareness, and trust in stakeholders involved in SAF production.

Moreover, while many studies focused on the demand side, there remains a notable scarcity of research on supply-side dynamics and community engagement in SAF-related projects. The findings underscore the critical need for targeted public awareness campaigns, addressing misconceptions and enhancing understanding of sustainable fuels in aviation. Additionally, determinants influencing attitudes and behaviors toward carbon offset programs present valuable insights that can inform strategies to boost acceptance of SAF.

As the aviation sector moves toward more sustainable practices, understanding societal perceptions and integrating public engagement will be fundamental in addressing concerns and fostering acceptance of SAF, thereby supporting the broader transition to greener aviation solutions. Future research should focus on filling the identified gaps, particularly concerning the supply side, community involvement, and longitudinal studies to capture shifts in perceptions over time.

4. Consumer Willingness to Pay for SAF

4.1 Consumer Willingness to Pay (WTP)

Consumer willingness to pay (WTP) for Sustainable Aviation Fuels (SAFs) is critical in successfully scaling and adopting them across global aviation markets. Even the most ambitious SAF policies and technological advances may struggle to create lasting market transformations without sufficient consumer support. Research indicates a nuanced relationship between passenger demographics, environmental awareness, ticket price sensitivity, and trust in airline sustainability commitments (Xu et al., 2022).

WTP varies across geographic regions, income levels, and passenger profiles. Studies show that consumers in high-income countries, particularly in Europe and North America, are more inclined to pay premiums for SAF-powered flights due to greater environmental awareness and stronger climate commitments (Chiambaretto et al., 2024). Conversely, consumers prioritize affordability over environmental considerations in developing regions with limited discretionary income, making premium pricing for SAF less viable without targeted subsidies (Zheng et al., 2024).

Table 9: WTP for SAF by Region

Region	Average WTP Premium	Key Drivers	Source
Europe	15-20%	Climate awareness, flight shame	Xu et al., 2022
North America	10-15%	Corporate sustainability, branding	Chiambaretto et al., 2024
Asia-Pacific	5-10%	Emerging awareness, price sensitivity	Raman et al., 2024
Africa & South America	<5%	Economic constraints, limited awareness	Caraveo Gomez Llanos et al., 2024

4.1.1 Analysis of WTP Trends

Several interlinked factors influence consumer WTP. Social movements such as "flight shame," originating in Europe, have created cultural pressures that encourage individuals to choose lower-emission flight options and, in some cases, avoid flying altogether (Anderson et al., 2022). These social pressures elevate WTP by making SAF an ethical and socially responsible choice.

Corporate messaging and sustainability branding also play key roles in shaping WTP. Airlines that transparently communicate their SAF use, emission reductions, and broader environmental commitments gain consumer trust and loyalty (Chiambaretto et al., 2024). However, the risk of "greenwashing"—where airlines exaggerate or fabricate sustainability claims—can erode this trust, reducing WTP and triggering public backlash (Watson et al., 2024).

In contrast, lower-income regions face significant barriers to high WTP for SAF due to structural economic inequalities. Passengers prioritize essential affordability and may lack the disposable income to pay premiums for sustainable flights (Bardon and Massol, 2025). Additionally, SAF awareness campaigns are often absent in these regions, leaving consumers unaware of the environmental impacts of their travel and the potential role of SAF in climate mitigation (Caraveo Gomez Llanos et al., 2024).

4.1.2 Case Studies: WTP in Practice

In Sweden, airlines offering "green fares" powered by SAF have reported higher-than-expected uptake rates, with consumers voluntarily paying premiums to support climate-neutral travel (Xu et al., 2022). These fares are marketed as part of broader national climate goals, leveraging strong public support for environmental policies.

In contrast, attempts to introduce SAF premiums in parts of Southeast Asia have faced resistance. With lower average incomes and weaker climate policy frameworks, passengers have shown limited interest in paying more for SAF, even when presented with detailed environmental impact data (Raman et al., 2024).

These contrasting case studies underscore the importance of tailoring SAF marketing strategies to local economic contexts and social values. In wealthier regions, messaging can focus on climate responsibility and ethical consumption. In lower-income regions, subsidies, corporate sponsorship, and government incentives may be necessary to make SAF-powered flights accessible.

4.1.3 Policy Implications

Governments play a crucial role in supporting consumer WTP through tax incentives, subsidies, and public awareness campaigns (Dua & Guzman, 2024). For instance, reducing taxes on SAF-inclusive tickets or providing carbon offset discounts can lower the effective premium, making sustainable flights more appealing. Integrating SAF education into public climate literacy programs can also enhance consumer understanding of aviation emissions and their mitigation options (Grimme, 2023).

4.1.4 Future Outlook

As the global aviation industry intensifies its decarbonization efforts, consumer WTP for SAF will continue to be a central driver of success. Airlines must navigate regional differences in economic capacity and environmental awareness, tailoring strategies to maximize WTP without alienating price-sensitive travelers. Partnerships with governments, civil society, and the private sector can support these efforts, ensuring that SAF transitions are both economically viable and socially inclusive.

Long-term success will depend on normalizing SAF as the standard in air travel, much like renewable electricity has become common in other sectors. This requires sustained investment in marketing, infrastructure, and policy, alongside robust safeguards against greenwashing and inequitable cost burdens.

By centering consumers in the SAF narrative—recognizing their power as both passengers and climate actors—the aviation industry can unlock meaningful support for sustainable transitions, ensuring that WTP aligns with individual values and collective climate goals.

5. Governance, Policies, and Equity in SAF Deployment

Sustainable Aviation Fuel (SAF) development governance is crucial for ensuring its deployment achieves environmental goals, social justice, and equitable resource distribution. As the global aviation sector advances its decarbonization agenda, the creation of robust policy frameworks and governance mechanisms is necessary to align the technical innovations of SAF with broader socio-economic priorities (Dua and Guzman, 2024). Without comprehensive governance, SAF development risks reinforcing historical inequalities and displacing environmental burdens onto the most vulnerable populations (German et al., 2011). This chapter explores the governance structures at international, national, and corporate levels, analyzing how these systems can promote fair and inclusive SAF transitions.

5.1 Global Governance Frameworks

International aviation bodies are central in coordinating SAF deployment through global standards and policy harmonization. The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), established by the International Civil Aviation Organization (ICAO), is the principal global initiative to reduce aviation-related emissions. However, CORSIA has been critiqued for focusing narrowly on carbon offsets while neglecting the social dimensions of sustainability, including land rights, labor conditions, and community participation (Grimme, 2023).

Strengthening CORSIA with integrated social safeguards is essential. Incorporating principles such as Free, Prior, and Informed Consent (FPIC) into CORSIA's criteria would ensure that indigenous communities and vulnerable populations are protected from displacement due to SAF feedstock cultivation (IUCN, 2014). Furthermore, aligning CORSIA with global human rights frameworks could enhance its legitimacy and effectiveness.

Table 10: Key International SAF Governance Instruments

Policy	Focus Area	Equity Mechanism	Source
CORSIA	Carbon offsetting	Weak social safeguards	Grimme, 2023
EU ReFuelEU	SAF blending mandate	Regional subsidies	Watson et al., 2024
RED II	Renewable energy sourcing	Certification standards	Dua & Guzman, 2024

5.2 National Policies and Regional Initiatives

National-level policies are pivotal to the development and scaling of SAF markets. Countries with ambitious climate targets, such as those in the European Union and the United States, have introduced progressive policies to foster SAF production and use. The European Union's ReFuelEU initiative sets binding SAF blending targets, creating predictable demand while providing financial support for producers and airlines (Watson et al., 2024). In the United States, the Inflation Reduction Act offers tax credits to lower the cost of SAF, making it more competitive with fossil fuels (Zheng et al., 2024).

However, countries in the Global South face systemic barriers, including limited public financing, infrastructural constraints, and weaker policy frameworks. As a result, SAF deployment in these regions lags behind, despite the availability of suitable feedstocks (Raman et al., 2024). Ensuring equitable SAF development requires transferring financial resources and technology from the Global North to the Global South, coupled with capacity-building initiatives.

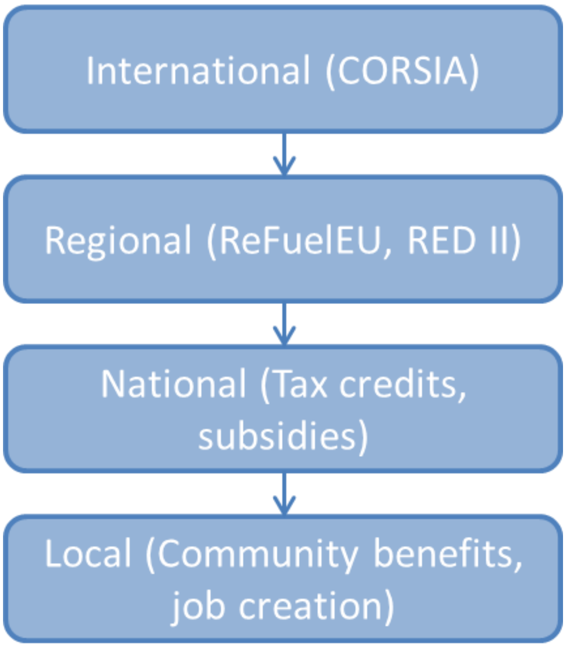

Figure 4: Policy Layers Supporting SAF Deployment

5.3 Equity Challenges in Governance

One of the primary equity challenges in SAF governance is the risk of shifting environmental and social burdens onto lower-income countries that provide feedstocks. Historically, resource extraction industries have imposed disproportionate costs on the Global South while delivering economic benefits to the Global North (Bardon and Massol, 2025). SAF production could replicate these dynamics if not managed carefully.

To mitigate these risks, governance frameworks must prioritize inclusive economic development by:

- Enforcing Free, Prior, and Informed Consent (FPIC) to protect indigenous land rights (IUCN, 2014).
- Mandating gender equity measures in labor practices to empower women in SAF supply chains (Sharno and Hiloidhari, 2024).
- Providing revenue-sharing mechanisms that allocate a fair portion of SAF profits to local communities (Caraveo Gomez Llanos et al., 2024).

International financial institutions can also play a role by directing investment toward equitable SAF projects, ensuring that social safeguards are tied to funding agreements.

5.4 Corporate Governance and Industry Standards

Corporate actors, particularly airlines and fuel producers are increasingly central to SAF governance through their sustainability strategies and procurement practices. Many companies are adopting Environmental, Social, and Governance (ESG) frameworks to manage their supply chains' social and environmental impacts (Caraveo Gomez Llanos et al., 2024). Certification schemes such as the Roundtable on Sustainable Biomaterials (RSB) verify that SAF is produced responsibly, ensuring compliance with labor rights, environmental protections, and land use standards (Dua and Guzman, 2024).

However, voluntary corporate commitments are insufficient without external accountability. Transparent reporting, third-party audits, and stakeholder engagement are necessary to hold companies accountable and ensure that social equity is not sidelined in pursuit of profits (Watson et al., 2024).

5.5 Community Participation in Governance

Community participation is essential for building trust, reducing conflict, and ensuring that SAF projects deliver tangible local benefits. Participatory governance models, including community advisory boards, cooperative ownership of feedstock operations, and shared decision-making processes, have proven effective in enhancing social acceptance and equitable outcomes (German et al., 2011).

Case studies from women-led cooperatives in Kenya demonstrate the value of inclusive governance. These cooperatives have successfully combined sustainable feedstock cultivation with local economic development, ensuring women benefit equally from SAF revenue streams (Sharno and Hiloidhari, 2024). Replicating such models in other regions can foster gender equity and enhance community resilience.

Moreover, participatory impact assessments can identify and mitigate potential social harms before implementing SAF projects. Engaging communities in the design, monitoring, and evaluation of SAF operations ensures that projects align with local development priorities and avoid unintended consequences (Anderson et al., 2022).

Effective governance and policy are critical to ensuring that SAF deployment is socially inclusive, environmentally sustainable, and economically viable. This requires coordinated international agreements, supportive national frameworks, corporate accountability, and meaningful community participation. By embedding equity into every level of SAF governance, the aviation industry can avoid repeating the injustices of past resource transitions and instead foster a future where the benefits of decarbonized flight are shared globally and fairly.

6. Future Pathways and Innovation in SAF

As the global aviation industry advances towards net-zero emissions targets by mid-century, the future of Sustainable Aviation Fuels (SAFs) depends on continuous innovation. This includes the development of advanced feedstocks, optimization of production technologies, supportive policy frameworks, and social inclusion strategies. Ensuring that SAF deployment is not only environmentally sustainable but also socially just and economically viable requires the aviation sector to adopt forward-looking approaches that embrace systemic change (Raman et al., 2024; Bardon and Massol, 2025). This chapter delves into the future trajectories of SAF, emphasizing the need for a holistic transition that integrates technological progress with social equity and global collaboration.

6.1 Ensuring Just Transitions

A truly sustainable SAF future must incorporate social justice principles, ensuring that SAF production does not perpetuate or exacerbate existing inequalities, particularly in the Global South. Many feedstock-producing regions face challenges of land tenure insecurity, labor exploitation, and gender disparities (Anderson et al., 2022; Sharno and Hiloidhari, 2024). Future SAF strategies should prioritize community-led models, equitable revenue sharing, fair labor practices, and meaningful participation in decision-making processes.

Investing in local skills development and infrastructure in feedstock-producing areas can help maximize socio-economic benefits. This includes supporting smallholder farmers through cooperative ownership models, creating opportunities for women in leadership roles within SAF value chains, and fostering community-driven environmental stewardship programs.

Additionally, future SAF certification schemes should embed social criteria, ensuring compliance with labor standards, land rights protections, and equitable profit-sharing mechanisms. Integrating these safeguards into international standards will help build trust and ensure that SAF markets operate fairly and inclusively.

6.2 Research and Development Priorities

Future research priorities for SAF should extend beyond technical challenges to include social, economic, and policy dimensions. Critical areas of focus include:

- Lowering the costs of advanced feedstocks, such as microalgae and lignocellulosic biomass, through improved cultivation techniques and supply chain logistics.
- Enhancing lifecycle assessment methodologies to comprehensively account for social and environmental trade-offs.
- Developing scalable carbon capture and utilization (CCU) technologies integrated with SAF production to create closed-loop carbon systems.
- Designing and implementing policy frameworks that incentivize SAF production while embedding equity considerations into funding, subsidies, and certification schemes (Dua and Guzman, 2024).
- Encouraging interdisciplinary collaboration between engineers, social scientists, economists, and policymakers to develop holistic SAF solutions that balance technological feasibility with social justice and economic resilience.

The future of SAF is deeply intertwined with technological, social, and political innovations. Unlocking its full potential requires continuous investment in advanced feedstocks, improved processing technologies, and comprehensive policy support that integrates social equity into every development phase. By centering community participation, environmental integrity, and global cooperation, SAF can become a tool for decarbonizing aviation and a driver of inclusive, sustainable development worldwide.

Moving forward, SAF must serve as a bridge in a broader transition towards a fundamentally transformed aviation system that balances the needs of climate mitigation, economic opportunity, and social justice. Achieving this vision will depend on sustained global collaboration, innovation, and a shared commitment to a just and resilient future for air travel.

7. Conclusions

The transition to Sustainable Aviation Fuels (SAFs) is a technological challenge and a profound social and economic transformation. Throughout this study, we have established that SAF development must integrate environmental sustainability with social equity and economic viability. SAFs offer significant potential to decarbonize aviation, reduce lifecycle greenhouse gas emissions, and lessen the sector's overall climate impact (Watson et al., 2024; Bardon and Massol, 2025). However, this potential comes with substantial social implications, particularly in feedstock-producing regions of the Global South (German et al., 2011; IUCN, 2014).

As highlighted in Chapter 4, SAF feedstock cultivation risks displacing communities, exacerbating gender inequalities, and exploiting labor unless robust safeguards are implemented (Anderson et al., 2022; Sharno and Hiloidhari, 2024;). Without careful governance, SAF transitions could reproduce colonial patterns of resource extraction, shifting environmental and social burdens onto marginalized populations (Lai and Karakaya, 2024). Therefore, social sustainability must be embedded into every stage of SAF development.

7.1 Integrated Approach for Sustainable Transitions

A just and sustainable SAF transition requires a systems approach that aligns technological innovation with social justice and equitable economic frameworks. As discussed in Chapter 8, future SAF strategies must diversify feedstocks to minimize land-use conflicts, invest in advanced technologies to reduce costs and ensure participatory governance that centers community voices (Vertès et al., 2020; Raman et al., 2024).

Social safeguards must accompany technical progress. These include protecting land tenure through Free, Prior, and Informed Consent (FPIC), promoting gender equity in labor practices, and ensuring fair revenue distribution in feedstock regions (IUCN, 2014; Caraveo Gomez Llanos et al., 2024). Lessons from women-led cooperatives in Kenya (Chapter 4) demonstrate how inclusive, community-driven SAF projects can deliver meaningful social benefits while contributing to global decarbonization (Sharno and Hiloidhari, 2024).

7.2 Policy Recommendations

The following policy priorities emerge from this research:

- **Global Integration of Social Standards**: International frameworks like CORSIA must evolve to incorporate social criteria, ensuring that carbon reductions are not achieved at the cost of human rights and social well-being (Grimme, 2023; Dua and Guzman, 2024).

- **Public Investment in Advanced Feedstocks**: Governments and multilateral organizations should support the scaling of next-generation feedstocks such as microalgae, municipal solid waste, and lignocellulosic biomass to reduce dependence on land-intensive crops (Raman et al., 2024; Watson et al., 2024).

- **Capacity Building in the Global South**: Policies should invest in technical training, cooperative development, and infrastructure in feedstock-producing regions, fostering local ownership and economic resilience (German et al., 2011; Sharno and Hiloidhari, 2024).

- **Transparency and Accountability**: Certification systems like the Roundtable on Sustainable Biomaterials (RSB) must be strengthened to verify compliance with labor, environmental, and equity standards across SAF supply chains (Dua and Guzman, 2024).

- **Cross-Sector Collaboration**: Aligning SAF transitions with broader sustainable development goals (SDGs) requires cooperation between governments, industry, civil society, and academia to balance emissions reductions with social justice (Anderson et al., 2022; Bardon and Massol, 2025).

7.3 Vision for the Future

The aviation industry's decarbonization cannot be separated from questions of global equity. As SAF deployment accelerates, the risk of deepening global inequalities grows if policies do not prioritize fairness and shared benefits. Aviation's future should not merely be about flying greener—it must be about flying fairer.

This requires rethinking aviation’s global footprint, ensuring that SAF transitions are designed to uplift communities, protect ecosystems, and distribute economic opportunities more equitably (German et al., 2011; Lai and Karakaya, 2024). The future of aviation decarbonization should be viewed as an opportunity to correct historical injustices by integrating inclusive governance models, community-driven development, and equitable financing mechanisms (Raman et al., 2024; Sharno and Hiloidhari, 2024).

By embedding justice and community empowerment into SAF transitions, the industry can become a leader in global climate solutions, showing that decarbonization does not need to come at the cost of social harm but can instead drive positive social transformation. A truly sustainable aviation sector advances the Paris Agreement’s climate goals and the UN Sustainable Development Goals (SDGs), ensuring no community is left behind.

7.4 Final Thoughts

Sustainable Aviation Fuels present a profound opportunity to reimagine the aviation industry. Beyond their technical role in reducing emissions, SAFs can reshape global aviation as a force for sustainable development, equity, and resilience. To realize this potential, SAF transitions must prioritize local empowerment, equitable profit-sharing, and social inclusion alongside carbon reductions (Caraveo Gomez Llanos et al., 2024; Watson et al., 2024).

Moving forward, industry leaders, policymakers, and communities must work together to develop SAF pathways that deliver holistic benefits. By placing social sustainability at the heart of SAF strategies, aviation can become a model of a responsible global industry where climate solutions are implemented not only for the benefit of the planet but also for the people who inhabit it.

8. References

Adelle, C., & Withana, S. (2008). EU and US public perceptions of environmental, climate change and energy issues. Institute for European Environmental Policy.

Ahmad, S., Xu, B., Greening, P., & Ouenniche, J. (2019). Public attitude towards aviation biofuels: A pilot study findings. In Phil Greening, and Jamal Ouenniche. In Proceedings of 11th International Conference on Applied Energy Vasteras, Sweden.

Akan, Ş., Özdemir, E., & Bakır, M. (2022). Purchase intention toward green airlines and willingness to pay more: Extending the Theory of Planned Behavior. In Corporate Governance, Sustainability, and Information Systems in the Aviation Sector, Volume I (pp. 123-143). Singapore: Springer Nature Singapore.

Amigun, B., Musango, J. K., & Brent, A. C. (2011). Community perspectives on the introduction of biodiesel production in the Eastern Cape Province of South Africa. Energy, 36(5), 2502-2508.

Amin, L., Hashim, H., Mahadi, Z., Ibrahim, M., & Ismail, K. (2017). Determinants of stakeholders' attitudes towards biodiesel. Biotechnology for Biofuels, 10(1), 1-17.

Anderson, B. J., Mueller, D. W., Hoard, S. A., Sanders, C. M., & Rijkhoff, S. A. M. (2022). Social science applications in sustainable aviation biofuels research: Opportunities, challenges, and advancements. Frontiers in Energy Research, 9, 771849.

Ansell, P. J. (2023). Review of sustainable energy carriers for aviation: Benefits, challenges, and future viability. Progress in Aerospace Sciences, 141, 100919.

Arning, K., Engelmann, L., & Ziefle, M. (2023). Ready to fly? Comparing acceptance and behavioral usage intentions of CO2-based aviation fuels in four European countries. Frontiers in Energy Research, 11, 1156709.

ASG Renaissance. (2004). Biodiesel end-user survey: Implications for industry growth. Dearborn, MI.

Baddeley, M. (2022). Prospects for zero carbon flight: A behavioural economic analysis of consumer preferences for sustainable aviation. Available at SSRN 4110232.

Bae, J. H. (2014). Non-linear preferences on bioethanol in South Korea. Environmental and Resource Economics Review, 23(3), 515-551.

Bakhtiyari, Z., Yazdanpanah, M., Forouzani, M., & Kazemi, N. (2017). Intention of agricultural professionals toward biofuels in Iran: Implications for energy security, society, and policy. Renewable and Sustainable Energy Reviews, 69, 341-349.

Bakır, M., & Itani, N. (2024). Modelling behavioural factors affecting consumers' intention to adopt electric aircraft: A multi-method investigation. Sustainability, 16(19), 8467.

Balogh, P., Bai, A., Popp, J., Huzsvai, L., & Jobbágy, P. (2015). Internet-orientated Hungarian car drivers' knowledge and attitudes towards biofuels. Renewable and Sustainable Energy Reviews, 48, 17-26.

Bardon, P., & Massol, O. (2025). Decarbonizing aviation with sustainable aviation fuels: Myths and realities of the roadmaps to net zero by 2050. Renewable and Sustainable Energy Reviews, 211, 115279.

Baumeister, S. (2017). An eco-label for the airline industry: Instrument for behavioral change? (Doctoral dissertation, University of Jyväskylä).

Berger, S., Kilchenmann, A., Lenz, O., & Schlöder, F. (2022). Willingness-to-pay for carbon dioxide offsets: Field evidence on revealed preferences in the aviation industry. Global Environmental Change, 73, 102470.

Bertsch, V., Hall, M., Weinhardt, C., & Fichtner, W. (2016). Public acceptance and preferences related to renewable energy and grid expansion policy: Empirical insights for Germany. Energy, 114, 465-477.

Bolsen, T., & Cook, F. L. (2008). The polls—trends: Public opinion on energy policy: 1974–2006. Public Opinion Quarterly, 72(2), 364-388.

Bösehans, G., Bolderdijk, J. W., & Wan, J. (2020). Pay more, fly more? Examining the potential guilt-reducing and flight-encouraging effect of an integrated carbon offset. Journal of Environmental Psychology, 71, 101469.

Brouwer, R., Brander, L., & Van Beukering, P. (2008). "A convenient truth": air travel passengers' willingness to pay to offset their CO 2 emissions. Climatic Change, 90, 299-313.

Cacciatore, M. A., Binder, A. R., Scheufele, D. A., & Shaw, B. R. (2012). Public attitudes toward biofuels. Politics and the Life Sciences, 31(1), 36-51.

Caraveo Gomez Llanos, A. F., Vijaya, A., & Wicaksono, H. (2024). Rating ESG key performance indicators in the airline industry. Environment, Development and Sustainability, 26, 27629–27653.

Carroll, J., Brazil, W., Howard, M., & Denny, E. (2022). Imperfect emissions information during flight choices and the role of CO2 labelling. Renewable and Sustainable Energy Reviews, 165, 112508.

Chang, J. S., Shon, J. Z., & Lin, T. D. (2010). Airline carbon offset: Passengers' willingness to pay and reasons to buy. In 12th World Conference on Transport Research (WCTR), Lisbon, Portugal, July (pp. 11-15).

Chen, F. Y. (2013). The intention and determining factors for airline passengers' participation in carbon offset schemes. Journal of Air Transport Management, 29, 17-22.

Cheung, J., Kragt, M., & Burton, M. (2015). The awareness and willingness of air travellers to pay for voluntary carbon offsets and their co-benefits.

Chiambaretto, P., Laurent, S., Schmalz, U., Fu, M., Rouyre, A., Bildstein, C., & Fernandez, A. S. (2024). Are consumers willing to pay more for green innovations? Insights from the air transport industry. Technovation, 137, 103079.

Choi, A. S., & Ritchie, B. (2013). Willingness to pay for flying carbon neutral. In CAUTHE 2013: Tourism and Global Change: On the Edge of Something Big (pp. 86-102). Christchurch, NZ: Lincoln University.

Choi, A. S., & Ritchie, B. W. (2014). Willingness to pay for flying carbon neutral in Australia: An exploratory study of offsetter profiles. Journal of Sustainable Tourism, 22(8), 1236-1256.

Choi, A. S., Gössling, S., & Ritchie, B. W. (2018). Flying with climate liability? Economic valuation of voluntary carbon offsets using forced choices. Transportation Research Part D: Transport and Environment, 62, 225-235.

Cliffe, A. D. (2014). An investigation of UK passenger attitudes towards the carbon offsetting of both flight and airport emissions.

Cordes, H. (2020). Voluntary carbon offsets in the aviation industry: how environmental knowledge affects travellers willingness to pay: a systematic review.

Crosby, P., Thompson, D., & Best, R. (2024). Air travellers' attitudes towards carbon emissions: evidence from the Google Flights interface. Journal of Sustainable Tourism, 1-24.

Crouse, S. R., Box, S. C., Winter, S. R., & Rice, S. (2024). Support for green initiatives in aviation: A case study across American aviation consumers. Journal of the Air Transport Research Society, 2, 100020.

de Alba, M. M. G., & Jencka, N. J. (2020). A study on low-carbon aviation fuels in the United States: economic potential and challenges facing consumer awareness and favorability (Master's thesis).

Delshad, A. B., Raymond, L., Sawicki, V., & Wegener, D. T. (2010). Public attitudes toward political and technological options for biofuels. Energy Policy, 38(7), 3414-3425.

den Daas, B. (2020). The relationship between air traveller's sustainable awareness, attitude and the willingness to mitigate – A paradox?.

Deng, P., Zheng, P., & Xie, D. (2024). Carbon offset payment intentions in aviation industry: Altruism vs. Egoism and airline sustainability. Tourism Review.

Dobers, G. M. (2019). Acceptance of biogas plants taking into account space and place. Energy Policy, 135, 110987.

Dodds, R., Leung, M., & Smith, W. (2008). Assessing awareness of carbon offsetting by travellers and travel agents. Anatolia, 19(1), 135-148.

Dominguez, J. M., & Olivares, M. (2012). Are biofuels socially accepted in Guayaquil? No. 1007-2016-79712.

Dragojlovic, N., & Einsiedel, E. (2014). The polarization of public opinion on biofuels in North America: Key drivers and future trends. Biofuels, 5(3), 233-247.

Dua, R., & Guzman, A. F. (2024). A perspective on emerging energy policy and economic research agenda for enabling aviation climate action. Energy Research & Social Science, 117, 103725.

Emmann, C. H., Arens, L., & Theuvsen, L. (2013). Individual acceptance of the biogas innovation: A structural equation model. Energy Policy, 62, 372-378.

Engelmann, L., Arning, K., & Ziefle, M. (2024). One step closer: Laypeople's perception of production steps for manufacturing CO2-based jet fuel. Energy, Sustainability and Society, 14(1), 9.

Engelmann, L., Arning, K., Linzenich, A., & Ziefle, M. (2020). Risk assessment regarding perceived toxicity and acceptance of carbon dioxide-based fuel by laypeople for its use in road traffic and aviation. Frontiers in Energy Research, 8, 579814.

Favero, G. (2020). Consumer awareness of CSR in the aviation industry.

Filimonau, V., & Högström, M. (2017). The attitudes of UK tourists to the use of biofuels in civil aviation: An exploratory study. Journal of Air Transport Management, 63, 84-94.

Filimonau, V., Mika, M., & Pawlusiński, R. (2018). Public attitudes to biofuel use in aviation: Evidence from an emerging tourist market. Journal of Cleaner Production, 172, 3102-3110.

Fung, T. K., Choi, D. H., Scheufele, D. A., & Shaw, B. R. (2014). Public opinion about biofuels: The interplay between party identification and risk/benefit perception. Energy Policy, 73, 344-355.

Gerich, A. (2021). Is Sustainable Aviation Ready for Take-Off? An analysis of airline initiatives and passenger views on sustainable business practices in the aviation industry [Master's thesis, Universidade NOVA de Lisboa (Portugal)].

German, L., Schoneveld, G. C., & Pacheco, P. (2011). Local social and environmental impacts of biofuels: Global comparative assessment and implications for governance. Ecology and Society, 16(4), 29.

German, L., Schoneveld, G. C., & Pacheco, P. (2011). The social and environmental impacts of biofuel feedstock cultivation: Evidence from multi-site research in the forest frontier. Ecology and Society, 16(3), 24.

Giraldo, L. A., Gracia, A., & Do Amaral, E. (2010). Willingness to pay for biodiesel in Spain: A pilot study for diesel consumers. Spanish Journal of Agricultural Research, 4, 887-894.

Goding, L. (2016). Swedish companies' willingness to pay a price premium for flights using bio jet fuel.

Goding, L., Andersson-Franko, M., & Lagerkvist, C. J. (2018). Preferences for bio jet fuel in Sweden: The case of business travel from a city airport. Sustainable Energy Technologies and Assessments, 29, 60-69.

Gössling, S., & Dolnicar, S. (2023). A review of air travel behavior and climate change. Wiley Interdisciplinary Reviews: Climate Change, 14(1), e802.

Gracia, A., Barreiro-Hurlé, J., & Pérez, L. P. (2018). Overcoming the barriers for biodiesel use in Spain: An analysis of the role of convenience and price. Journal of Cleaner Production, 172, 391-401.

Grimme, W. (2023). The introduction of sustainable aviation fuels—A discussion of challenges, options and alternatives. Aerospace, 10(3), 218.

Han, H., Lee, M. J., Chua, B. L., & Kim, W. (2019). Triggers of traveler willingness to use and recommend eco-friendly airplanes. Journal of Hospitality and Tourism Management, 38, 91-101.

Henle, M. (2022). Pro-environmental behavior and motivation to offset flight emissions among flight passengers.

Hinkel, J. (2022). Ready for take-off?: Effectiveness of different green communication strategies in the aviation industry - The influence of evidence type and eco-label type on willingness to pay for sustainable kerosine (Bachelor's thesis, University of Twente).

Hinnen, G., Hille, S. L., & Wittmer, A. (2017). Willingness to pay for green products in air travel: Ready for take-off?. Business Strategy and the Environment, 26(2), 197-208.

Hui, T., Itani, N., & O'Connell, J. F. (2024). Examining air travellers' willingness to pay for non-voluntary environment-related fees: The case of SAF surcharge and carbon taxes. Highlights of Sustainability, 3(1), 61-75.

Hwang, J., & Lyu, S. O. (2020). Relationships among green image, consumer attitudes, desire, and customer citizenship behavior in the airline industry. International Journal of Sustainable Transportation, 14(6), 437-447.

Hylan, K., Thomas Jr, C. A., Sharma, V., & Wheeler, B. (2024). Passenger insight on sustainable flight: Exploring the relationships between attitudes and risk propensity on willingness to fly.

International Union for Conservation of Nature (IUCN). (2014). A global assessment of the environmental and social impacts caused by the production and use of biofuels. IUCN.

Jacobson, L., Åkerman, J., Giusti, M., & Bhowmik, A. K. (2020). Tipping to staying on the ground: Internalized knowledge of climate change crucial for transformed air travel behavior. Sustainability, 12(5), 1994.

Jäger, A., Kahr, H., Ortner, T., & Kränzl-Nagl, R. (2017). Bioethanol from straw and its public acceptance. In International scientific conference RURAL DEVELOPMENT 2017 (pp. 301-305).

Jensen, K. L., Clark, C. D., English, B. C., Menard, R. J., Skahan, D. K., & Marra, A. C. (2010). Willingness to pay for E85 from corn, switchgrass, and wood residues. Energy Economics, 32(6), 1253-1262.

Jou, R. C., & Chen, T. Y. (2015). Willingness to pay of air passengers for carbon-offset. Sustainability, 7(3), 3071-3085.

Kallas, Z., & Gil, J. M. (2015). Do the Spanish want biodiesel? A case study in the Catalan transport sector. Renewable Energy, 83, 398-406.

Kallela, L. (2024). Understanding attitudes and barriers towards voluntary carbon emission offsetting among Finnish airline passengers.

Kantenbacher, J., Hanna, P., Cohen, S., Miller, G., & Scarles, C. (2018). Public attitudes about climate policy options for aviation. Environmental Science & Policy, 81, 46-53.

Keiser, D., Pupkes, B., & Freitag, M. (2023). Passenger expectations towards a sustainable aviation industry. Transportation Research Procedia, 75, 189-197.

Khand, P. B. (2018). Air Traveler's Willingness to Pay to Offset Their CO_2 Emission in Pokhara. Prithvi Academic Journal, 1(1), 12-22.

Korba, P., Sekelová, I., Koščáková, M., & Behúnová, A. (2023). Passengers' knowledge and attitudes toward green initiatives in aviation. Sustainability, 15(7), 6187.

Kortsch, T., Hildebrand, J., & Schweizer-Ries, P. (2015). Acceptance of biomass plants – Results of a longitudinal study in the bioenergy-region Altmark. Renewable Energy, 83, 690-697.

Kostidi, E., & Lyridis, D. (2024). Social impact assessment of biofuel production for maritime and aviation sectors: A case study of a pilot biorefinery project. Frontiers in Energy Research, 12, 1454862.

Kubik, M. (2006). Consumer views on transportation and energy (No. NREL/TP-620-39047). National Renewable Energy Lab. https://nrel.gov/docs/fy06osti/39047.pdf

Lahmann, E. L. (2005). Biodiesel in Oregon: An agricultural perspective. Honors Baccalaureate of Science in Environmental Economics, Policy and Management. University of Oregon.

Lai, Y. Y., & Karakaya, E. (2024). Rethinking the sustainability of transitions: An illustrative case of burden-shifting and sociotechnical dynamics of aviation fuel in Sweden. Energy Research & Social Science, 113, 103574.

Lanzini, P., Testa, F., & Iraldo, F. (2016). Factors affecting drivers' willingness to pay for biofuels: The case of Italy. Journal of Cleaner Production, 112, 2684-2692.

Lau, J. I. C., Wang, Y. S., Ang, T., Seo, J. C. F., Khadaroo, S. N. B. A., Chew, J. J., Ng, A. K. L., & Sunarso, J. (2024). Emerging technologies, policies and challenges toward implementing sustainable aviation fuel (SAF). Biomass and Bioenergy, 186, 107277.

Lee, G. E., Loveridge, S., & Joshi, S. (2017). Local acceptance and heterogeneous externalities of biorefineries. Energy Economics, 67, 328-336.

Li, T., & McCluskey, J. J. (2014). Consumer preferences for second-generation bioethanol. In 2014 Annual Meeting, Agricultural and Applied Economics Association (No. 170203).

Lim, S. Y., Kim, H. J., & Yoo, S. H. (2017). Public's willingness to pay a premium for bioethanol in Korea: A contingent valuation study. Energy Policy, 101, 20-27.

Longstaff, H., Secko, D. M., Capurro, G., Hanney, P., & McIntyre, T. (2015). Fostering citizen deliberations on the social acceptability of renewable fuels policy: The case of advanced lignocellulosic biofuels in Canada. Biomass and Bioenergy, 74, 103-112.

Loureiro, M. L., Labandeira, X., & Hanemann, M. (2013). Transport and low-carbon fuel: A study of public preferences in Spain. Energy Economics, 40, S126-S133.

Lu, J. L., & Shon, J. Z. Exploring airline passengers' willingness to pay for carbon offset.

Lu, J. L., & Shon, Z. Y. (2012). Exploring airline passengers' willingness to pay for carbon offsets. Transportation Research Part D: Transport and Environment, 17(2), 124-128.

Lu, J. L., & Wang, C. Y. (2018). Investigating the impacts of air travellers' environmental knowledge on attitudes toward carbon offsetting and willingness to mitigate the environmental impacts of aviation. Transportation Research Part D: Transport and Environment, 59, 96-107.

Lynch, D. H., Klaassen, P., & Broerse, J. E. (2017). Unraveling Dutch citizens' perceptions on the bio-based economy: The case of bioplastics, bio-jetfuels and small-scale bio-refineries. Industrial Crops and Products, 106, 130-137.

Ma, W., Zhang, Y., & Cui, J. (2021). Chinese future frequent flyers' willingness to pay for carbon emissions reduction. Transportation Research Part D: Transport and Environment, 97, 102935.

Ma, Z., Zhang, C., Chen, C. (2014). Analyzing the factors that influence Chinese consumers' adoption of biodiesel: The private vehicle owner's investigation in Beijing. Renewable and Sustainable Energy Reviews, 37, 199-206.

Macario, R. (2024). Tourist behavior and awareness in airline voluntary carbon offset programs: A Portuguese perspective. Journal of the Air Transport Research Society, 3, 100042.

Mair, J. (2011). Exploring air travellers' voluntary carbon-offsetting behaviour. Journal of Sustainable Tourism, 19(2), 215-230.

Mamadzhanov, A., McCluskey, J. J., & Li, T. (2019). Willingness to pay for second-generation bioethanol: A case study of Korea. Energy Policy, 127, 464-474.

Mariasiu, F. (2013). Consumers' attitudes related to biofuel use in transportation. International Review of Management and Marketing, 3(1), 1-9.

McCollum, C. J., Ramsey, S. M., Bergtold, J. S., & Andrango, G. (2021). Estimating the supply of oilseed acreage for sustainable aviation fuel production: taking account of farmers' willingness to adopt. Energy, Sustainability and Society, 11, 1-22.

Meidiana, C., Hidayah, A., & Wijayanti, W. P. (2020). Factors influencing biogas acceptance in rural areas. In IOP Conference Series: Earth and Environmental Science, 520(1), 012006. IOP Publishing.

Moula, M. M. E., Nyári, J., & Bartel, A. (2017). Public acceptance of biofuels in the transport sector in Finland. International Journal of Sustainable Built Environment, 6(2), 434-441.

Ojala, R. (2019). Millennials' awareness and attitudes towards flying.

Ölçen, O., & Önler, B. Ü. Ş. R. A. (2022). Greenhouse gas emission awareness and fare-purchasing behaviour of passengers in air carriers: A socio-demographic analysis. Journal of Sustainability Science and Management, 17(9).

Paris, A., Gastineau, P., Mahieu, P. A., & Cheze, B. (2020). Citizen involvement in the energy transition: Highlighting the role played by the spatial heterogeneity of preferences in the public acceptance of biofuels. No. 2828. Orleans Economics Laboratory/Laboratoire d'Economie d'Orleans (LEO), University of Orleans.

Park, J., Ryu, Y., & Kim, Y. (2024). Factors influencing air passengers' intention to purchase voluntary carbon offsetting programs: The moderating role of environmental knowledge. Journal of Air Transport Management, 118, 102619.

Petrolia, D. R., Bhattacharjee, S., Hudson, D., & Herndon, C. W. (2010). Do Americans want ethanol? A comparative contingent-valuation study of willingness to pay for E-10 and E-85. Energy Economics, 32(1), 121-128.

Phalan, B. (2009). The social and environmental impacts of biofuels in Asia: An overview. Applied Energy, 86, 21-29.

Pouliot, S. (2013). Arbitrage between ethanol and gasoline: Evidence from motor fuel consumption in Brazil. Selected Paper Prepared for Presentation at the Agricultural & Applied Economics Association's 2013 AAEA & CAES Annual Meeting, Washington, DC.

Ragbir, N. K., Rice, S., Winter, S. R., & Choy, E. C. (2021). Emotions and caring mediate the relationship between knowledge of sustainability and willingness to pay for greener aviation. Technology in Society, 64, 101491.

Rajiani, I., & Kot, S. (2018). The prospective consumers of the Indonesian green aviation initiative for sustainable development in air transportation. Sustainability, 10(6), 1772.

Raman, R., Gunasekar, S., Dávíd, L. D., Rahmat, A. F., & Nedungadi, P. (2024). Aligning sustainable aviation fuel research with sustainable development goals: Trends and thematic analysis. Energy Reports, 12, 2642–2652.

Rice, C., Ragbir, N. K., Rice, S., & Barcia, G. (2020). Willingness to pay for sustainable aviation depends on ticket price, greenhouse gas reductions and gender. Technology in Society, 60, 101224.

Ritchie, B. W., Kemperman, A., & Dolnicar, S. (2021). Which types of product attributes lead to aviation voluntary carbon offsetting among air passengers?. Tourism Management, 85, 104276.

Rohracher, H. (2003). The role of users in the social shaping of environmental technologies. Innovation: The European Journal of Social Science Research, 16(2), 177-192.

Rohracher, H. (2010). Biofuels and their publics: The need for differentiated analyses and strategies. Biofuels, 1(1), 3-5.

Rostan, J. (n.d.). Marine bio-energy; What do third generation marine biofuels mean for society?.

Rotaris, L., Giansoldati, M., & Scorrano, M. (2020). Are air travellers willing to pay for reducing or offsetting carbon emissions? Evidence from Italy. Transportation Research Part A: Policy and Practice, 142, 71-84.

Rush, L., Simonpietri, J., & Kukac, N. (2025). Community engagement in the development of bioenergy projects from cellulosic urban waste feedstock in Hawaii for sustainable aviation fuel. Frontiers in Sustainable Cities, 6, 1496241.

Salvo, A., & Huse, C. (2013). Build it, but will they come? Evidence from consumer choice between gasoline and sugarcane ethanol. Journal of Environmental Economics and Management, 66(2), 251-279.

Savvanidou, E., Zervas, E., & Tsagarakis, K. P. (2010). Public acceptance of biofuels. Energy Policy, 38(7), 3482-3488.

Schomakers, E. M., Engelmann, L., & Ziefle, M. (2024). Diversity in the acceptance of sustainable aviation fuels: Uncovering varying motivational patterns. Fuel Communications, 20, 100129.

Schumacher, K., & Schultmann, F. (2017). Local acceptance of biogas plants: A comparative study in the Trinational Upper Rhine Region. Waste and Biomass Valorization, 8(7), 2393-2412.

Selfa, T., Kulcsar, L., Bain, C., Goe, R., & Middendorf, G. (2011). Biofuels bonanza?: Exploring community perceptions of the promises and perils of biofuels production. Biomass and Bioenergy, 35(4), 1379-1389.

Shaari, N. F., Abdul-Rahim, A. S., & Afandi, S. H. M. (2020). Are Malaysian airline passengers willing to pay to offset carbon emissions?. Environmental Science and Pollution Research, 27, 24242-24252.

Shaari, N. F., Majid, M., Ramli, M. F., Badyalina, B., Mokhtar, N. A., & Mohamad, A. (2022). An investigation of Malaysian airline passengers towards the willingness to pay for airlines carbon offset based on frequency and trip purposes. Journal of Islamic, Social, Economics and Development, 7(47), 114-122.

Sharno, M. A., & Hiloidhari, M. (2024). Social sustainability of biojet fuel for net zero aviation. Energy for Sustainable Development, 79, 101419.

Shin, J., & Hwang, W. S. (2017). Consumer preference and willingness to pay for a renewable fuel standard (RFS) policy: Focusing on ex-ante market analysis and segmentation. Energy Policy, 106, 32-40.

Simkó, B. (2010). The role of public evaluation of bioethanol as a biofuel in Hungary. University of West Hungary, Faculty of Economics.

Simons, L., Engelmann, L., Arning, K., & Ziefle, M. (2021). Two sides of the same coin—explaining the acceptance of CO2-based fuels for aviation using PLS-SEM by considering the production and product evaluation. Frontiers in Energy Research, 9, 742109.

Soland, M., Steimer, N., & Götz, W. (2013). Local acceptance of existing biogas plants in Switzerland. Energy Policy, 61, 802-810.

Solomon, B. D., & Johnson, N. H. (2009). Valuing climate protection through willingness to pay for biomass ethanol. Ecological Economics, 68(7), 2137-2144.

Stenius, J. (2023). Developing the offering of sustainable aviation fuel.

Stiebe, M. (2023). Stakeholder perceptions on sustainability challenges and innovations in general aviation. Sustainability, 15(23), 16505.

Tang, B. J., Yan, R., Chen, J. Y., & Ji, C. J. (2024). Are air travelers willing to pay for mandatory carbon emission policies? Evidence from China. Sustainable Production and Consumption, 52, 111-123.

Tao, Y., Duan, M., & Deng, Z. (2021). Using an extended theory of planned behaviour to explain willingness towards voluntary carbon offsetting among Chinese consumers. Ecological Economics, 185, 107068.

Þorsteinsdóttir, A. H. (2023). Why should you carbon offset your flights? An analysis of people's willingness to pay for carbon offset and thereby offset the carbon footprints of flying (Doctoral dissertation).

Tolanuwat, S., & Jangsiriwattana, T. Impact of Attitude, Subjective Norm and Perceived Behavioral Control on Carbon Offset Purchasing Intention: A Case Study of Thai Passengers.

Truong-Dinh, B. Q., Nguyen, T. T., Cheng, T. C. F., & Cheng, J. M. S. (2023). Effects of consumer perceptions on carbon-offset payment through mediating and moderating mechanisms. Transportation Research Part D: Transport and Environment, 115, 103584.

University of Wisconsin-Madison. (2009). Survey shows high interest in biofuels. Retrieved April 1, 2009, from http://www.news.wisc.edu/releases/15175

van Birgelen, M., Semeijn, J., & Behrens, P. (2011). Explaining pro-environment consumer behavior in air travel. Journal of Air Transport Management, 17(2), 125-128.

Van de Velde, L., Vandermeulen, V., Van Huylenbroeck, G., & Verbeke, W. (2011). Consumer information (in)sufficiency in relation to biofuels: Determinants and impact. Biofuels, Bioproducts and Biorefining, 5(2), 125-131.

van Santen, T. (2024). Determining stakeholders' preferences towards sustainable aviation technologies: A Bayesian best-worst method in assessing sustainable aviation technologies preferences.

Varela Villarreal, J., Burgués, C., & Rösch, C. (2020). Acceptability of genetically engineered algae biofuels in Europe: Opinions of experts and stakeholders. Biotechnology for Biofuels, 13, 1-21.

Vertès, A. A., Qureshi, N., Blaschek, H. P., & Yukawa, H. (Eds.). (2020). Green energy to sustainability: Strategies for global industries. Wiley.

Vongtharawat, M., Jeambua, K., & Pooripakdee, S. (2019). Willingness to use and pro-environmental attitudes for airlines' environment friendly services: the perspective of Thai passengers. International Journal of Humanities, Arts and Social Sciences, 5(4), 145.

Wang, Z., Ali, S., Akbar, A., & Rasool, F. (2020). Determining the influencing factors of biogas technology adoption intention in Pakistan: The moderating role of social media. International Journal of Environmental Research and Public Health, 17(7), 2311.

Watson, M. J., Machado, P. G., da Silva, A. V., Saltar, Y., Ribeiro, C. O., Nascimento, C. A. O., & Dowling, A. W. (2024). Sustainable aviation fuel technologies, costs, emissions, policies, and markets: A critical review. Journal of Cleaner Production, 449, 141472.

Wegener, D. T., & Kelly, J. R. (2008). Social psychological dimensions of bioenergy development and public acceptance. Bioenergy Research, 1(2), 107-117.

Winter, S. R., Crouse, S. R., & Rice, S. (2021). The development of 'green' airports: Which factors influence willingness to pay for sustainability and intention to act? A structural and mediation model analysis. Technology in Society, 65, 101576.

Wu, H., Zhang, H., & Song, H. (2024). Are Chinese willing to pay for travel carbon offset products?. Journal of Sustainable Tourism, 1-22.

Wu, Z., Ai, Y., Chu, Y., & Zhang, H. (2025). Material Incentive or Emotional Incentive-A Study on the Effect of Incentive Mechanism on Passengers' Willingness to Pay for Carbon Offset in Aviation. Available at SSRN 5138699.

Wüstenhagen, R., Wolsink, M., & Bürer, M. J. (2007). Social acceptance of renewable energy innovation: An introduction to the concept. Energy Policy, 35(5), 2683-2691.

Xu, B., Ahmad, S., Charles, V., & Xuan, J. (2022). Sustainable commercial aviation: What determines air travellers' willingness to pay more for sustainable aviation fuel?. Journal of Cleaner Production, 374, 133990.

Yıldız, O., & Başakcı, T. (2024) Consumer acceptance of sustainable airlines through the lens of the triple bottom line. Available at SSRN 5061009.

Yraola III, S. D., & Mendiola, A. A. (2024). The theory of planned behavior and its influences on willingness-to-pay for green air travel: A values orientation perspective. Journal of Management for Global Sustainability, 12(1), 4.

Zailani, S., Iranmanesh, M., Sean Hyun, S., & Ali, M. H. (2019). Applying the theory of consumption values to explain drivers' willingness to pay for biofuels. Sustainability, 11(3), 668.

Zapata, C., & Nieuwenhuis, P. (2009). Driving on liquid sunshine—the Brazilian biofuel experience: A policy driven analysis. Business Strategy and the Environment, 18(8), 528-541.

Zhang, B., Ritchie, B., Mair, J., & Driml, S. (2019). Is the airline trustworthy? The impact of source credibility on voluntary carbon offsetting. Journal of Travel Research, 58(5), 715-731.

Zhang, Y., Yu, Y., Li, T., & Zou, B. (2011). Analyzing Chinese consumers' perception of biofuels implementation: A private vehicle owner's investigation in Nanjing. Renewable and Sustainable Energy Reviews, 15(5), 2299-2309.

Zheng, S., Wang, C., & Jiang, C. (2024). Carrot or stick? Environmental and welfare implications of sustainable aviation fuel policies. Transportation Research Part B, 188, 103062.