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Facilitating a Sustainable Aviation Fuel Transition in Italy

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Abstract: Civil aviation significantly contributes to "hard-to-abate" emissions, responsible for 2% of global CO_2 emissions. This paper examines the most effective policies to promote Sustainable Aviation Fuels (SAFs) in Italy, using a multi-level policy analysis and a stakeholder-based case study approach. The policies reviewed comprise the international, European, and national level. The paper analyses at the international level, ICAO CORSIA and, at the European level, the Renewable Energy Directive (RED), ReFuel EU, and the EU Emissions Trading System (EU ETS) for aviation. Italy has not yet implemented specific policies targeting SAF transition, which is challenging due to commercialization issues and policy inconsistencies. These include the price gap between SAF and conventional fuels, different definitions adopted, and environmental objectives pursued with respect to sustainable fuels by ICAO and the EU. Other challenges include double-counting risks and fuel tankering practices. This article contributes to Italy's SAF policymaking by developing a stakeholder-based quantitative survey, whose results suggest that three measures are key: tax subsidies for technology and infrastructure users, tax credits for upgrading production infrastructure, and tax breaks for SAF-using companies, fuel handlers, and distributors.

Keywords: SAF; sustainability; emissions; stakeholder engagement; multi-level analysis

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Citation: Erriu, R.; Marcucci, E.; Gatta, V. Facilitating a Sustainable Aviation Fuel Transition in Italy. *Energies* **2024**, *17*, 3388. https://doi.org/10.3390/en17143388

Academic Editor: Alberto Pettinau

Received: 6 June 2024
Revised: 25 June 2024
Accepted: 4 July 2024
Published: 10 July 2024

1. Introduction

Sustainability is core in contemporary discourse concerning aviation. To address this issue, one must promote a transition towards sustainability. Adopting Sustainable Aviation Fuels (SAFs) offers a promising solution to abate aviation's carbon footprint [1]. This paper investigates the most effective policies to facilitate SAF integration within Italian civil aviation. Compelling statistics point to the urgency of adopting SAF. In fact, civil aviation not only contributes approximately 2% of global carbon dioxide (CO_2) emissions but also accounts for 13.4% of total emissions within the European transport sector, whose carbon emissions keep growing despite endeavors to curtail them [2,3]. Such trends raise deep concerns about aviation sustainability, given its higher emissions intensity compared to alternative sectors [4]. SAF can abate aviation's environmental impact in the near-to-medium term. These fuels, derived from renewable sources (e.g., biomass) or synthetic processes (e.g., using captured carbon and green hydrogen), can reduce emissions without significant aircraft engine modifications. SAFs allow for circumventing the extensive technological reconfiguration or fleet replacement that adopting other fuels would imply [5,6]. Formulating and implementing supportive policies at various levels is necessary to unlock SAF's potential [7].

The International Civil Aviation Organization (ICAO) promotes carbon reduction through the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). The EU fosters SAF uptake by promoting the Renewable Energy Directive (RED) [8], ReFuel EU [9], and the EU Emissions Trading System for Aviation (EU ETS Aviation) [10]. Italy still lacks a dedicated national policy framework to support the SAF transition.

The path toward SAF adoption is riddled with obstacles, including barriers to commercialization and policy inconsistencies. Factors such as high production costs and limited market volumes hamper SAFs' commercial viability, exacerbating price differential with respect to Conventional Jet Fuels (CJFs) [11]. In addition, differences in sustainability criteria adopted between international and regional policy frameworks add to the complexity of SAF adoption [12].

This study aims to answer the following research questions (RQs): (RQ1) Why is SAF the most effective choice for reducing carbon emissions in the aviation industry? (RQ2) What are the primary policy gaps that need to be addressed? (RQ3) What measures could best facilitate the SAF transition of the Italian civil aviation sector, according to stakeholders?

This article is structured as follows: Section 2 describes the two research methodologies adopted. It first illustrates the methodology underpinning multi-level policy analysis and subsequently describes both survey design and administration. Section 3 discusses the main policy inconsistencies regarding SAF transition, both between and within the three different policy levels. Section 4 reports the main findings of the stakeholder-based case study with a focus on the best and worst perceived measures for promoting SAF transition. Section 5 delves into the enablers and barriers to SAF transition. Section 6 concludes.

2. Methodology

This paper investigates RQ1, RQ2, and RQ3 by combining two research methodologies. First, it employs a multi-level policy analysis to examine the existing international, national, and regional policy landscape. Second, it adopts a stakeholder-based case study approach by conducting a comprehensive survey involving key stakeholders within the Italian aviation sector. The survey is collaboratively developed with the Italian Civil Aviation Authority (ENAC) and involves a broad spectrum of stakeholders' categories, namely fuel suppliers, airlines, and airports. The participants represent a significant portion (78%) of the Italian civil aviation industry. The insights gained from the different stakeholders' perspectives serve to formulate policies aimed at promoting SAF adoption and aligning the Italian aviation sector with EU sustainability goals.

This section consists of two sub-sections. The first (Section 2.1) describes the methodology adopted for the literature review on the multi-level analysis of SAF transition policies, and the second (Section 2.2) describes the methodology implemented to develop the quantitative survey. Figure 1 summarizes this paper's methodology.

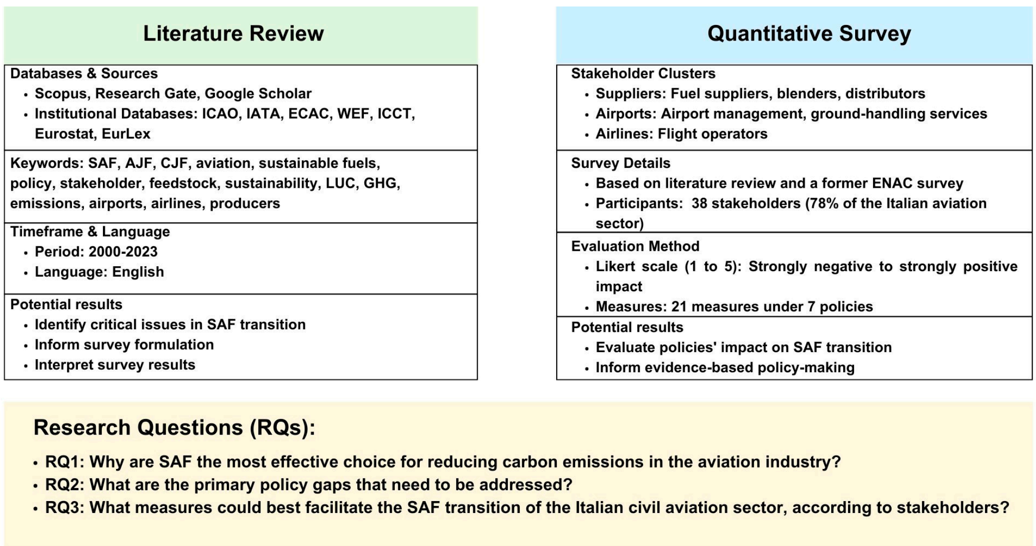


Figure 1. Illustration of the paper's methodology.

2.1. Literature Review

This section illustrates the details of the SAF policies at various governance levels using both institutional and academic sources by performing an extensive search using several databases (e.g., Scopus, Research Gate, and Google Scholar) to retrieve relevant information.

In pursuit of reliable data, the paper meticulously scrutinizes an array of institutional databases, datasets, and reports. These include repositories provided by esteemed organizations such as ICAO, International Air Transport Association (IATA), European Civil Aviation Conference (ECAC), World Economic Forum (WEF), International Council on Clean Transportation (ICCT), as well as relevant resources such as Eurostat and EurLex. The keywords used are selected to fathom diverse facets of SAF transition. These are SAFs, Alternative Jet Fuels (AJFs), Conventional Jet Fuels (CJFs), aviation, sustainable fuels, policy, stakeholder, feedstock, sustainability, Land Use Change (LUC), greenhouse gas (GHG), emissions, airports, airlines, and producers. The research refers to the 2000–2023 period to highlight the latest developments of SAF transition. Only articles, papers, and books written in English were considered. The literature review offers a compelling social science perspective on the transition of civil aviation to SAF. The selected papers, articles, and books in this study employ robust social science methodologies to analyze and understand this critical research topic. By adopting this approach, the paper produces valuable insights into the complex social dynamics and implications associated with the SAF adoption in aviation.

The paper compares the various sources to identify critical issues relevant to the discourse, serving a dual purpose in the research framework.

First, they inform the formulation of a range of measures proposed within the survey, allowing for a targeted exploration of the prevailing challenges the broader aviation sector faces. Although the primary focus is on the Italian context, collecting stakeholders' perceptions is of paramount importance due to the international interests of the majority of the organizations involved.

Second, these criticalities aid in interpreting survey results and provide new insights into how effective the 'best measures' are in tackling the identified problems. In essence, the methodological approach ensures a robust and nuanced exploration of the policy landscape concerning SAF transition, enriching the research discourse with empirically grounded insights and facilitating informed decision-making in pursuit of sustainable aviation practices.

2.2. Quantitative Survey

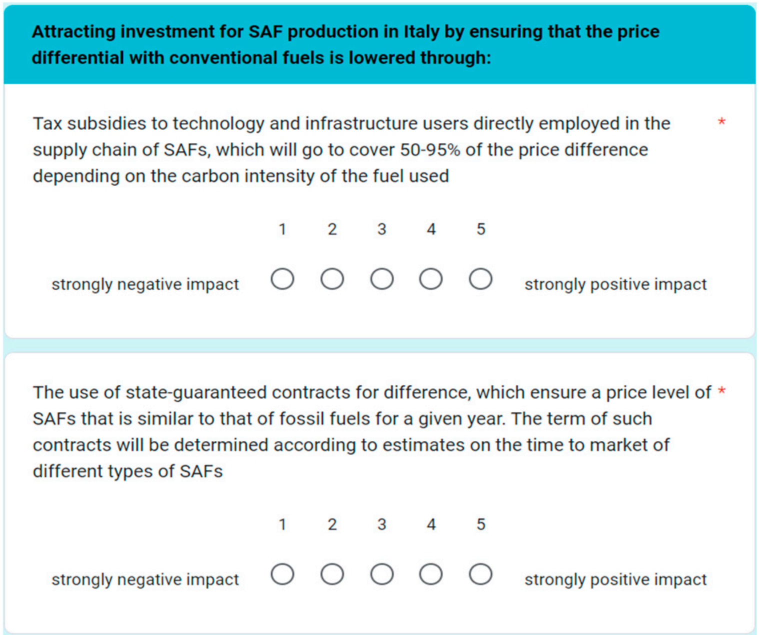
The academic discourse acknowledges the challenges of scaling up SAF production pathways, especially in the absence of significant incentives from national governments [13]. This underscores the critical role of governmental intervention in incentivizing the transition towards sustainable aviation practices. Moreover, Anderson et al. (2022) emphasize the importance of stakeholder engagement in shaping SAF development [14]. Using focus groups and surveys proves indispensable in this regard.

The paper implements a stakeholder-based quantitative survey, taking advantage of both the findings of the literature review and the outcomes of a survey conducted by ENAC during the 6th SAF Roundtable (held in July 2023). The latter underlined the consensus among Italian civil aviation stakeholders concerning the need for government-backed financial support and tax relief to facilitate SAF transition [15]. The proposed survey bridges the gap between theory and practical policymaking, thereby contributing to the formulation of evidence-based policies to promote the sector's sustainable transformation.

Civil aviation stakeholders are partitioned into three clusters: suppliers, airports, and airlines. The first represents fuel suppliers, including blenders and distributors other than producers. The second includes airports, airport management entities, and ground-handling service providers. The third comprises flight operators (i.e., airlines). The three clusters cover the entire SAF supply chain, from feedstock acquisition to fuel production, distribution, and end-use, representing the main categories affected by SAF transition [16].

Stakeholders report their perception from the point of view and interests of the organization they represent via a Likert scale ranging from 1 to 5, where 1 represents a "strongly negative impact", 2 a "weakly negative impact", 3 a "negligible impact", 4 a "weakly positive impact", and 5 a "strongly positive impact" of the measure.

Figure 2 reports an example.


Attracting investment for SAF production in Italy by ensuring that the price differential with conventional fuels is lowered through:

Tax subsidies to technology and infrastructure users directly employed in the supply chain of SAFs, which will go to cover 50-95% of the price difference depending on the carbon intensity of the fuel used *

1 2 3 4 5

strongly negative impact ○ ○ ○ ○ ○ strongly positive impact

The use of state-guaranteed contracts for difference, which ensure a price level of SAFs that is similar to that of fossil fuels for a given year. The term of such contracts will be determined according to estimates on the time to market of different types of SAFs *

1 2 3 4 5

strongly negative impact ○ ○ ○ ○ ○ strongly positive impact

Figure 2. An example of the questionnaire.

The article, in describing the survey and its results, refers to "measure" as a way of translating a more abstract "policy" into reality.

The survey took place between August and September 2023. Interestingly, civil aviation stakeholders consistently participated, representing about 78% of the organizations commercially active in Italy. A total of 38 stakeholders responded to the survey: 11 suppliers, 9 airports, and 18 airlines.

The measures the survey proposes for evaluation are selected based on two categories of sources, which are institutional (e.g., reports, documents, policies at the international and European levels, ENAC's SAF roundtables) and academic (e.g., papers, techno-economic assessments, and impact assessments). Specifically, the questionnaire proposes 21 specific measures that fall under seven policies selected by stakeholders from a previous ENAC survey.

In calculating average scores, both overall and by cluster, this paper does not weigh any stakeholder or cluster since stakeholders in aviation operate within a "closely knitted" supply chain, where each actor plays a fundamental role [17].

3. Multi-Level Policy Analysis

This section identifies and analyses current SAF transition policies at various governance levels. Sections 3.1–3.3 illustrate the international, European, and Italian levels, respectively. Section 3.4 discusses the findings.

It is worth noting that while a large amount of information is available on climate policies for the aviation sector, there is a lack of research comprehensively analyzing international and national climate policies [4]. Upham et al. (2003) conclude that social science research on SAF has mainly focused on sustainability, site selection, and public acceptance [18]. Although the academy has made relevant progress on the topic over the last 20 years, Anderson et al. (2022) recently confirmed this issue [14].

In recent years, academic research has underscored the need for additional research on how to promote a sustainable aviation industry. To pursue this objective, Gegg et al. (2015) interviewed European aviation stakeholders, revealing critical challenges such as biofuel feedstock availability and sustainability issues [19]. For the same reason, Noh et al. (2016) emphasized the crucial role policy-driven incentives play in advancing global SAF adoption for aviation's transition to sustainability [20]. Al Sarrah et al. (2020) also pointed to such need and systematically explored key sustainability indicators across social, economic, and environmental domains within civil aviation, emphasizing stakeholder engagement as a crucial tool in shaping sustainable aviation practices [21]. A recent study by Lee et al. (2021) deepened our understanding of aviation emissions by highlighting the intricate interplay between CO_2 and non-CO_2 factors, which is essential for comprehensively assessing aviation's climate impact [22]. Moreover, Shahriar and Khanal (2022) called for a global SAF transition to mitigate aviation's environmental repercussions, underlining their potential as a renewable alternative to CJF and significantly lowering CO_2 emissions [23]. However, challenges persist, as Ebrahimi et al. (2022) noted, concerning the sustainable scalability of SAF feedstock to meet growing aviation demand [24]. Looking ahead, Ballesteros et al. (2022) underscored the critical need for technological innovation and strategic investments to align the aviation sector with ambitious sustainability objectives, exemplified by initiatives like the European Green Deal. [12] Collectively, these studies contributed to an evolving discourse on sustainable aviation practices, highlighting the necessity for comprehensive approaches and collaborative actions to address sustainability challenges and forge a path toward a greener aviation future.

Larsson et al. (2019) develop an analysis closely aligned with this article, focusing on the role of aviation in explaining global carbon emissions and the impact of international policies, including CORSIA and the EU ETS, on air travel emissions from 2017 to 2030. The Authors support the utilization of additional national policy instruments to further reduce emissions within the aviation sector. Notably, they focus on the Swedish case analyzing potential national aviation policy instruments that could complement ETS and CORSIA in mitigating emissions. However, the Authors' exclusion of stakeholders limits their insights with respect to the anticipated effects of policies on emissions reduction. Importantly, the policy instruments they identify primarily target reducing air travel demand as a strategy to abate emissions, with minimal attention paid to SAF as a potential solution [4].

3.1. International Level

CORSIA is an international policy approved by ICAO in 2018 and implemented in its "pilot phase" in 2021. In the "first phase" (2024–2026), participation in CORSIA is voluntary for ICAO countries, with obligations to offset emissions from international aviation. In the second phase, CORSIA becomes mandatory for all ICAO signatory states responsible for over 0.5% of international revenue ton-kilometers in 2018 (with certain exemptions). This policy framework applies a "carbon offsetting" principle, whereby international aviation has to offset any post-2019 growth in CO_2 emissions from 2021 onwards. Specifically, airlines must purchase carbon offsets to compensate for any emissions above the 2019 baseline [12].

CORSIA adopts a multifaceted approach to incentivize airlines to become carbon neutral. It includes improving airline efficiency and assigns an important role to lower-carbon fuels in pursuing environmental goals [25]. It constitutes a fundamental instrument, stimulating airlines to adopt SAF and Lower Carbon Aviation Fuels (LCAFs) to cater to their emission-offsetting obligations.

Several sustainability criteria determine alternative aviation fuels' eligibility within CORSIA. For instance, it requires a minimum of 10% GHG savings compared to conventional fuels. LCAFs, fossil fuels that can be produced with emissions capture technologies or supply chain optimization, are eligible under the same threshold. ICAO delineates SAFs as aviation fuels derived from renewable or waste sources meeting a set of direct and indirect criteria related to emissions as well as feedstock sustainability criteria. CORSIA mandates that eligible alternative fuels must not originate from biomass feedstock obtained through land conversion [26].

3.2. European Level

There are three key policies concerning SAF in Europe: (1) the Renewable Energy Directive (RED III), establishing sustainability standards and incentives for sustainable fuels; (2) ReFuel EU, implementing a blending mandate for SAF; and (3) EU ETS Aviation, a cap-and-trade scheme wherein SAF play an integral role in reducing airlines' reported emissions.

In more detail, RED III seeks to expand the scope of the fuel pool subject to the transport sub-target to account for all energy supplied to the transport sector, including aviation [8]. The previous 14% target for the use of renewable energy in transportation is increased to a 14.2% reduction in GHG intensity. Alternatively, Member States can adopt a 29% target for renewable energy used within the transport sector. RED III incentivizes renewable fuels' GHG performance other than the volume supplied. This characteristic makes the Directive technologically neutral by avoiding prescriptions of specific fuel types for achieving emissions reductions while focusing on mandated GHG reduction targets [27]. This Directive incentivizes fuel suppliers to offer SAF to the aviation sector by introducing a multiplier of 1.2× for advanced biofuels and 1.5× for Renewable Fuels of Non-Biological Origin (RFNBOs) to foster the widespread adoption of SAF within the EU. These multipliers indicate that any SAF supplied to this sector would be credited with at least 120% of its energy content in the energy reporting required to meet the EU's renewable energy targets [8]. Additionally, RED prescribes strict sustainability criteria for SAF to be eligible under this Directive. Specifically, they must (1) originate from non-"food-and-feed" feedstocks, (2) achieve a 65% reduction minimum in GHG emissions compared to CJF (if produced after December 2021), and (3) not produce significant adverse effects on food security, water usage, or biodiversity [12].

ReFuel EU Regulation imposes the mandatory blending of SAF with conventional fuels, recognizing SAF as the most viable near-term solution to meet civil aviation environmental goals [9]. Together with other initiatives within the "Fit for 55" package, ReFuel EU plays a key role in stimulating SAF demand. Specifically, it sends a clear policy signal aimed at catalyzing investment in the development of the necessary SAF supply chain technologies. This policy initiative aims at creating a fair and sustainable air transport environment by addressing undesirable practices like "fuel tankering" by airlines. Fuel tankering occurs when aircraft operators refuel more than necessary at airports where fuel prices are lower, thereby avoiding refueling at destinations where costs are higher [28]. In response to this issue, ReFuel mandates that aircraft operators departing from EU airports refuel only the amount necessary for the flight. The amount of fuel uplifted at EU airports must represent 90% of the aviation fuel required for the operators' routes [29]. ReFuel EU imposes the minimum volume of SAF blended at 2% by 2025, rising to 6% by 2030 and progressively escalating to 70% by 2050 [9].

EU ETS Aviation caps CO_2 emissions at 95% of the 2004–2006 emissions, representing a cap-and-trade framework tailored to the aviation sector within the European Economic Area (EEA). Since 2021, the EU ETS has applied a reduction factor of 2.2% per year to emission allowances, gradually reducing the sector's environmental footprint [11]. Airlines operating within Europe have to report their emissions annually and surrender emissions allowances accordingly. These allowances are quotas of the sector's total emissions (not exceeding the overall CO_2 emissions cap) allocated annually to airlines, who can trade them according to their operational needs. For example, if an airline needs additional allowances to operate flights, it must purchase them from the carbon market and buy from other companies at higher market rates. Under the EU ETS framework, 82% of allowances are distributed for free depending on a performance-based benchmark accounting for a predetermined volume of emissions. Moreover, 15% of allowances are auctioned to airlines, and 3% are reserved for new market entrants. Notably, the recent ETS revision outlines a phased reduction in the allocation of free allowances, culminating in full auctioning by 2027 [10]. EU ETS Aviation incentivizes airlines to adopt SAF by awarding a "zero emissions" rating to those who use SAF for commercial operations. Airlines employing SAF, meeting the sustainability criteria outlined in RED, are exempted from surrendering any allowances for CO_2 emissions resulting from flights operated using these fuels [11].

3.3. Italian Level

Italy has taken bold steps in addressing the environmental issues the aviation industry is faced with. The country is among the first 88 to voluntarily participate in the ICAO CORSIA program since its inception, including the 2020 "pilot phase" [30]. Nonetheless, there are currently no national policies directly incentivizing SAF transition. ENAC is facilitating it by establishing an SAF National Observatory, supporting Italy's engagement, and providing significant suggestions to major industry stakeholders. The SAF Observatory includes representatives from the Ministry of Transport (MOT) and the Ministry of Environment (MOE), engaging key stakeholders in the SAF sector. The observatory primarily advocates for a negotiating stance that considers Italy's industrial capabilities, recognized for both technological and industrial maturity as well as its practical capacity to fulfil the objectives EU regulations outline [20].

3.4. Multi-Level Policy Issues

The interplay between current policies at different juridical levels can jeopardize SAF transition.

Firstly, it is worth distinguishing the principles governing market-based emissions reduction mechanisms between international and EU levels. Rather than directly reducing emissions, CORSIA tries to have airlines compensate economically for their post-2019 emissions increase. This is confirmed by companies purchasing carbon offsets, reflecting a "carbon offsetting" principle. Offset mechanisms, as a means to curtailing carbon emissions, have been subject to debate and sharp skepticism [12]. Assessing the actual GHG reductions achieved through offset purchases involves confronting complexity and uncertainty, including the risk of allowing emissions increases based on an airline's ability to economically compensate for them. Moreover, as Scheelhaase et al. (2018) note, the efficacy of environmental projects generating carbon credits for CORSIA remains questionable [31]. Conversely, the EU ETS Aviation operates as a cap-and-trade mechanism reflecting the "polluter pays" principle, inducing airlines to trade emissions allowances to conduct flights within the EEA. Notably, the simultaneous operation of CORSIA and EU ETS introduces the risk of double counting emission reductions. In this scenario, emission reductions attributed to a project are credited both to the country where the project is implemented and to the airline purchasing the offsets generated by the project. Furthermore, considering airlines' ongoing contributions to the EU ETS, they contend that it is unjustifiable for them to bear the costs of carbon credits under CORSIA while also acquiring emissions allowances under the EU ETS. Indeed, while EU ETS has been applied to European aviation since 2012, CORSIA will become mandatory only in 2027 [4].

Despite being more environmentally ambitious than CORSIA, EU ETS still entails missed environmental opportunities. This is because the EU adopted a "reduced scope" for ETS in aviation following the international implementation of CORSIA, thus limiting the application of EU ETS to flights within the EEA. By opting for this reduced scope, the EU has foregone the chance to achieve greater CO_2 reductions. However, expanding the scope to include all flights to and from the EEA, known as the "extended scope", could significantly impact air traffic demand due to the associated increase in operational costs.

CORSIA and EU ETS also diverge in their delineation of eligible fuels. CORSIA's eligible fuels encompass SAF, whether biological or synthetic, as well as LCAF. This comprises fossil fuels produced in facilities equipped with carbon-capture systems or optimized distribution processes to reduce fuels' carbon intensity. These provisions primarily target emission reductions in fossil kerosene production, allowing fossil fuels to be used under

CORSIA. However, despite their relative ease of production compared to SAF, LCAF still inherits the problematic characteristics associated with fossil fuel extraction and distribution. Geopolitically, fossil fuels are intricately linked to issues of energy dependence, precipitating market volatility and energy security across various countries and regions [23]. In contrast, RED III adopts a stringent stance by excluding fossil fuels entirely, mandating 65% minimum GHG abatement compared to CJF for any SAF eligible within the EU.

RED III only envisions the use of SAF obtained from feedstocks that are not (1) grown in areas converted from land with previously high carbon stock, (2) produced in a land that has high biodiversity, and (3) competing with food production (thus only including advanced biofuels and RFNBOs). The EU adopted such sustainability standards since food-based feedstocks for AJF production have documented higher GHG emissions, with some even surpassing fossil fuels (e.g., palm oil AJF production emits 300% more GHG). Their carbon intensity is attributed to the direct and indirect consequences of land-use change (LUC). These concerns, compounded by those previously mentioned, attract substantial EU attention but not so much ICAO's [12]. Additionally, some studies have criticized ICAO for adopting limited and insufficient sustainability criteria that are not capable of ensuring the genuine sustainability of aviation biofuels [32].

Thus, having two different systems with dissimilar environmental goals and reach on two legal levels could render the coexistence of these measures complicated. If policymakers do not act on this issue, these interlinked radical incoherencies will likely induce EU member states to apply carbon accounting measures in a conflicting way [33].

Despite RED III imposing stricter sustainability standards than CORSIA, it fails to furnish the necessary incentives to kickstart the development of SAF production in Europe. Indeed, the reporting 1.2× multiplier for advanced biofuel energy has proven insufficient to create the critical mass needed to scale up SAF production [25]. The fuel blending mandate, established by ReFuel EU, must remain within the SAF production capabilities perimeter. Should ReFuel's targets surpass sustainability feedstock production thresholds or SAF deployment technological capacities, this might compromise policy credibility [12].

During the European SAF transition, policymakers should learn from the errors made in the road sector, where over a decade of policy backing has led to the proliferation of food-based feedstocks for fuel production, which has inhibited substantial growth in more environmentally benign advanced biofuels [34].

The socio-political acceptance of the policies this paper analyses clashes with the community's willingness to bear the associated burdens. This phenomenon, known as "not in my backyard" (NIMBY), describes a scenario where companies and citizens initially endorse policy initiatives but withdraw their support upon realizing the negative repercussions the initiative produces on their immediate interests. Consequently, while there is increasing backing for sustainability as an abstract concept, a substantial disparity persists between political rhetoric and practical implementation [35].

Moreover, there is pervasive uncertainty as to which SAF production pathway will be the industry's frontrunner. Indeed, each SAF production method has different strengths and limitations when it comes to economic viability and environmental impact, complicating decision-making for experts and policymakers alike [23]. Overall, these inconsistencies contribute to heightened risk perceptions among investors, ultimately dissuading investments in similar technologies [25]. However, with the implementation of appropriate incentives, policies, and initiatives, SAF technology could become accessible to economic systems of any scale.

Finally, commercial challenges are affecting the SAF transition, posing a threat to the goals the policies illustrated pursued. The final AJF production costs are between 2 and 8 times higher than those for conventional kerosene production, while the minimum selling price of AJF is between 1.5 and 6 times higher than conventional fuels, depending on the feedstock source and fuel production pathway employed [25]. The substantial difference in production costs primarily stems from feedstock costs' impact on the final production costs. These disparities in commercial viability between AJF and CJF, along with sustainability concerns over feedstocks used in SAF production, could jeopardize the entire SAF transition. Given the size of the current gap, there is a prevailing consensus that scaling SAF up commercially through current market mechanisms is unlikely. SAF's competitiveness with respect to fossil fuels is severely limited, given the current mechanisms. While the cost gap between SAF and CJF diminishes as SAF benefits from economies of scale, achieving SAF competitiveness with CJF is improbable without policy support or incentives. Such policies should focus on establishing "long-term, predictable demand to de-risk investments in supply chains" [7].

SAF supply chain complexity in the EU is often likened to a "chicken-or-egg" dilemma. Its substantially higher market price compared to CJF undermines SAF demand. Consequently, the absence of effective demand for SAF discourages biofuels producers from scaling up SAF production. As a result, due to limited SAF supply, production costs and market prices remain high. Without changes to the current regulatory framework, this situation is likely to stagnate. The consensus on addressing these challenges centers on governmental interventions, which could provide incentives to enhance both SAF supply chain network efficiency and sustainability [36].

4. Stakeholder-Based Survey Results

This section describes the survey, illustrates the results, and discusses relevant findings. Section 4.1 identifies the clusters involved and why these are relevant to the scope of this survey. Section 4.2 briefly describes the ratio of the policies proposed. Section 4.3 illustrates the results.

4.1. Clusters

The case study is based on an extensive survey of key stakeholders in the Italian civil aviation sector. The study categorizes stakeholders into three primary groups: *suppliers*, *airports*, and *airlines*. *Suppliers* encompass entities involved in the production, distribution, and blending of fuel within the Italian civil aviation domain. *Airports* comprehend airport management bodies and providers of handling services, while *airlines* include cargo and passenger aircraft operators.

The SAF commercialization within this industry depends upon a multitude of technical and non-technical factors. These encompass the proximity of facilities to end-users, such as airports, SAF production costs, the amount of GHG reduction, infrastructure suitability, and policies conducive to SAF deployment beyond national borders [24]. This survey explores SAF dynamics within its supply chain, covering fuel production, distribution, and consumption.

4.2. Policies and Measures

The survey investigates 21 distinct measures (M#) designed to advance seven policies (P#) aimed at facilitating SAF transition, identified and prioritized in a previous survey. Originally, the survey proposed 10 policies asking stakeholders to assess their effectiveness in achieving ten predetermined objectives, including energy independence, feedstocks' sustainability, production scalability, SAF cost reduction, and mitigation strategies for potential consumer airfare increases.

Figure 3 illustrates the questionnaire's structure in terms of policies and measures investigated.

Policy	M1	M2	M3	M4	M5
(P1) Attract investments for SAF production in Italy by ensuring that the price differential …	Tax subsidies to technology and infra-structure users …	The use of state-guaran-teed con-tracts for dif-ference …			
(P2) Attract investments to stimulate SAF market through the provision of …	Release of capital advances ….	Low-interest loans provision …	A mix of grants and low-interest loans where the former prevails	A mix of grants and low-interest loans where the latter prevails	
(P3) Provide specific tax incentives for SAF producers …	Reduce SAF production taxes to en-courage SAF production …	Increase CJF taxes …	A mix of the previous two measures	Strengthen-ing book and claim mecha-nisms …	Fiscal incen-tives reward-ing virtuous behaviors …
(P4) Provide specific tax incentives for producers of raw materials …	Imports tax exemption for raw materials …	Tax credit for investments made to ameliorate …	Income tax reduction for companies producing raw materials …		
(P5) Provide specific tax incentives for users of domestically produced SAF …	Tax breaks for SAF-us-ing compa-nies covering the cost difference …	Tax breaks targeting SAF users who avoid using "book and claim" mechanisms			
(P6) Assign additional tax incentives for both producers and users of domestically produced SAF …	Tax incen-tives for different SAF types	Tax incen-tives linked to SAF-re-lated emissions			
(P7) Monitoring will ensure higher policy effectiveness for SAF transition …	Existing national supervisory authorities and bodies	Existing European authorities and control bodies	Authorities and control bodies created for this specific purpose		

Figure 3. Policies and measures investigated.

4.3. Winners and Losers

This sub-section discusses the measures of greatest impact. Specifically, the discussion focuses on measures with an average score of >4 (winners) or <3 (losers). This selective approach helps highlight measures whose perception is either highly positive or completely detrimental. For further details on survey results, see Appendix A.

4.3.1. Winners

(P1) Attract SAF production investments in Italy by ensuring that the price differential with conventional fuels is lowered through M1:tax subsidies to technology and infrastructure users directly employed in the SAF supply chain, covering 50–95% of the price difference.

Such incentives align with the compensation needs to address the SAF and CJF price gaps. It disentangles the "chicken-or-egg" dilemma by mitigating investment risk and stimulating investments, thus increasing SAF production levels. The price disparity reduction would range between 50 and 95 percent, depending on the GHG abatement associated with SAF technology. This percentage indirectly excludes LCAF, which the EU no longer recognizes as SAF. Simultaneously, it leaves a technological margin to fuel producers that can develop innovative SAF production technologies [37].

This measure scored 4.32 (Table A1), highlighting strong support from all three clusters. Tax subsidies are designed to benefit all SAF users and the infrastructure. The scores, ranging from 4.1 to 4.6, reveal widespread optimism about this measure's potential to spur investment in SAF production in Italy. The high ratings emphasize stakeholders' backing and enthusiasm with respect to advancing SAF technologies in reducing carbon intensity. The main barrier to SAF production and commercialization is the lack of support to offset the high SAF transitioning costs of transitioning to SAF. Stakeholders collectively recognize this issue, highlighting the need for public investments.

(P3) Provide specific tax incentives for SAF producers with plants located in Italy (including blenders), establishing proportionality to the SAF and conventional jet fuel cost differential through M1: a decrease in SAF production taxes, coupled with incentives to facilitate its distribution, encouraging lower carbon intensity fuels' production and transportation.

Tax incentives targeting SAF producers in Italy could comprise tax exemptions on feedstock supply. In particular, these incentives would depend on SAF's commercial profitability of each production and distribution path. Additional financial incentives stimulating SAF distribution would complement such tax incentives. For instance, one could provide a premium to distributors reaching specific SAF supply volume. The combination of these incentives can take the form of producers' or blenders' tax credits strategically designed to bridge the crucial gap between SAF and CJF production costs. By doing so, this measure facilitates SAF commercial scale-up [38].

This measure received a 4.18 score (Table A3), reflecting an overall industry endorsement. However, a closer look reveals notable differences in support. Fuel suppliers and airlines are enthusiasts, scoring above 4 out of 5, while airports exhibit a more lukewarm response with a score below 4. This variance likely arises because the measure primarily benefits fuel producers and airlines. Fuel producers gain from SAF production tax incentives, while airlines benefit from reduced SAF prices. Conversely, airports may feel less supported financially in managing the administrative and technical challenges that an SAF transition generates. Despite assigning a low 3.88 score, airports still recognize the potential positive impact of this measure. This acknowledgment likely derives from an understanding that these incentives would facilitate an SAF transition, helping the Italian civil aviation sector maintain operational continuity under new conditions and prices. This could reduce, for airports, SAF transition risks.

(P4) Provide specific tax incentives for producers of raw materials or intermediate products for SAF production with plants located in Italy, reducing the SAF-CJF cost differential through M2: an investments' tax credit to expand/upgrade the SAF-related raw or intermediate materials production infrastructures.

This measure offers a financial incentive to stimulate SAF production investments by lowering SAF production costs thanks to tax credits. Eligible businesses can access this financial incentive by investing in new facilities or expanding existing ones. Such investments might target facilities producing feedstock (e.g., used cooking oil and agricultural waste) as well as those involved in synthetic fuel production [38]. Tax credits can be structured differently, for example, covering part of the investment cost. This measure facilitates SAF production and commercial upscaling by reducing SAF production costs.

It scored 4.2 (Table A4), hinting at a broad consensus among all clusters. Impressively, scores from individual clusters are all close to 4.2, suggesting widespread optimism. Although tax credits focus solely on SAF production, their impact spreads across the entire SAF production chain, including raw or intermediate materials producers. This comprehensive approach addresses a critical SAF transition challenge, which is feedstock availability.

(P5) Provide specific tax incentives for users of domestically produced SAF, reducing the SAF-CJF cost differential through M1: tax breaks for SAF-using companies, fuel handlers, and SAF distributors, compensating for the cost difference depending on the SAF type and blending percentage.

These tax incentives are directed towards SAF end-users within the supply chain. Such aid facilitates airlines and the production industry in adopting higher SAF blends and promoting SAF commercialization. This measure can play a relevant role in assisting companies in bridging the CJF and SAF price gaps [39]. Moreover, the extent of compensation provided through these tax breaks is determined by the proportion of SAF that is blended and the specific SAF technology utilized. One then has an interest in using the highest permitted blending percentages for each fuel type (i.e., up to 50), given SAF's commercial availability [40].

This measure scored 4.37 (Table A5), making it the most supported across all clusters. Scores range from 4.1 to 4.6, reflecting a strong consensus on its effectiveness. Airlines, in particular, show the highest support, likely due to the prospect of direct incentives for SAF uptake. Stakeholders' alignment on using domestically produced SAF is a noteworthy finding. Domestically produced fuels offer advantages such as greater transparency in monitoring sustainability across production and distribution and improved commercial viability. Conversely, importing SAF poses risks related to sustainability and commercial viability, potentially undermining SAF production and disrupting the EU aviation-level playing field. By advocating for domestically produced SAF, stakeholders consider this measure a safeguard for maintaining common sustainability standards and ensuring fair competition within the industry.

4.3.2. Losers

(P3) Provide specific tax incentives for SAF producers with plants located in Italy (including blenders), establishing proportionality to the SAF and conventional jet fuel cost differential through

M2: tax increase on fossil aviation fuels to reduce the SAF-CJF cost difference. To a lesser extent, tax relief will apply to low-carbon aviation fuels (LCAFs).

M3: a mix of the previous measures.

While such measures could potentially increase support for SAF production, it is important to consider the prevailing commercial interests within the sector. As of 2022, SAF supplied to EU airports accounted for less than 0.05% of total aviation fuels [41], with fossil fuels market share of 99.5%. Consequently, due to the significant economic interests at stake, any measures perceived as detrimental to the commerce of fossil fuels may encounter substantial resistance. Proposals to raise CJF taxes could potentially trigger a financial shock affecting the entire aviation sector. The magnitude of this negative impact could be significant, deterring the industry's ability to scale up SAF production and use it effectively. For instance, imposing such a tax would increase CJF prices, thus abating air transport services and fuel demand.

These two measures scored 2.51 and 2.91, respectively (Table A3). The considerations regarded above might explain these negative results. As for M3, it is worth noting a significant discrepancy between clusters. Fuel suppliers are not against the implementation of a combination of higher taxes on CJF alongside lower taxes on SAF production, assigning a 3.36 score to the measure. This divergence can be attributed to the perception that lower SAF production taxes, together with incentives stemming from CJF taxation, provide a valuable commercial assurance for SAF transition.

(P7) Monitoring will ensure higher policy effectiveness for SAF transition, especially when performed by M3: authorities and control bodies created for this specific purpose.

The proposal for establishing specific authorities or control bodies to oversee SAF implementation could be deployed in various forms, such as assuming a monitoring role at the EU level with enforcement mandates at the national level or through the creation of a transversal agency with contributions from all EEA countries. The benefit of establishing such bodies lies in their specific focus on the aviation industry. Although the creation of an ad hoc organization for monitoring purposes is a promising possibility, the realization of such an institution would require strong political efforts at the national and European levels. Indeed, SAF is a relatively new fuel whose monitoring could be attributed to existing bodies [38]. However, there is ample evidence of the failure of current monitoring mechanisms supporting advanced biofuels in the road sector [25].

This measure received the second-lowest average score of 2.87 (Table A7). While airlines seem indifferent, other clusters generally view this measure as potentially detrimental. Establishing specialized inspection bodies/authorities presents significant challenges, primarily due to the substantial time and resources required. The process would entail years of deliberation, study, negotiation, and renegotiation among policymakers and industry stakeholders. Given the urgent environmental issues confronting civil aviation at both the European and international levels, such prolonged deliberations are impractical. One has to recognize the unique SAF potential to substantially reduce GHG emissions in the short term. Delays stemming from the creation of specialized institutions could hinder the timely implementation of SAF-related measures, thereby undermining the expected benefits of SAF adoption. This concern underscores the importance of more immediate and practical solutions to advance SAF adoption without unnecessary bureaucratic delays.

5. SAF Enablers and Barriers

The findings represent a solid base to discuss key enablers and barriers to SAF transition.

Currently, the aviation industry suffers from uncertainty concerning the solutions that will lead the transition to sustainability. In addition, aviation sector investors are risk-averse and reluctant to invest in innovative solutions. This apprehension, particularly notable in the case of SAF, stems from the significant upfront capital investment required for production and the long investment cycle associated with the SAF commercial scale-up. Consequently, the industry may defer significant investment until a clear frontrunner SAF production technology emerges. Achieving such clarity necessitates formulating clear, coherent, and time-defined policies across various governance levels. Moreover, the SAF transition mandates robust public support. Such public aid would help untangle the "chicken or the egg" dilemma by addressing the prevailing commercial supply and demand challenges.

The interaction between SAF and fossil fuel markets constitutes a major SAF commercialization barrier. Compared to CJF, SAF production entails various uncertainties and risks. These include fluctuations in feedstock availability and cost, volatility in oil prices, variability in the efficiency of various conversion technologies, environmental impacts, and shifts in government policies. For example, in 2015, a decline in CJF prices occurred, significantly impeding the adoption of alternative fuels. This price reduction widened the CJF and SAF gap, making SAF adoption non-competitive [42]. Current policies and targets should consider fossil fuels' dominance in today's market. Facilitating SAF transition mechanisms should be designed to work regardless of fossil fuel market fluctuations.

Feedstock availability represents a sustainability challenge policymakers and industry need to address. Since SAF feedstocks operate in a competitive market, increased demand could raise prices due to limited availability. As a result, this could exacerbate cost differentials. In addition, one should also consider the potential impacts of feedstocks' limited availability on other sectors, such as road transport. Indeed, intense competition for feedstocks can impede the overall progress of the broader transport sector towards sustainability. Establishing clear sustainability criteria for the production and distribution of feedstocks is key, and relying on imported feedstocks introduces an additional layer of complexity due to monitoring and sustainability checks on the incoming products [23].

Double counting is a potentially relevant issue demanding immediate policymakers' attention. This occurs when airlines use carbon credits from emissions-reducing projects based in other countries that are simultaneously counted by those countries as part of their national contributions to climate targets. This practice must be prevented as it would distort the environmental progress attributed to policies at different levels and in different geographical areas.

In terms of decarbonization policies within the EU, one can notice a focus on intra-EEA flights. Any policy measures introduced at the EU level may disproportionately impact EU airlines and airports compared to their non-EU counterparts. Airlines, in response, may resort to tankering practices, avoiding increased fuel costs resulting from SAF blending within the EEA. This could lead to a shift in demand for air transport services from EU to non-EU hubs. Such a scenario would also pose significant challenges to the EU airports located along the borders of the EEA's economic and commercial interests. In the absence of policy implementation in other regions, the resulting demand effects could significantly affect EU airlines and airports [12]. In this regard, one should recognize airlines' limited capacity to absorb additional costs associated with sustainability transition. The EU aviation sector is indeed characterized by intense competition, limiting aircraft operators' capacity to absorb additional SAF transition-induced costs. One should not overlook the risk of these additional costs being passed on to air transport users, potentially affecting air transport services' demand [22].

From a broader perspective, there is an overarching barrier hampering the transition of aviation towards sustainability. Despite setting ambitious sustainability objectives, many countries have failed to enact effective policies to address sustainability goals, relegating sustainability to a mere abstract principle due to NIMBY issues. As McManners (2016) points out, sudden challenges and vested interests can sideline sustainability efforts in the aviation sector [39].

Survey results indicate unanimous agreement across all clusters on three key SAF "enabling" measures. Italian policymakers are currently considering these measures as part of the preparation of the national policy roadmap for the SAF transition.

The first is *(P1) M1*. This measure foresees a tax incentive compensating the CJF and SAF price difference according to the GHG intensity of the SAF used. According to stakeholders, it would have a very positive impact on SAF investment increase and in reducing the price differentials. The second SAF-enabling measure all clusters like is *(P4) M2*. This measure creates a tax credit for any investment aimed at improving the SAF infrastructure and producing raw or intermediate materials for SAF synthesis. In particular, it would positively impact the establishment of SAF and CJF price proportionality. The third strongly supported measure is *(P5) M1*. It provides tax relief for SAF-using companies, covering the cost difference between SAF and CJF depending on the SAF volume blended and typology.

The survey also identifies relevant potential "barriers". *(P3) M2–M3* have in common an increase in fossil fuel taxes that the industry generally perceives as harmful to curtail the SAF-CJF price gap. The industry views the joint CJF tax increase and lower SAF production taxes as detrimental. Another measure perceived as harmful is *(P7) M3*. The creation of ad hoc authorities or institutions for SAF monitoring raises several concerns such as time inefficiency and ineffectiveness of establishing a similar body.

6. Conclusions

The results of this research address all RQs outlined in the introduction.

As for RQ1, one can consider SAF as the most promising solution for achieving sustainability in the aviation sector. Adopting SAF presents a unique opportunity, ensuring tangible short- and medium-term environmental benefits. Indeed, these fuels have the potential to cut aviation's GHG emissions completely. Unlike hydrogen and electricity, SAFs do not necessitate replacing existing aircraft. Although hydrogen and electricity are also promising alternatives, their widespread adoption would require a lengthy and daunting process. Their significant impact on reducing aviation GHG emissions is likely to be realized only in the long term, making them less compatible with current environmental goals. In addition, aircraft operations alone are limited in reducing aircraft GHG emissions. While optimizing aircraft operations can yield some benefits, further progress is constrained by physical limitations at airports and operational constraints on airlines.

To unveil which are the primary policy gaps to be addressed (RQ2), this paper conducts a multi-level policy analysis to identify the primary obstacles to SAF transition. Importantly, it underscores a lack of policy coherence across different levels. The EU and ICAO notably differ in the environmental objectives they pursue and support for SAF. The EU prioritizes both higher environmental targets and the adoption of high GHG-abating SAF. The differences in the sustainability criteria associated with eligible fuel technologies are significant. While the aviation industry's sustainability transition at the EU level increasingly excludes LCAF, these fuels are still supported within CORSIA. Other challenges identified across various policymaking levels include the risks of double counting and fuel tankering practices. These stem from inconsistencies between the policies at different levels, exacerbating the complexities in efforts for SAF transition. There is currently no policy in place to facilitate a national SAF transition in Italy. To help fill this gap, this paper performs a stakeholder-based quantitative survey.

Stakeholders unanimously prioritize three measures to foster the Italian SAF transition (RQ3). All of these involve market and fiscal SAF production and distribution incentives. The measures are (1) tax subsidies to technology and infrastructure used within SAF's supply chain; (2) tax credits for investments made to upgrade the production infrastructure of intermediate SAF products; (3) tax breaks for SAF-using companies, fuel handlers, and SAF distributors.

This article argues that achieving sustainability in aviation necessitates a collaborative and participatory approach. Specifically, the SAF transition underscores the potential for closer collaboration between civil aviation stakeholders and policymakers. Strengthening collaboration can significantly enhance the sector's environmental contributions, irrespective of the economic context in which these partnerships are developed. Both policymakers and stakeholders must prioritize long-term commitment to sustainability objectives and ensure timely implementation of relevant technologies and policies within a co-creative process.

It is important to recognize the role civil aviation plays in catalyzing economic growth, job creation, trade, and tourism. The contribution of the aviation industry to connectivity, mobility, and regional cohesion is undeniable, with far-reaching effects. Given its crucial influence, the imperative for transitioning to SAF cannot be overlooked.

In conclusion, SAF implementation and commercial expansion would ensure a more sustainable future where aviation will continue to play a vital role in connecting regions, businesses, and communities while prioritizing environmental protection for future generations. The aviation sector's transition to sustainability, propelled by SAF, requires a collective commitment to achieving a balanced coexistence of economic prosperity and environmental sustainability. Aviation must then be part of a comprehensive policy framework to address climate change while bearing a burden commensurate with its contribution to the problem.

Author Contributions: Conceptualization, E.M. and V.G.; Methodology, R.E.; Validation, E.M. and V.G.; Formal analysis, R.E.; Investigation, R.E.; Data curation, R.E.; Writing—original draft, R.E.; Writing—review & editing, E.M. and V.G.; Supervision, E.M. and V.G. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: The original contributions presented in the study are included in the article, further inquiries can be directed to Riccardo Erriu.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Average scores indicating a strong positive impact (>4) on the policy objective are underlined. Conversely, measures perceived as detrimental (<3) are in *cursive*. Measure descriptions in **bold** are the most impactful for promoting the respective policy objective.

Table A1. Perceived impact of *(P1) M1* and *(P1) M2* on the realization of P1.

(P1) Attract Investments for SAF Production in Italy by Ensuring That the Price Differential with Conventional Fuels Is Lowered through the Following:		
CLUSTER	M1	M2
	Tax subsidies to technology and infrastructure users covering 50–95% of the price difference.	The use of state-guaranteed contracts for difference abating the price difference between SAF and CJF
SUPPLIERS	4.54	3.45
AIRPORTS	4.11	3.44
AIRLINES	4.29	3.94
AVERAGE SCORE	4.32	3.61

Table A2. Perceived impact of *(P2) M1*, *(P2) M2*, *(P2) M3*, and *(P2) M4* on the realization of P2.

(P2) Attract Investments to Stimulate SAF Market through the Provision of Government-Guaranteed Grants and Low-Interest Loans:				
CLUSTER	M1	M2	M3	M4
	Release of capital advances determined according to SAF production carbon intensity.	Low-interest loans provision linked to SAF production carbon intensity.	A mix of grants and low-interest loans where the former prevails.	A mix of grants and low-interest loans where the latter prevails.
SUPPLIERS	3.73	3.45	3.27	3.54
AIRPORTS	3.44	3.55	3.33	3.44
AIRLINES	3.76	3.41	3.41	3.53
AVERAGE SCORE	3.64	3.47	3.34	3.51

Table A3. Perceived impact of *(P3) M1*, *(P3) M2*, *(P3) M3*, *(P3) M4*, and *(P3) M5* on the realization of P3.

(P3) Provide Specific Tax Incentives for SAF Producers with Plants Located in Italy (Including Blenders), Reducing the SAF-CJF Cost Differential through the Following:					
CLUSTER	M1	M2	M3	M4	M5
	Reduce SAF production taxes to encourage SAF production and transportation.	*Increase CJF taxes, whose revenue helps abate the SAF-CJF cost differential*	*A mix of the previous two measures*	Strengthening book and claim mechanisms with stronger transparency standards	Fiscal incentives rewarding virtuous behaviors linked to anti-tankering EEA regulations
SUPPLIERS	4.18	2.73	3.36	3.82	3.73
AIRPORTS	3.89	2.55	2.89	3.89	3.33
AIRLINES	4.47	2.23	2.47	3.76	3.53
AVERAGE SCORE	4.18	*2.51*	*2.91*	3.82	3.53

Table A4. Perceived impact of *(P4) M1*, *(P4) M2*, and *(P4) M3* on the realization of P4.

(P4) Provide Specific Tax Incentives for Producers of Raw Materials or Intermediate Products for the Production of SAF with Plants Located in Italy, Reducing the SAF-CJF Cost Differential through the Following:			
CLUSTER	M1	M2	M3
	Imports tax exemption for raw materials needed to produce SAF	**Tax credit for investments made to ameliorate the production infrastructure of raw materials for SAF production.**	Income tax reduction for companies producing raw materials for SAF production.
SUPPLIERS	4.09	4.27	3.63
AIRPORTS	3.44	4.22	3.11
AIRLINES	4.29	4.23	4.41
AVERAGE SCORE	3.94	<u>4.24</u>	3.72

Table A5. Perceived impact of *(P5) M1* and *(P5) M2* on the realization of P5.

(P5) Provide Specific Tax Incentives for Users of Domestically Produced SAF, Reducing the SAF-CJF Cost Differential through the Following:		
CLUSTER	M1	M2
	Tax breaks for SAF-using companies covering the cost difference depending on the volume and SAF type used	Tax breaks targeting SAF users who avoid using "book and claim" mechanisms
SUPPLIERS	4.18	3.18
AIRPORTS	4.33	3.67
AIRLINES	4.59	4.12
AVERAGE SCORE	<u>4.37</u>	3.65

Table A6. Perceived impact of *(P6) M1* and *(P6) M2* on the realization of P6.

(P6) Assign Additional Tax Incentives for Both Producers and Users of Domestically Produced SAF, Rewarding the Lower SAF Environmental Impact, by Considering Benefits Related to Lower CO_2 and Non-CO_2 Emissions through the Following:		
CLUSTER	M1	M2
	Tax incentives for different SAF types	Tax incentives linked to SAF-related emissions.
SUPPLIERS	3.64	3.45
AIRPORTS	3.78	3.67
AIRLINES	3.82	4
AVERAGE SCORE	3.74	3.71

Table A7. Perceived impact of *(P7) M1*, *(P7) M2*, and *(P7) M3* on the realization of P7.

(P7) Monitoring Will Ensure Higher Policy Effectiveness for SAF Transition, Especially When Performed by the Following:			
CLUSTER	M1	M2	M3
	Existing national supervisory authorities and bodies	**Existing European authorities and control bodies**	*Authorities and control bodies created for this specific purpose*
SUPPLIERS	3.54	3.64	2.82
AIRPORTS	4	4.33	2.67
AIRLINES	3.47	3.59	3.12
AVERAGE SCORE	3.67	3.85	*2.87*

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