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Empirical Research Article

Beyond the Rhetoric of "Sustainable Aviation": A Counterfactual Confrontation

Journal of Travel Research
1–18
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DOI: 10.1177/00472875251411867
journals.sagepub.com/home/jtr
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Abstract

Amid evidence of rising emissions, the aviation industry continues to promote demand growth while offering long-term sustainability reassurances communicated as "facts." Using counterfactual analysis, this paper examines how industry rhetoric constructs and defends these discursive strategies. Drawing on a content analysis of 211 sources – including airline websites, industry reports, and manufacturer statements – the study identifies seven discursive strategies. The findings reveal a novel theoretical mechanism, "future soothing": projecting technological salvation into a perpetually deferred future to ease public concern and postpone regulation. By transforming delay into the illusion of progress, discourses operate as rhetorical governance, sustaining growth under the guise of climate responsibility. The paper contributes to scholarship on the temporal politics of sustainability, showing how appeals to the future enable inaction in the present and illustrating how rhetoric, temporality, and power intertwine in shaping societal responses to climate change. Breaking aviation's "cycle of blame" requires policymaker action.

Keywords

climate change, sustainable aviation, future soothing, sustainability communication, industry rhetoric, counterfactual thinking

Introduction

Aviation contributes to climate change through its ongoing dependence on fossil fuels, and there is growing public and regulatory pressure (mostly in the EU) for the sector to reduce its emissions. Yet aviation is one of the most challenging sectors to decarbonise (International Energy Agency [IEA], 2025), as the industry itself has acknowledged (Reuters, 2025a). Policy responses across the sector remain vastly insufficient to meet global emissions reduction targets, as air transport emissions have continuously risen (IEA, 2024). The aviation sector's mitigation strategies mostly focus on carbon removal (IATA, 2025) and technology solutions that face low levels of maturity, scalability challenges, uncertain timeframes and high costs (Bergero et al., 2023; Dray et al., 2022; Grewe et al., 2021). As growth in air transport capacity and demand outpaces efficiency gains – and can be expected to do so under scenarios of continued growth (Airbus, 2025; Boeing, 2025) – mitigation in line with net-zero ambitions is unlikely (Bardon & Massol, 2025; Gössling & Humpe, 2024). These obstacles to net zero aviation have been outlined for decades (Åkerman, 2005; Higham et al., 2016).

In response to growing consumer awareness and public discourse around climate change and the need for emissions reduction, the aviation industry has paradoxically positioned itself as a leader in sustainability (Cregan et al., 2024; Gürçam, 2022), embracing the concept of "sustainable aviation" (Hopkins et al., 2023). Communication of environmental action is not new, and climate change mitigation "technology myths" have been created and communicated by the aviation sector since the mid-1990s (Peeters et al., 2016). More recently, airlines and their organisations have, however, launched a considerable number of initiatives to assert their

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commitment to addressing climate change. Most recently, the International Air Transport Association's (IATA, 2024) *Net Zero Roadmap* emphasises that net-zero CO_2 emissions by 2050 is feasible. The International Civil Aviation Organisation (ICAO, 2025a) has promoted its "long-term aspirational goal" of net-zero carbon emissions by 2050. Airlines have been similarly active in communicating environmental awareness and action. For example, United Airlines established the United Airlines Ventures Sustainable Flight Fund (Time, 2024), while Wizz Air (2024) has advocated for policy action to drive aviation's net-zero future.

The industry's messaging, often referencing future solutions (Peeters et al., 2016), requires critical evaluation, as many claims have been identified as misleading and even false (Guix et al., 2022; Neureiter et al., 2024). Initiatives have sought to shape the perception that aviation is on track to become more climatically friendly, despite consistent growth in the sector's emissions (IEA, 2024). As a consequence, airlines have faced legal actions and advertising bans: KLM's "Fly Responsibly" campaign was found to misleadingly communicate that flying with the airline could be sustainable (Financial Times, 2024); Air France, Lufthansa, Virgin Atlantic, Ryanair and Etihad advertisements were banned by the UK's Advertising Standards Authority for misleading customers (The Guardian, 2023; The Times, 2024); while Austrian Airlines was banned from advertising that its flights could be "CO_2-neutral" (ORF, 2023). Environmental organisation ClientEarth's (2024) claim that 71 airlines have been warned over greenwashing, suggests that the practice of making misleading climate claims in the aviation sector is widespread and commonplace.

Against this background, this paper aims to dissect industry narratives of "sustainable flight" through the lens of counterfactual thinking, a method that helps to evaluate the logic of the presented "truths" or the feasibility of the proposed solutions. This approach is not limited to technology, and considers wider narratives related to, for example, distributional justice and the "unfairness" of environmental taxes, "poverty alleviation" and the sector's proclaimed economic benefits. By highlighting discrepancies between industry rhetoric and scientific evidence, this study reveals the complexity and character of the discourses chosen, as well as the risks of relying on industry claims – which overlook "the underlying premise of corporate capitalism that is driving continuously increasing greenhouse gas emissions" (Nyberg & Wright, 2025, p. 1).

Literature Review and Theoretical Approach

Critiquing Airline Sustainability Communications

The aviation sector has long been identified as a rapidly growing source of greenhouse gas emissions (Bergero et al., 2023; Dray et al., 2022), yet both policy interventions and voluntary behavioural changes remain limited (Higham et al., 2018; Lyle, 2018). Scholars have described this gap between awareness and action as a communicative paradox, rooted in the discursive frameworks propagated by airlines and industry organisations. These narratives– circulated through CEO messages, reports, corporate websites, and marketing campaigns – portray air travel as energy-efficient, socially indispensable, and technologically progressive (Peeters et al., 2016; Thepchalerm & Pinsuwan, 2025). They thus naturalise continued aviation growth by linking it to economic necessity and innovation. At the same time, such accounts tend to marginalise the scientific consensus on aviation's climate impacts (Lee et al., 2021; Penner et al., 1999) and obscure structural accountability, producing what has been termed "aviation exceptionalism" (Higham et al., 2022; also see Huwe et al., 2025; Maclaurin et al., 2025).

Existing scholarship converges on the view that the sector's sustainability discourse performs an ideological function, yet researchers differ in their diagnosis of how this occurs. Peeters et al. (2016), for instance, highlight "technology myths": the recurrent invocation of future innovations such as hydrogen or electric aircraft that perpetually defer political interference (see also Muehlberger et al., 2024). Such technological optimism, they argue, sustains a "myth of progress" that legitimises inaction by creating untethered imaginaries of a climate-compatible aviation future. In contrast, Guix et al. (2022) approach the problem through the lens of truthfulness, empirically coding airline claims about voluntary carbon offsetting (VCO). Their finding that nearly half of all claims are misleading situates communicative manipulation as a form of corporate greenwashing rather than collective self-deception. Together, these studies point to two explanatory tendencies in the literature: one that critiques discursive optimism (future-oriented promises), and one that critiques communicative deception (present-oriented misrepresentation). Yet the interaction between these two forms of persuasion – the future as moral alibi for present inaction – remains underexamined.

A further body of work investigates how audiences interpret these claims. Experimental studies suggest that greenwashed airline advertising not only undermines consumer trust but also fosters disengagement from climate concerns. For instance, Stubenvoll and Neureiter (2021) demonstrate that exposure to sustainability-themed advertising can diminish perceived urgency for emissions reduction, while Olk (2021) shows that when an airline's environmental initiatives align with consumers' ideal self-image, perceived authenticity increases and scepticism declines. Neureiter et al. (2024) extend this research by contrasting abstract versus concrete compensation claims: abstract claims heighten perceptions of greenwashing, whereas concrete ones do not significantly alter brand evaluations. Crucially, even environmentally informed consumers proved vulnerable to these rhetorical framings. Taken together, these studies reveal that

airline communication strategies shape not only belief but intention, a dynamic that reinforces passivity rather than mobilisation. However, the underlying persuasive mechanisms that enable such affective influence are seldom analysed in rhetorical terms.

From a governance perspective, scholars have also begun to interrogate the regulatory responses to airline greenwashing. There is a general consensus in the literature (e.g., Gürçam, 2022; Larsson et al., 2019) that voluntary initiatives have largely failed to restrain misleading environmental communication, necessitating stronger regulatory oversight. Truxal and Aras (2025) document how the EU's Unfair Commercial Practices Directive (UCPD) has been applied to sanction deceptive airline campaigns, including the Dutch court's ruling against KLM's "fly sustainably" advertisements. These developments mark an important shift from self-regulation to legal accountability. Yet while such legal analyses identify the boundaries of permissible communication, they leave open the question of how sustainability narratives function persuasively before regulation intervenes.

Across these strands, a critical consensus emerges: airline sustainability communication reproduces a sense of moral adequacy despite ongoing environmental harm. What remains less understood is the rhetorical architecture that enables this paradox to persist. Existing studies tend to describe *what* airlines say (Guix et al., 2022), but not *how* these statements achieve credibility. Much attention has also been paid to what airlines should communicate to encourage consumer engagement with sustainability initiatives (see e.g., Cocolas et al., 2024; Zhang et al., 2022) without interrogating existing strategies deployed across the sector. Moreover, empirical research focuses largely on content (e.g., claim typologies, message framing, truthfulness of statements), whereas conceptual work often lacks methodological tools for analysing the logic of persuasion. Building on prior research, this paper bridges this gap by applying rhetorical and counterfactual theory to uncover the mechanisms through which airlines construct the plausibility of a "sustainable" aviation future in light of opposing scientific evidence.

Rhetoric as Analytical Lens

Rhetoric, understood as the strategic use of communication to persuade, provides a productive framework for examining the legitimising power of corporate sustainability discourse. Classical rhetorical theory distinguishes between ethos (credibility), pathos (emotion), and logos (logic) as the foundational appeals of persuasion (Aristotle, 2007). Modern theorists have expanded these principles to encompass identification (Burke, 1969) and situational responsiveness (Bitzer, 1968), recognising that rhetoric constructs social reality rather than merely reflecting it. In environmental contexts, rhetorical strategies operate not only through language but also through affect, metaphor, and temporality (Dryzek, 2013; Warnick, 2007). In the context of aviation, Popp and Mendelson (2022) have shown how corporate communication engages in "impression management," aligning ecological concern with brand identity. These appeals are not simply stylistic devices, but strategic choices tailored to audience, purpose, and context.

Building on this foundation, the research presented in this paper treats airline sustainability narratives as rhetorical acts that seek to reconcile contradiction: the simultaneous acknowledgement of environmental harm and affirmation of continued growth. By invoking ethos (institutional credibility), pathos (moral reassurance), and logos (appeals to technological rationality), airlines render their climate pledges persuasive. As such, their rhetorical strategies are not merely devices of persuasion but tools that shape public meaning, mediate conflict, and construct social realities.

Counterfactual Theory

To move beyond descriptive critique, we employ Counterfactual Thinking (CT) as an analytical method. Originating in psychology (Roese, 1994; Roese & Olson, 1995), CT explores "imagined alternatives to actual events" (Gleicher et al., 1990, p. 284). Recent applications range from assessing vaccination outcomes (Bergström et al., 2025) to evaluating gender wage gaps (Soni & Pattanaik, 2025). Here, CT is repurposed as a critical-analytical tool to interrogate aviation's prefactual narratives – an anticipatory mode of reasoning in which hypothetical scenarios are explored (McConnell et al., 2000; Sanna, 1996).

Prefactual thinking shifts the analytical lens from "what might have been" to "what could be," positing conditional constructs such as "If action A is taken, outcome B may follow" (Goerke et al., 2004). Applied to the context of aviation's sustainability discourse, this methodological stance facilitates an ex-ante evaluation of the sector's climate pledges. Rather than merely accepting declared intentions at face value, prefactual analysis examines their internal coherence, feasibility, and potential to yield transformative outcomes. It thus offers a means to critically assess the industry's proposed transition pathways before empirical validation becomes possible. CT serves as a framework for evaluating aviation's sustainability strategies by examining both the industry's promises and the potential outcomes of suggested climate action pathways. This approach has proven effective in various sustainability contexts, such as positively influencing tourists' environmental attitudes (Yilmaz et al., 2021), evaluating the effectiveness of carbon offsetting projects (Ehrenstein & Muniesa, 2013) or the support for climate policies (Bertolotti et al., 2022). In transport studies, van Wee (2023, p. 1056) used counterfactual checks to confront opinion holders with an alternative perspective, arguing that "counterfactual check can be useful for policy makers, planners and other practitioners, and researchers with controversial ideas, facing strong opposition."

Prefactual counterfactuals build on the Potential Outcome Model (Rubin, 1974), a statistical approach to estimate effects that would occur under a specific action in comparison to another specific action. This approach can be used to assess the outcomes of alternate scenarios for aviation. This is particularly relevant as public narratives on long-term commitments, sustainable aviation fuels (SAFs) or new propulsion technologies require critical evaluation of their feasibility and long-term consequences. For example, by comparing different growth trajectories, it is possible to evaluate whether industry promises to align with feasible climate mitigation or if alternative pathways are required.

Research Gap

The literature reviewed above collectively demonstrates that while the aviation industry engages with narratives of sustainability, the academic literature has yet to fully theorise *how* discourses function to maintain legitimacy. Previous research identifies misleading claims (Guix et al., 2022), discursive optimism (Gürçam, 2022), and consumer effects (Stubenvoll & Neureiter, 2021), but lacks a cohesive analytical model that identifies narratives and integrates these with rhetorical strategy and counterfactual reasoning. By combining rhetorical theory with prefactual counterfactual analysis, this paper develops a novel approach to understanding how the aviation sector constructs its climate narrative, and, by extension, how such narratives shape the boundaries of public imagination and policy response.

Methodology

Sample Selection and Data Collection

Airlines that aim to project environmental and climate responsibility routinely share sustainability initiatives, goals, and priorities with customers, the public, employees, and investors through webpages, reports, and white papers (Hopkins et al., 2023). These documents present the opportunity to critically examine communication strategies using airline websites, industry reports, and statements from key aircraft manufacturers. The sample includes a diverse range of airlines, selected based on their operational scope, size, and geographic location (Supplemental Appendix 1). Following the methodology developed by Hopkins et al. (2023), this considered:

1. The top five international and top five domestic airlines by scheduled revenue passenger kilometres (2021 World Air Transport Statistics).
2. The top five airlines ranked in the Leafscore Sustainable Airline Ranking 2022.

Since Delta Airlines appeared in both lists, the final sample comprises 14 airlines. To incorporate broader industry perspectives, key aviation organisations and manufacturers were also considered: the two leading aircraft manufacturers (Airbus, Boeing), the International Air Transport Association (IATA), the International Civil Aviation Organization (ICAO), and the Air Transport Action Group (ATAG).

Documents were initially collected in February 2024, and the search was repeated in June 2025 based on the following procedure: (1) a review of airline/manufacturer/organisation homepages, (2) the identification of sustainability-related links, (3) the search for relevant pages, and (4) Google queries to detect further communication by using the search words "[airline name] AND sustainab*." Only documents produced by the respective airline/manufacturer/organisation were included. In total, 211 documents were identified, with their URLs logged in a spreadsheet and saved as PDFs (for reports) or as screenshots (for webpages), for further analysis. This analysis builds on qualitative content analysis (QCA) and critical discourse analysis (CDA), that is, a multimethod research design that combines "breadth and depth" (Alejandro & Zhao, 2024). This allows us to use both as complementary methods of analysis through which the data can be structured and critically assessed.

After collecting and storing the documents, a qualitative content analysis was conducted to examine and structure their content. QCA is a systematic, rule-based method for interpreting textual data, widely used in the social sciences to uncover patterns and themes. The analysis follows a stepwise, iterative process involving category development, feedback loops, and a structured analytical procedure (Mayring, 2021). Key statements were extracted and thematically categorised using spreadsheets. Prevailing industry narratives were identified on this basis, and seven dominant narratives were revealed that link climate change mitigation, perceived barriers, and the benefits of air transport: (1) Leadership and commitment to net zero, (2) Aviation's small relative contribution to climate change, (3) Ongoing progress on decarbonisation, (4) Anticipated future solutions, (5) Socio-economic benefits, (6) Growth as a driver of sustainability in aviation, and (7) Insurmountable barriers. Narratives are presented based on selected statements to illustrate the rhetorical strategies employed. The complete set of statements is available in Supplemental Appendix 1. These statements are subsequently analysed in terms of discourse strategy and evaluated against a counterfactual perspective. The overall structure of analysis follows an approach of defining the narrative, an evaluation of its rhetoric, and a counterfactual assessment.

Discourse Analysis

Critical discourse analysis was applied to interrogate how narratives are constructed, whose interests they serve, and what power structures they reinforce. Discourse analysis offers a critical lens through which to examine how language is used to shape perceptions, justify actions, and construct or maintain

social realities (Johnstone & Andrus, 2024). Discourse analysis highlights that language is not impartial, as it constructs and mirrors societal power relations, ideologies, and values. The deconstruction of the narratives identified is thus especially valuable for examining transport discourses, where language plays a key role in shaping and reflecting policy choices, public perceptions, and mobility-related behaviours.

Discourse analysis enables a systematic unpacking of climate-change related statements by examining not only what is said and by whom, but also how it is said, and what is left unsaid. This involves analysing lexical choices, argumentative structures, and the broader socio-political context in which these discourses are produced (Burman & Parker, 2016; Fairclough, 2013). For example, appeals to technological progress (such as the promotion of the Airbus A380 as a "Green Giant") function rhetorically to present aviation as a forward-thinking and environmentally responsible industry, despite data showing rising absolute emissions (IEA, 2024). By interrogating these discursive constructions, this analysis reveals the ways in which the aviation industry maintains legitimacy and resists regulatory pressure. It also highlights how environmental narratives generated from industry are tailored to resonate with public values such as progress, freedom of movement, and economic growth. A discourse analytic approach provides insight into how language operates as a form of soft power, enabling the aviation sector to manage – and ultimately control – environmental critique while continuing unsustainable growth trajectories.

Analysis of Narratives, Rhetoric Strategy, and Counterfactuals

As a general observation, airlines differ in their sustainability communication, which may range from minimal to extensive disclosure. What all the reviewed airlines do have in common, however, is that sustainability content does not usually feature prominently on websites but requires know-how and navigation from the homepage in order to locate it. In other words, it is unlikely that consumers would happen across much of this information without purposefully seeking it out. This means that the possibility of eco-labelling resulting in alternative travel behaviours (Baumeister et al., 2022) is reduced for those passengers using the airline's websites to book their flights. Our analysis identified seven narratives that frequently re-appeared and were consistently perpetuated in aviation climate sustainability communications. In each instance, these are presented as sector discourses, rhetoric (claims) and counterfactuals (counter claims) as follows.

Narrative 1: Awareness, Leadership and Commitment to Net Zero

Discourse. By emphasising their awareness and commitment to action, airlines position themselves as agents of change, rejecting the need for policy interventions. Statements appear to be designed to reinforce the idea that airlines are aware and proactive. For example, Turkish Airlines states that it is "fully aware of the impact of the aviation industry on the climate change" and that "air transportation was the first sector to take global action to reduce greenhouse gas emissions and set comprehensive targets," while others acknowledge that "air travel is currently not sustainable" and that "we need to focus on reducing our negative impact now, as this is the decade of action" (both KLM). Airlines also acknowledge that "there is no such thing as carbon-neutral flight" (Air France) and that "Making the transition to low- and no-carbon aviation depends on a range of technologies that are not yet at commercial scale – or haven't yet been invented" (American Airlines). These may be considered efforts to display honesty.

Airlines also highlight decarbonisation targets, often framed as bold commitments. A common practice among airlines is to pledge net-zero emissions by 2050 or earlier. Reference is made to "science-based targets," regulatory compliance, and partnerships with academic institutions on emissions assessments, SAF certification and zero-carbon propulsion; all underlining the robustness of net-zero roadmaps. Additionally, sustainability is presented as a competitive race, with airlines showcasing awards and accolades: "Delta [has been] shortlisted for "Best Innovation" and "Lowest CO_2 Emissions Ground Ops" awards"; "Air Transport World (ATW) named American Airlines its 2023 Eco-Airline of the Year"; while China Southern highlights that "The carrier was listed in "Wind"s 2024 Top 100 Listed Companies with Best ESG Practices in China' as the only airline candidate."

Rhetoric. The industry asserts its awareness and commitment to action, positioning itself as an agent of change and thus undermining the need for regulatory interventions. Analysis suggests that many industry frameworks, such as the Carbon Offsetting and Reduction Scheme for International Aviation, are aspirational, insufficient in ambition, and lacking credibility (Fuglestvedt et al., 2023; Gössling & Lyle, 2021; Lyle, 2018). For literally *all* emission reduction targets formulated by air transport organisations and airlines, analysis suggests that these have not been met and subsequently been replaced with new long-term goals (Possible, 2022, Scott & Gössling, 2025). Vague terminology is embedded within ICAO's net-zero 2050, as "Long Term *Aspirational* Goals." In this sense, "aspirational" is deployed to reflect pioneering or innovative efforts, strengthening the sector's position as leaders while simultaneously discounting the need to quantitatively measure progress or to be legally committed to specific reduction goals.

ICAO has resisted regulation for decades (Lin, 2017), and strategically delayed action (Huwe et al., 2025). Due to loopholes and industry resistance, air transport remains unregulated, a phenomenon described as

"aviation exceptionalism" (Higham et al., 2022). Hopkins et al. (2023) also show that inaction and industry communication are based on pseudo-science, while Guix et al. (2022) found many industry claims to be misleading and untrue. Meanwhile, many airlines face anti-"greenwashing" litigation (The Conversation, 2023). Against the background of various court rules forcing airlines to retract misleading claims, analysis seems to underline that the industry systematically portrays itself as aware, proactive, and committed to mitigation to *deflect* legislation that would force the sector to reliably reduce its emissions.

Counterfactual. Aviation's impact on climate change has been highlighted since the mid-1990s. If industry had shown "climate leadership," as it claims, a decline in emissions would be traceable in trajectories. However, the evidence is that emissions have more than doubled since the 1990s (Gössling & Humpe, 2024) and will continue to grow – with industry expectations that transport volumes will double over the coming two decades (Airbus, 2022).

Narrative 2: Small Relative Contributions to Climate Change

Discourse. The aviation industry frequently emphasises its relatively small share of global emissions, highlighting that air travel is responsible for less than 2% to 3% of global CO_2 emissions. For example, Air France suggests that "CO_2 emissions from civil aviation directly impact climate change (2.4% of global emissions) [and] the climate," while Cathay Pacific invokes academic authority to suggest that: "according to the most recent figures from the Intergovernmental Panel on Climate Change, civil aviation currently accounts for about 2% of global CO_2 emissions from human activity and it is expected to grow to 3% by 2050." Even more intricate is ATAG's (2025) claim that:

> Air transport generated 882 million tonnes of carbon dioxide (CO_2) in 2023, around 2.05% of the 57.1 gigatonnes of CO_2 generated by human activities in the same year. Despite traffic growth increasing at an average of 4.5% annually, aviation has managed to limit its emissions growth to around half of that.

The statement conveys accuracy ("2.05%") that simultaneously points to limited relative contributions to climate change, invoking that these have stayed small even though the sector has seen rapid growth.

Reference to the sector's limited contribution to climate change is a long-standing industry discourse. 20 years ago, German airline Lufthansa stated (cited in Gössling & Peeters, 2007, p. 407):

> Today's level of air traffic has a 3.5% share of the man-made greenhouse effect. Industry, power stations and road traffic all have double-digit shares. Even higher is the difference between man-made and natural emission sources, such as volcanic eruptions.

This is of interest because Lufthansa included non-CO_2 emissions in its 2005 assessment. While non-CO_2 warming is currently acknowledged by some airlines (e.g., Air France, Cathay Pacific, KLM), none quantify this contribution, and some suggest that there remains scientific "uncertainty" (KLM) regarding the magnitude of the impact.

Rhetoric. Relative comparisons serve the purpose of trivialising the sector's contribution to climate change. In the case of ATAG (2025), this involves rhetorical strategies (accuracy, interlinkages with growth), as well as complex language. For example, the sentence "despite traffic growth [. . .], aviation has managed to limit its emissions growth to around half of that" suggests that progress has been made on emission reductions (a relative claim), obscuring that emissions have grown in absolute terms. This is an issue even in comparison with shares in global emissions, as both continue to grow. This rhetoric also reframes the focus around sacrifice ("limits" to emissions growth), suggesting continual improvement towards sustainable operations is embedded within an otherwise unabated growth paradigm. As a consequence, aviation can continuously grow in its emissions yet claim small relative contributions. The omission of non-CO_2 forcings is problematic, as reasonably robust assessments have been published, suggesting that aviation's contribution to climate change is considerably larger than CO_2 (Klöwer et al., 2021; Lee et al., 2021).

Counterfactual. Air transport emits about 900 Mt CO_2 in direct emissions (Quadros et al., 2022; Teoh et al., 2024). This may be a small share of *total* anthropogenic emissions, but flying is also an elite activity, with only 2% to 4% of the world's population flying internationally in a year (Gössling & Humpe, 2020). The frequent fliers – 1% of the world's population – are responsible for half of air transport's emissions, equivalent to 5 tonnes of CO_2 per capita and year (Gössling & Humpe, 2020). If every person in the world took as many flights as the frequent fliers, the sector would emit in excess of 42.5 gigatonne (Gt) CO_2 and more than *double* current *total* global emissions of CO_2 (37.4 Gt CO_2; IEA, 2024). Considering non-CO_2 warming (Lee et al., 2021), the magnitude of the impact would be even larger. Air transport's small relative contribution to climate change is thus a result of skewed distributions in use, and the sector's rhetoric deflects from the fact that it is very limited wealthy elites that make disproportionally large contributions to climate change.

Narrative 3: Progress on Decarbonisation

Discourse. All airlines invoke progress on emission reductions, with heavy emphasis on emission "savings." The narrative is focused on relative efficiency gains through

operational or technical innovation that have contributed to relative performance gains. For example, Turkish Airlines cites "57,581 tonnes of fuel savings, 181,379 tonnes of CO_2 emissions avoided," while Ryanair reports on "single engine taxi, saving approx. 68,000 tonnes of fuel." Comparison is common, as exemplified by Cathay Pacific: "Our investments and efforts in efficiency have led to a 28% improvement since 1998. The accumulative reduction almost equates to 2 years of Hong Kong's emissions!," or KLM's claim that the "weight of catering and service equipment has been reduced (saving 3.9 million kgs CO_2 per year), carrying less drinking water, saving 2.7 kgs CO_2 per year, reducing required reserve fuel, saving 47,000 tonnes CO_2 (equivalent of 3,000 B737 flights from Amsterdam to Barcelona)."

ATAG highlights that average aircraft occupancy is "much higher than other forms of transport," that "CO_2 emissions per seat km [decreased] by 80% (since 1950)," and that "your flight today would generate just 50% of the CO_2 compared to the same flight back in 1990." Cathay Pacific points to "25% lower fuel consumption from the 70 new aircraft." These claims extend into the future. For example, Ryanair announces "Our near-term targets are to reduce Scope 2 absolute emissions by 35% by 2030 and 100% by 2040." American Airways claims a goal of a "45% GHG emission intensity reduction by 2035," and Delta to achieve a "20+% fuel efficiency gains compared to 2019" by 2035. KLM and Air France are the only airlines to propose specific short-term goals for absolute emissions, presented as a "12% reduction of our absolute emissions in 2030 compared to 2019" (KLM) and "30% of CO_2 emissions by 2030 compared to 2019" (Air France).

Rhetoric. The aviation industry stresses fuel efficiency gains and emission reductions to create an understanding of progress on climate goals. As already highlighted, efficiency gains are a relative measure of decarbonisation that sideline the industry's consistent growth in emissions. It can be assumed that percentage reductions, inconsistent timelines, comparisons, and other rhetorical strategies are intended to confuse critical customers. Of particular interest in this context is Ryanair's suggestion to reduce scope 2 absolute emissions. While the goal sounds ambitious and focused on cutting total emissions, scope 2 mostly refers to electricity sourced at airports, and is insignificant in comparison to scope 1 (direct energy use for fuel). As an example, Zurich airport reports scope 1 emissions of about 29,000 tonnes of CO_2 for 2023 (Zurich Airport, 2025) – which is likely less than the emissions from more than 300 flights departing from Zurich every day (Airportia, 2025). The rhetoric strategy has in common that avoided emission volumes and stated goals may be accurate or achievable yet allow airlines to grow in total emissions.

Counterfactual. All sectors have to fully decarbonise to be aligned with net-zero ambitions. To decarbonise in line with global climate change objectives, airlines would have to reduce emissions reliably and rapidly. Given the 25-year remaining period of time to 2050, net-zero is equivalent to a linear emission reduction from current levels by 4% per year. Even Air France's relatively ambitious goal of reducing emissions by 30% between 2019 and 2030, or about 3% per year, falls short of necessary emission reductions. As shown by Gössling et al. (2024) for a sample of large airlines, their planned growth would require these airlines to achieve decarbonisation rates of >12% per year. With observed global average efficiency gains of 1.0% to 1.5% per year (Gössling & Humpe, 2024), air transport is nowhere near such decarbonisation rates.

Narrative 4: Future Solutions

Discourse. Technology innovation and operational improvements are regularly presented as solutions to the climate crisis. For example, hydrogen is presented as "game-changing" and a "promising revolutionary technology" (Delta). Airlines also reference battery-electric, fuel-cell, and hybrid propulsion. Yet, sustainable aviation fuels (SAFs) are considered "the most realistic and effective method for aviation to reduce emissions" (Ryanair), a "decisive game-changer" (Air France), and "the most promising lever for a net-zero future" (Delta). Ambitions of "100% SAF flying" (Emirates) are communicated. Several airlines acknowledge that SAF are not CO_2 neutral, but non-CO_2 warming – which SAF will not limit – is not mentioned. Assurances that SAF can be sustainable and will not interfere with food production are given; with airlines acknowledging that SAF are a prospect: "We look forward to the development of biofuels that are technically safe, cost competitive, and truly sustainable, with a viable supply chain in place from feedstock to the aircraft" (Ryanair).

KLM states, for example, that "while 1% SAF may seem very little, it's an important step in the right direction." Most notably in the context of SAF is the acknowledgement that "there is not enough SAF today to fuel a fleet Delta's size for a single day" (Delta) or "to fuel the world's commercial airlines for even a single day" (KLM). As some airlines propose that it will take time "until SAFs and novel propulsion technologies become viable at scale" (Alaska) or that "the future development and availability of these technologies is not something we can predict with precision" (American Airlines), carbon offsetting is described as necessary "to close the gap to net zero targets" (Alaska). Airlines mention reforestation, mangrove restoration, or "clean cooking initiatives," as well as carbon trading and CORSIA.

Rhetoric. Strategies pointing to future technological solutions ("technology myths") have been in use for more than 30 years (Peeters et al., 2016). A key element of this strategy is to depict one or several technologies as being under development or close to break-through, while timelines

continuously shift to the future. Recently, this mostly includes "net zero by 2050" (e.g., Emirates, Ryanair, Qatar, American, Southwest, Delta, or Cathay), a goal that is even less tangible in the absence of milestones against which progress could be measured. In regard to SAF, airlines communicate vast numbers ("125 million litres available in 2021," IATA, 2022b), while global commercial fuel use is hundreds of millions of *tonnes* of Jet A1. Currently, less than 1% of aviation fuel demand is SAF (Undavalli et al., 2023).

Counterfactual. SAF is aviation's main strategy, but its availability is limited. The lack of markets and production capacity has been highlighted as a barrier (Grewe et al., 2021), as has its cost, which recently was quantified for European aviation alone as €2.4 trillion until 2050, or about €100 billion per year (Destination2050, 2025). This is >50 times air transport's long-term profitability, at less than €2 billion per year (Gössling & Humpe, 2024). As Airbus has just backed away from its hydrogen aircraft development plans Reuters (2025b), it is doubtful that alternative fuels or new propulsion technologies will become available at the necessary scale and speed.

Narrative 5: Socio-Economic Benefits

Discourse. Societal benefits are a different type of narrative invoked by the aviation industry that centres on philanthropy and global connectivity. Even though social benefits are not directly played out against environmental impacts, comparison is implicit. Airlines point to their charitable efforts, such as meal programmes "feeding the hungry" (American Airlines) or "helping to fight poverty" (China Southern). The industry also highlights its role in global connectivity, economic growth, and disaster relief. Airlines stress that air travel links people and cultures, supports trade, local economies, and jobs, also for the least developed countries: "Through the global connectivity we offer, we create opportunities for [the least developed countries] to enhance their economic and social relationships with the world" (Turkish Airlines).

This interlinks aspects with human needs for sociality – "Air travel connects us to our friends and families, helps us understand one another" (Alaska Airlines) – as well as more abstract societal benefits: the "Aviation is one of the most important contributors to global economic and social development" and the "industry supports nearly 63 million people worldwide and contributes USD 2.7 trillion per annum to world GDP" (both Emirates). Airlines also highlight that low fares have "democratised" travel, and "making overseas holidays affordable for millions of people" (Ryanair), while advancing global exchange: "aviation transport industry bears an important mission of advancing humanistic exchange, economic and trade exchange, and cultural communication" (China Eastern), or "[. . .] connecting people and nations, helping in small ways to create and preserve friendship, and further understanding and cooperation around the world for a sustainable future" (Qatar).

Rhetoric. Aviation is presented as a sector that provides value to societies and individuals through its cultural, social, and economic contributions. It has particular relevance for less developed countries and the "poor," as it brings development benefits and as airlines make direct charitable contributions to meal programmes. Implicitly, even the offer of "affordable" holidays is catering to the relatively less well-off in Europe. Even though climate change will negatively affect and undermine most sustainable goals, socio-economic benefits are weighted against environmental impacts. Interlinked with the rhetoric that aviation makes minor contributions to climate change, this intention is to create an understanding that benefits outweigh costs. Psychologically, this may be described as characterised by "cognitive dissonance," that is, a situation in which two or more conflicting beliefs or values are presented, prompting the individual to reduce the inconsistency by downplaying one side (Festinger, 1957) – here likely environmental impacts.

Counterfactual. Aviation does provide socio-economic benefits, such as delivering organs, providing disaster relief, connecting residents of remote areas, but these are vastly outweighed by flights for purposes that do not provide significant societal benefits, nor does the air transport sector mention the cost of air transport. Aviation is responsible for 4% of global warming (Klöwer et al., 2021), and a corresponding share of the social cost of carbon (Tol, 2023) can be attributed to the sector. At €600 per tonne CO_2-equivalent (Gössling & Humpe, 2024), the cost of air transport to society is currently equivalent to about 0.5 trillion Euro per year (at 800–900 Mt of CO_2). As climate change progresses, this cost will rise until it tends to infinity as ecosystem functions are lost (Costanza et al., 1997). While air transport may currently make contributions to economic development, the cost is not discussed. In the longer run, climate change will affect poorer populations disproportionally, as ecosystems disappear on which livelihoods depend. There is already much evidence of forced migration as a result of climate change (Almulhim et al., 2024; BMZ, 2023), and climate change has exacerbated environmental disasters including floods, droughts, and wildfires that have already caused millions of deaths (Abbass et al., 2022; Germanwatch, 2025; Pozzer et al., 2024). Socio-economic benefits measured in terms of improved lives would consequently have to be measured and weighted against lost livelihoods and death.

Narrative 6: Sustainability Through Growth

Discourse. The aviation industry has long argued that taxes harm competitiveness and economic growth. Under the "sustainability through growth" discourse, growth becomes a precondition for sustaining innovation and technological progress, while taxation is portrayed as a barrier to the commercialisation of SAF (IATA, 2020, 2022a). Aviation is simultaneously framed as a "hard-to-abate sector" (Delta, KLM), requiring subsidies to support the transition to new

fuels. This argument is perpetuated by associated industries such as SAF providers: "*We don't need persuading, or punitive measures like taxes to motivate change. [. . .] taxes siphon money from the industry that could support emissions' reducing investments in fleet renewal and clean technologies*" (Biofuels International, 2021). Airline organisations have also issued warnings that flying will be unaffordable for those with limited resources should the sector have to carry additional costs (IATA, 2020).

Rhetoric. Taxes reduce air transport demand (Falk & Hagsten, 2019), suggesting that in particular low-cost travel is induced by low price – sometimes below the cost of the fuel used (Gössling et al., 2019).

Furthermore, aviation fuel is largely exempt from excise duties in most regions of the world, particularly for international flights (CE Delft, 2019), and its environmental damage cost is not internalised. If it was, demand reductions that upset the low-profit, high-volume model of global aviation can be expected. Airlines, aware of their low profit margins and dependence on high traveller flows, have for this reason sought to turn the argument around: only if profit margins are maintained and the sector is allowed to grow can the additional cost of new 'alternative' fuels be shouldered.

Counterfactual. As various studies have shown, only radically different air transport models reducing capacity will increase profit margins and allow the sector to pay for the fuel transition (Neiva et al., 2021; Valdés et al., 2021). Taxation would reduce demand while simultaneously providing funds that could be used to finance the net-zero transition (Sobieralski & Hubbard, 2020). For example, a €0.33 tax per litre of fuel has been estimated to lead to a 12% demand reduction and corresponding CO_2 savings, while raising €422 billion in revenue by mid-century (Valdés et al., 2021). For Intra-EEA flights, a tax could reduce emissions between 6% and 15% and raise €7 billion in annual tax revenue (Neiva et al., 2021). Taxes on emissions will also close the cost gap between conventional jet fuel and SAFs (Neiva et al., 2021), while incentivising airlines to optimise operations (Valdés et al., 2021). While unpopular with airlines as upsetting their business model, there is much evidence that taxes would have the opposite effect for climate change mitigation than the sector claims: Reducing jet fuel taxes offers minimal economic benefits, increases emissions, and has limited impact on aviation employment growth (Sobieralski & Hubbard, 2020).

Narrative 7: Insurmountable Barriers

Discourse. The industry is committed to climate change mitigation, but it cannot currently achieve its goals because of various barriers, including the non-availability of biofuels, their cost, or new technologies that "haven't yet been invented" (American Airlines). Airlines highlight that "Our ability to advance on this path continues to rely significantly on the development of technologies [. . .] that do not exist today at the scale or with the operational and commercial viability needed for the future" (Alaska) and are "outside of American's control. [. . .] the future development and availability of these technologies is not something we can predict with precision" (American Airlines). Hence, airlines "look forward to the development of biofuels that are technically safe, cost competitive, and truly sustainable, with a viable supply chain in place" (Ryanair), noting that "Their contribution to our decarbonisation will depend on the pace at which new technologies are developed and the willingness of stakeholders to invest in them, as well as the implementation of public policies" (American Airlines). Ultimately, this is not a likely scenario: "Even that the amount of SAF being produced until 2050 from the bio-based feedstock in the Netherlands can only meet a fraction of the anticipated demand. If feedstock is imported from other European countries and all feedstock is allocated to aviation, it might be possible to meet demand, but this is unrealistic" (KLM).

Rhetoric. While related to Narrative 4 ("Future Solutions"), Narrative 7 is different in that it acknowledges likely failure. Airlines highlight the many "ifs" on which future solutions depend, while indirectly pointing to barriers that currently prevent them from adopting existing solutions – cost, "true" sustainability, "viable" supply chains. The failures highlighted are outside the control of airlines – technology developments, SAF production – reiterating airlines' position as supply-dependent and thus disempowered to take steps independently to reduce emissions. This rhetoric conveys – intentionally or otherwise – that airlines cannot be made accountable should they not be able to contribute to mitigation goals.

Counterfactual. Airlines point to barriers that they themselves create. Deflecting policies – rhetorical strategy R1 – means that no frameworks can be created that will force all airlines to adopt biofuels or other technologies. Refusal to buy SAF due to their high cost means that no markets for these fuels can come into existence. Continued growth in fuel use means that the challenge to find sufficient feedstocks for SAF becomes greater.

Discussion

The analysis presented here shows that the aviation industry's public discussion of climate change represents an amalgam of narratives that collectively function as a form of temporal legitimation, that is, a discursive strategy that constructs credibility and moral authority through promises of future progress. By playing with temporalities and responsibilities, the sector situates itself within the discourse of climate-compatible travel, standing in marked contrast to the scientific consensus (e.g., Klöwer et al., 2021) and the

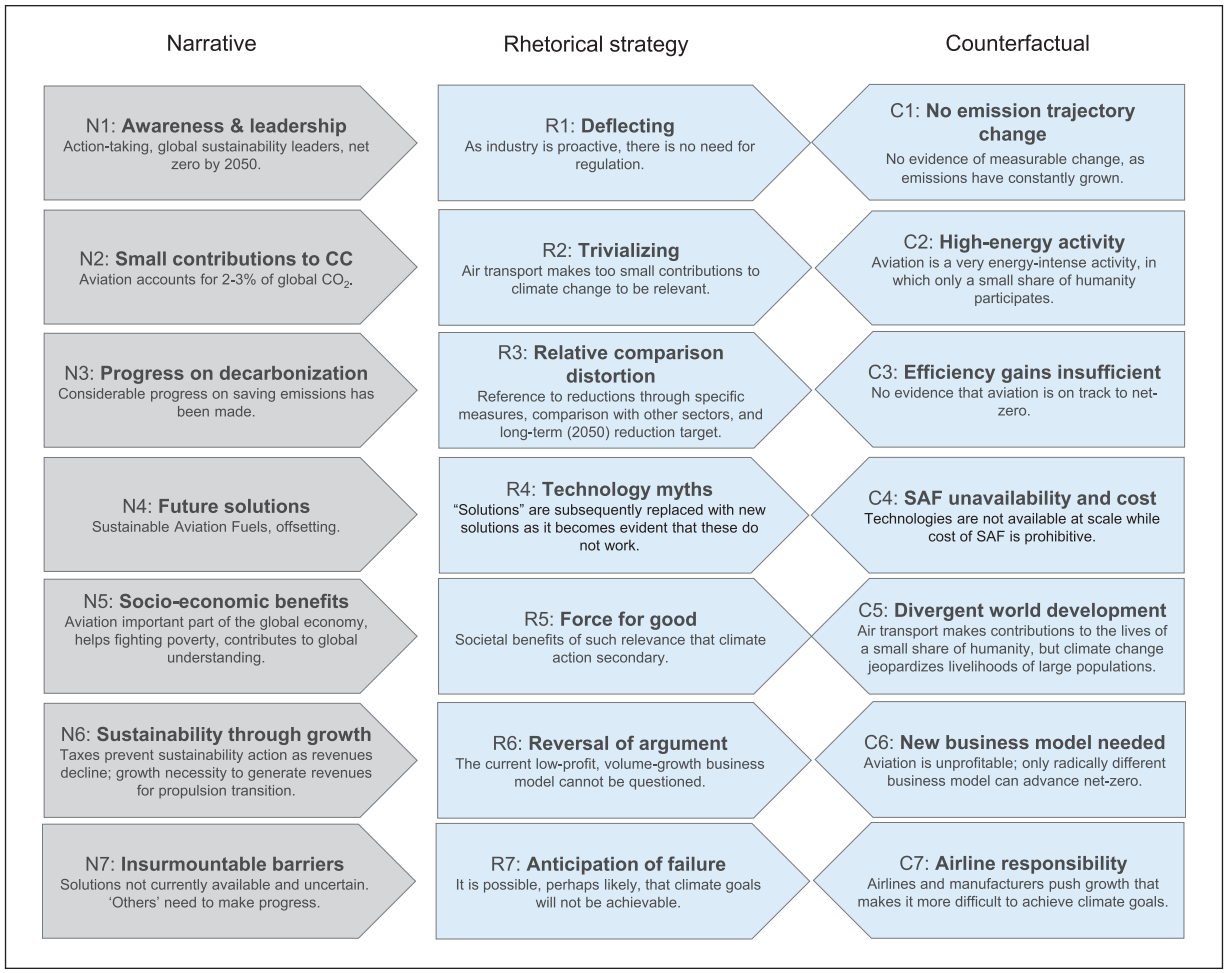

Figure 1. Overview of narratives, rhetorical strategy, and counterfactual.

assessments of supranational organisations (IEA, 2024). We conceptualise this rhetorical manoeuvre as "future soothing": by projecting technological innovation and managerial competence into an ever-receding horizon, airlines symbolically resolve the tension between growth and decarbonisation. The result is a discourse that soothes public concern and defers air transport governance, while preserving the legitimacy of continued expansion.

By presenting each narrative individually, this paper has revealed how the industry constructs a layered and dynamic discursive field. These layers are subtly interwoven to convey an image of awareness and progress on climate change mitigation, while simultaneously invoking air transport's social and economic benefits as a license for continued growth, or even as a precondition for achieving sustainability. The dynamically compounding nature of the narratives adds to their opacity. The fluidity with which they can be recombined situationally makes them adaptable to different audiences and policy contexts, further strengthening their hegemonic function. Figure 1 provides an overview of the seven main narratives identified in this research, the rhetorical strategies employed, and the counterfactuals that challenge the logic of the industry's "truths."

Some of these narratives have deep historical roots. Industry references to "future solutions" date back to the early 1990s, when aviation's climate impacts first gained attention and pressure for mitigation increased (Gössling & Peeters, 2007). Peeters et al. (2016) termed these "technology myths," highlighting their cyclical renewal in media discourse. Such persistent narratives, including claims of "small contributions" to climate change and "socio-economic indispensability," exemplify a long-standing rhetorical basis – persistent narratives – that has evolved to remain compatible with shifting socio-technical and political conditions. As Ferns and Amaeshi (2019) argue in the context of business' role in sustainable development, the endurance of such narratives is underpinned by temporal dynamics of hegemony, through which transformational delay becomes an active mode of governance.

Building on these persistent narratives, three new discourses have emerged. First, airlines now openly acknowledge climate change and claim leadership in addressing it,

particularly in Europe, where proactive positioning serves to pre-empt regulatory intervention. Second, the sector increasingly promotes long-term net-zero goals in place of near-term commitments – or interim targets, – pairing them with the claim that sustainability is achievable only through growth. This represents a clear example of discursive paradox, where apparently progressive rhetoric legitimises business-as-usual trajectories fundamentally incompatible with scientific assessments of decarbonisation limits (Gössling & Humpe, 2024; Lai et al., 2022). Through these two approaches, air travel is represented by the sector as "compatibly co-existing" with climate breakdown (Hopkins et al., 2023).

A third and even more recent discourse, "insurmountable barriers," acknowledges the difficulty of achieving net-zero and shifts responsibility to absent or ineffective third parties (biofuel providers, governments, or international bodies). This seeks to develop a circular narrative of attribution and blame, both with spatio-temporal contingencies – waiting for someone, somewhere else, to do something – while indirectly acknowledging that no such third party can be expected to step forward or to intervene rapidly enough at the necessary scale. While this discourse aims to dispel future criticism of inaction, it underlines the realities of limited decarbonisation pathways available to the sector, both currently and likely in the future.

The contradictions between these narratives are not accidental but constitutive. For example, Narrative 7 (insurmountable barriers) directly contradicts Narrative 6 (sustainability through growth), yet both are sustained because their coexistence allows the sector to appeal simultaneously to optimism and realism, to hope and to resignation. Inherent contradiction is also evident in suggestions that policies are needed, while the sector has continuously rejected regulation attempts (Lyle, 2018). The design of CORSIA, widely criticised as ineffective (Gössling & Lyle, 2021), illustrates how self-regulation can perform commitment while preventing transformation. Such discursive contradictions create interpretive flexibility, enabling the industry to maintain coherence in the face of inconsistency, a hallmark of hegemonic discourse formation (Laclau & Mouffe, 1985.).

Resisting both persistent and newly emerging narratives requires recognition of the counterfactuals revealed in this paper, but also how such narratives are cleverly formulated and disseminated by public relations and communications agencies (Brulle & Werthman, 2021), who have a long history of remaining active but "invisible" in environmental issues (Stauber & Rampton, 1995), and who hold a powerful role in climate communications (Brulle & Werthman, 2021). The aviation sector therefore does not sit alone in producing these narratives. Credibility of the sector's narratives is forged through, for instance, the partnerships airlines and other aviation industry actors are developing with academic institutions, which provide an illusion of legitimacy (e.g., Hopkins et al., 2023). These partnerships are supported by the sector's capacity to fund new research – including into new technologies, fuels and business modes – directing the types of new knowledge that are generated and avoiding that which will challenge the sector's hegemony.

Conceptual and Theoretical Contributions

The repurposing of counterfactual thinking as a critical-analytical tool to interrogate aviation's prefactual narratives has exposed how the aviation sector's climate communications blur the boundaries between persuasion, policy, and governance. This represents a significant step-change in academic knowledge, moving beyond previous work which has primarily focused on the *existence* of greenwashing practices, and the *impacts* of these communications on consumer understanding, both of which are symptomatic of airline's persuasive climate communication strategies. In this paper, we thus push further to expose hidden dynamics at play. This paper makes three interrelated theoretical contributions to scholarship on sustainability communication, climate delay, and the governance of high carbon aeromobilities.

First, we introduce our conceptualisation of "future soothing" as a distinctive strategy of "anticipatory legitimation." By this we mean the continual invocation of speculative futures, of technological breakthroughs, efficiency gains, or impending transitions, to reconcile moral responsibility with material inertia. Future soothing allows actors to acknowledge the gravity of climate change, align themselves discursively with ambitious sustainability goals, and yet defer substantive disruption to existing business models. In contrast to more classical accounts of denial or obstruction, anticipatory legitimation normalises delay through hopeful projections rather than outright rejection of climate science. This reframing advances theories of rhetorical strategy by illuminating how future-oriented discourse functions not simply as visionary or aspirational talk, but as a systematic means of justifying the high-carbon status quo.

Second, our analysis extends thinking on sustainability communication by specifying the affective and temporal dimensions of hegemony in carbon- intensive industries, including, but not limited to aviation and tourism. We show that reassurance, optimism, and managerial faith in gradual, controlled transition are not incidental but core tools of governance. These affective registers work through time, smoothing over the dissonance between urgent climate targets, and slow, incremental change by promising that current trajectories are already aligned with a sustainable future. In doing so, they cultivate a sense of calm inevitability around existing pathways, what we term future soothing, thereby stabilising incumbent interests and narrowing the imagined space of alternatives. This moves debates on sustainability communication beyond the content of environmental claims (e.g., greenwashing) to consider how temporal rhetoric and affect together secure consent for ongoing high-carbon travel practices.

Third, we contribute to emerging scholarship on the temporal politics of sustainability and climate delay in mobility systems. We demonstrate how industries invoke the *future*, through long-term net zero horizons, narratives of "transition in progress" and speculative technological fixes, to secure inaction *in the present*. Rather than treating time as a neutral backdrop for decarbonisation, our findings show that temporal framings are actively contested and strategically deployed to prioritise incremental over transformative change. Recognising future soothing as a mechanism of anticipatory legitimation offers a transferable analytical lens for examining other carbon-intensive sectors, from fossil fuels to cruise tourism and shipping. For travel research, this perspective foregrounds how promises of future sustainable travel coexist with, and even legitimise, the expansion of high-carbon mobility infrastructures today.

Taken together, these contributions highlight the importance of studying not only what industries say about sustainability, but when and how they locate change in time, and how those temporal moves feel to audiences. Future soothing, as elaborated here, provides a conceptual tool for unpacking the subtle forms of climate delay that operate through hope, reassurance, and managerial confidence in the sustainable future of travel.

Policy Contributions

We agree with van Wee (2023, p. 1056) that counterfactual checks can provide valuable insights for "policy makers, planners and other practitioners, and researchers" where they are faced with high levels of opposition to particular ideas – such as prioritising ecological stability over aeromobility. The findings presented in this paper thus have important implications for air transport governance. Under current conditions, the sector's emissions remain largely or entirely unregulated. The primary global policy mechanism – the International Civil Aviation Organisation's Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) – contains no binding commitments, covers only a share of emissions from international aviation, lacks interim targets before 2050, and places strong emphasis on offsetting and the notion of "carbon-neutral growth" (Lyle, 2018; Wozny et al., 2022). Given continued growth in air travel, it is inconceivable that CORSIA will make a substantial contribution to global net-zero objectives (Lyle, 2025).

Consequently, effective emission reductions will have to be pursued through alternative mechanisms, which requires a systematic analysis of the air transport system and its three principal stakeholder groups: air travellers, airlines, and policymakers. Travellers' decisions are strongly shaped by price considerations. Where air transport is inexpensive, flight intensity increases, particularly among those who already fly frequently (Banister, 2018). Conversely, even modest taxation tends to reduce demand (Falk & Hagsten, 2019). This indicates that a considerable share of air-travel demand is price-induced, while environmental concerns have only limited influence on travellers' willingness to fly less (Gössling & Dolnicar, 2023).

Airlines, by contrast, are heavily subsidised (Gössling et al., 2017) and are structurally oriented toward continuous expansion, resulting in capacity growth accompanied by very small profit margins (Gössling & Humpe, 2024). Unwilling to abandon volume-based business models, airlines are highly sensitive to changes in operational cost structures. Available evidence suggests that any significant reduction in total emissions, whether through sustainable aviation fuels (SAF) or carbon capture, will increase operating costs. To maintain even modest profit margins, these costs would need to be passed on to travellers, which would in turn reduce demand and undermine current business models. It is therefore unsurprising that airlines and their lobby organisations actively oppose taxation (ICAO, 2025b) and remain vulnerable to additional costs arising from SAF deployment or from the internalisation of negative externalities, such as the social cost of carbon (Tol, 2023).

In the absence of robust and credible global measures to reduce emissions from aviation, regional and national governance has become increasingly important (Lyle, 2018). At present, the European Union is the only major actor seeking to directly address emissions growth in aviation, through its ReFuelEU Aviation initiative and the EU Emissions Trading System (EU ETS; EC, 2025). Substantial increases in carbon prices are expected within the EU, while even the relatively modest SAF uptake mandated by ReFuelEU is likely to raise airlines' operating costs considerably over the coming decade (European Parliament, 2023). As a result, policies such as these will face strong industry resistance (briefly reported by Hopkins et al., 2023).

Herein lies the salience of critical narrative analysis. Our findings contribute to understanding how governance processes are shaped, and how policy implementation is constrained by what can be described as a "cycle of blame" which amounts in practice to abrogation of responsibility on the part of all three principal stakeholder groups. In the present system, travellers expect politicians or airlines to act; politicians emphasise "responsible consumption" on the part of travellers and technological innovation on the part of airlines; and airlines use green narratives supported by carefully constructed rhetorical strategies to resist policy and regulatory intervention. Offering carbon offsetting options to travellers and expecting governments to subsidise SAF have allowed airlines to effectively pass responsibility for progress on decarbonisation (or lack thereof) to travellers and governments (Young et al., 2014). Unless policymakers recognise and address this dynamic, it will remain difficult to break out of this cycle and to implement policies capable of placing the aviation sector on a pathway of consistent and credible decarbonisation.

Academic scholarship has pointed to several policy options, including the internalisation of the costs of CO_2 and

non-CO_2 climate effects, the introduction of (higher) global SAF quotas, taxation of premium-class travel, a moratorium on airport expansion, and efficiency-focused regulation (Lyle, 2025; Schneider et al., 2024). Findings in this paper would also encourage litigation where airlines disseminate misleading or false information (Guix et al., 2022). Collectively, such measures highlight both the complexity of the governance challenge and the central (and as yet unfulfilled) role of political leadership and policy intervention in transforming the air transport system.

Conclusion

This paper has critically examined the aviation industry's sustainability discourse through the combined lenses of rhetorical analysis and counterfactual thinking. By analysing corporate communications from major airlines, manufacturers, and industry organisations, the research identified seven dominant narratives that collectively construct an image of climate responsibility while legitimising continued growth, including three new strategies that were not previously reported in past scholarship. These narratives form a discursive system that sustains belief in aviation's "compatible coexistence" with climate breakdown (Hopkins et al., 2023), even though emissions from the sector continue to rise.

Rhetorical analysis and counterfactual thinking provide a novel perspective on aviation sustainability discourse; however, study limitations must be acknowledged. First, the use of qualitative content and discourse analysis involves interpretive judgement. Although the systematic coding procedure and counterfactual approach enhance analytical rigour, alternative readings of specific statements or rhetorical patterns are possible. Future research incorporating experimental or ethnographic work could extend our findings to better understand the reception and influence of sustainability discourse. Second, the analysis is based on publicly available communications from airlines, manufacturers, and industry bodies. These materials do not represent actual decision-making processes. Third, while the dataset is extensive, it is not exhaustive. The focus on large international airlines and major industry organisations may limit the generalisability of findings to smaller carriers or regional markets where sustainability communication practices may differ. Finally, the study concentrates on industry-produced texts and does not incorporate audience reception, meaning it cannot assess how travellers, policymakers, or other stakeholders interpret or respond to these narratives.

Despite these limitations, our analysis provides a valuable contribution to research by revealing how the industry's rhetorical control over public meaning, reinforced through partnerships with governments, public-relations agencies, and even academic institutions, enables it to shape not only consumer attitudes but also regulatory expectations. In doing so, airlines and industry bodies participate in what may be described as rhetorical governance, where language itself becomes a technology of delay. Delay is not simply an absence of policy action but a discursive accomplishment that redefines what counts as credible, feasible, or moral within climate politics.

The analysis not only confirms earlier research on aviation exceptionalism (Higham et al., 2022) and technological mythmaking (Peeters et al., 2016) but extends this literature by revealing the rhetorical mechanisms through which discourses are rendered persuasive. Specifically, the research shows that airlines deploy a distinctive rhetorical strategy of "future soothing," a rhetorical mechanism that calms concerns by projecting a comforting, optimistic future that also functions as a legitimation of continued growth. This challenges conventional understandings of greenwashing that focus primarily on factual accuracy. In other words, the issue is not "the facts versus the fiction" as much as the underlying strategy of temporal displacement, where future promises substitute for present accountability. As a result, the industry veers away from measurable improvements and emissions reductions while ensuring sustainability firmly remains in aviation discourse. The aviation sector effectively governs through time, delaying action and transforming inaction into the appearance of progress.

A key further finding of the analysis is the existence of contradictory claims such as "sustainability through growth" or "leadership amid failure," which are not rhetorical flaws but productive tensions that enhance the discourse's adaptability and hegemonic reach. These contradictions allow airlines to speak simultaneously to optimism and realism, action and inaction, thereby maintaining legitimacy across divergent audiences. Understanding this logic of contradiction contributes to broader theories of hegemonic discourse and anticipatory legitimation, in which the promise of future transformation secures a license to operate. These insights situate aviation's sustainability discourses within broader debates on post-truth environmentalism, where credibility is performed through narrative coherence rather than empirical evidence – measurable, for example, in a decline in emissions.

These insights bridge rhetorical analysis with broader debates on socio-technical transitions and temporal governance. The aviation sector's communications show how delay is not simply the absence of action but a productive discursive practice that shapes expectations, directs investment, and defines the boundaries of the possible (cf. Köves & Bajmócy, 2022). Through persistent narratives of innovation and leadership, airlines reproduce a cultural logic in which technological progress is both the problem and the solution. This self-reinforcing cycle aligns with what Lamb et al. (2020) describe as "discourses of climate delay," in which commitment to long-term goals becomes a substitute for immediate structural change (also see Shue, 2023).

Building on the findings in this study, future research should develop and test the theoretical proposition that discourses constitute a new form of legitimacy construction in

high-emission industries. Comparative analyses could reveal whether similar prefactual strategies are emerging as dominant legitimation devices elsewhere. More broadly, confronting the power relations embedded in these narratives remains essential: they protect the privileges of high-emitting elites by promoting futures that preserve, rather than disrupt, existing patterns of both consumption and its governance. Recognising these dynamics contributes to a deeper theoretical understanding of how rhetoric, temporality, and power intersect in shaping societal responses to climate breakdown.

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Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article:) Scott Cohen is financed by National Funds provided by FCT – Foundation for Science and Technology through project UID/04020/2025 (CinTurs).

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Data Availability Statement

Data will be made available upon request

Supplemental Material

Supplemental material for this article is available online.

References

Abbass, K., Qasim, M. Z., Song, H., Murshed, M., Mahmood, H., & Younis, I. (2022). A review of the global climate change impacts, adaptation, and sustainable mitigation measures. *Environmental Science and Pollution Research*, *29*(28), 42539–42559. https://doi.org/10.1007/s11356-021-18494-3

Airbus. (2022). *Global market forecast 2022–2041*. https://aircraft.airbus.com/en/market/global-services-forecast-gsf-2022-2041

Airbus (2025). Airbus Global Market Forecast 2025-2044. https://www.airbus.com/en/products-services/commercial-aircraft/global-market-forecast

Airportia. (2025). *Zurich Airport ZRH flight statistics*. https://www.airportia.com/switzerland/zurich-airport/statistic

Åkerman, J. (2005). Sustainable air transport–On track in 2050. *Transportation Research Part D: Transport and Environment*, *10*(2), 111–126. https://doi.org/10.1016/j.trd.2004.11.004

Alejandro, A., & Zhao, L. (2024). Multi-method qualitative text and discourse analysis: A methodological framework. *Qualitative Inquiry*, *30*(6), 461–473. https://doi.org/10.1177/10778004231184421

Almulhim, A. I., Alverio, G. N., Sharifi, A., Shaw, R., Huq, S., Mahmud, M. J., Ahmad, S., & Abubakar, I. R. (2024). Climate-induced migration in the Global South: An in depth analysis. *NPJ Climate Action*, *3*, Article 47. https://doi.org/10.1038/s44168-024-00133-1

Aristotle. (2007). *On rhetoric: A theory of civic discourse*. Oxford University Press.

ATAG. (2025). *Climate impact*. https://aviationbenefits.org/environmental-efficiency/climate-impact/

Banister, D. (2018). *Inequality in transport*. Alexandrine Press.

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*, Article 115279. https://doi.org/10.1016/j.rser.2024.115279

Baumeister, S., Zeng, C., & Hoffendahl, A. (2022). The effect of an eco-label on the booking decisions of air passengers. *Transport Policy*, *124*, 175–182. https://doi.org/10.1016/j.tranpol.2020.07.009

Boeing (2025). Commercial Market Outlook 2025-2044. https://www.boeing.com/commercial/market/commercial-market-outlook

Bergero, C., Gosnell, G., Gielen, D., Kang, S., Bazilian, M., & Davis, S. J. (2023). Pathways to net-zero emissions from aviation. *Nature Sustainability*, *6*(4), 404–414. https://doi.org/10.1038/s41893-023-01134-7

Bergström, F., Günther, F., & Britton, T. (2025). A counterfactual analysis quantifying the COVID-19 vaccination impact in Sweden. *Vaccine*, *52*, Article 126870. https://doi.org/10.1016/j.vaccine.2024.126870

Bertolotti, M., Valla, L. G., & Catellani, P. (2022). "If it weren't for COVID-19. . .": Counterfactual arguments influence support for climate change policies via cross-domain moral licensing or moral consistency effects. *Frontiers in Psychology*, *13*, Article 1005813. https://doi.org/10.3389/fpsyg.2022.1005813

Biofuels International. (2021). *Taxation not solution to cutting aviation emissions, says IATA*. https://biofuels-news.com/news/taxation-not-solution-to-cutting-aviation-emissions-says-iata/

Bitzer, L. F. (1968). The rhetorical situation. *Philosophy & Rhetoric*, *1*(1), 1–14.

BMZ. (2023). *Migration and climate*. German Federal Ministry for Economic Cooperation and Development. https://www.bmz.de/en/issues/climate-change-and-development/migration-and-climate

Burke, K. (1969). *A rhetoric of motives*. University of California Press.

Brulle, R. J., & Werthman, C. (2021). The role of public relations firms in climate change politics. *Climatic Change*, *169*(1), 8.

Burman, E., & Parker, I. (2016). *Discourse analytic research: Repertoires and readings of texts in action*. Routledge.

CE Delft. (2019). *Taxes in the field of aviation and their impact: Final report* (pp. 1–150). https://cedelft.eu/publications/taxes-in-the-field-of-aviation-and-their-impact/

ClientEarth. (2024). *Ryanair, Delta, Lufthansa, EasyJet among 71 airlines warned over potential greenwashing* [Press release]. https://www.clientearth.org/latest/press-office/press-releases/ryanair-delta-lufthansa-easyjet-among-71-airlines-warned-over-potential-greenwashing/

Cocolas, N., Walters, G., Ruhanen, L., & Higham, J. (2024). Air travel and persuasive climate communications. *Journal of Sustainable Tourism*, *32*(10), 2118–2140. https://doi.org/10.1080/09669582.2023.2272060

Cregan, C., Kelly, J. A., & Clinch, J. P. (2024). Are environmental, social and governance (ESG) ratings reliable indicators of emissions outcomes? A case study of the airline industry. *Corporate Social Responsibility and Environmental Management*, *31*(2), 909–928. https://doi.org/10.1002/csr.2507

Costanza, R., d'Arge, R., De Groot, R., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neill, R. V., Paruelo, J., & Raskin, R. G. (1997). The value of the world's ecosystem services and natural capital. *Nature*, *387*(6630), 253–260.

Destination2050. (2025). *Destination 2050: A route to net zero European aviation*. https://www.aci-europe.org/downloads/resources/DESTINATION-2050-Roadmap-2025.pdf

Dray, L., Schäfer, A. W., Grobler, C., Falter, C., Allroggen, F., Stettler, M. E., & Barrett, S. R. (2022). Cost and emissions pathways towards net-zero climate impacts in aviation. *Nature Climate Change*, *12*(10), 956–962. https://doi.org/10.1038/s41558-022-01490-5

Dryzek, J. S. (2013). *The politics of the Earth: Environmental discourses* (3rd ed.). Oxford University Press.

EC (European Commission). (2025). *RefuelEU aviation*. https://transport.ec.europa.eu/transport-modes/air/environment/refueleu-aviation_en

Ehrenstein, V., & Muniesa, F. (2013). The conditional sink: Counterfactual display in the valuation of a carbon offsetting reforestation project. *Valuation Studies*, *1*(2), 161–188. https://doi.org/10.3384/vs.2001-5992.1312161

European Parliament. (2023). *ReFuelEU Aviation initiative*. https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/698900/EPRS_BRI%282022%29698900_EN.pdf

Fairclough, N. (2013). *Critical discourse analysis: The critical study of language* (2nd ed.). Routledge.

Falk, M., & Hagsten, E. (2019). Short-run impact of the flight departure tax on air travel. *International Journal of Tourism Research*, *21*(1), 37–44. https://doi.org/10.1002/jtr.2232

Ferns, G., & Amaeshi, K. (2019). Struggles at the summits: Discourse coalitions, field boundaries, and the shifting role of business in sustainable development. *Business & Society*, *58*(8), 1533–1571.

Festinger, L. (1957). *A theory of cognitive dissonance*. Stanford University Press.

Financial Times. (2024). *Dutch court rules KLM ads "misleading" in greenwashing case*. https://www.ft.com/content/5169410d-427e-4156-ba08-f17284c477ca

Fuglestvedt, J., Lund, M. T., Kallbekken, S., Samset, B. H., & Lee, D. S. (2023). A "greenhouse gas balance" for aviation in line with the Paris Agreement. *Wiley Interdisciplinary Reviews: Climate Change*, *14*(5), Article e839. https://doi.org/10.1002/wcc.839

Germanwatch. (2025). *Climate risk index*. https://www.germanwatch.org/en/cri

Gleicher, F., Kost, K. A., Baker, S. M., Strathman, A. J., Richman, S. A., & Sherman, S. J. (1990). The role of counterfactual thinking in judgments of affect. *Personality and Social Psychology Bulletin*, *16*(2), 284–295. https://doi.org/10.1177/0146167290162009

Goerke, M., Möller, J., & Schulz-Hardt, S. (2004). "It's not my fault – but only I can change it": Counterfactual and prefactual thoughts of managers. *Journal of Applied Psychology*, *89*(2), 279–292. https://doi.org/10.1037/0021-9010.89.2.279

Gössling, S., & Dolnicar, S. (2023). A review of air travel behavior and climate change. *Wiley Interdisciplinary Reviews: Climate Change*, *14*(1), Article e802. https://doi.org/10.1002/wcc.802

Gössling, S., Fichert, F., & Forsyth, P. (2017). Subsidies in aviation. *Sustainability*, *9*(8), Article 1295. https://doi.org/10.3390/su9081295

Gössling, S., & Humpe, A. (2020). The global scale, distribution and growth of aviation: Implications for climate change. *Global Environmental Change*, *65*, Article 102194. https://doi.org/10.1016/j.gloenvcha.2020.102194

Gössling, S., & Humpe, A. (2024). Net-zero aviation: Transition barriers and radical climate policy design implications. *Science of the Total Environment*, *912*, Article 169107. https://doi.org/10.1016/j.scitotenv.2023.169107

Gössling, S., Hanna, P., Higham, J., Cohen, S., & Hopkins, D. (2019). Can we fly less? Evaluating the 'necessity'of air travel. *Journal of Air Transport Management*, *81*, 101722.

Gössling, S., Humpe, A., & Sun, Y.-Y. (2024). Are emissions from global air transport significantly underestimated? *Current Issues in Tourism*, *28*(5), 695–708. https://doi.org/10.1080/13683500.2024.2337281

Gössling, S., & Lyle, C. (2021). Transition policies for climatically sustainable aviation. *Transport Reviews*, *41*(5), 643–658.

Gössling, S., & Peeters, P. (2007). "It does not harm the environment!": An analysis of industry discourses on tourism, air travel and the environment. *Journal of Sustainable Tourism*, *15*(4), 402–417. https://doi.org/10.2167/jost672.0

Grewe, V., Gangoli Rao, A., Grönstedt, T., Xisto, C., Linke, F., Melkert, J., Middel, J., Ohlenforst, B., Blakey, S., Christie, S., Matthes, S., & Dahlmann, K. (2021). Evaluating the climate impact of aviation emission scenarios towards the Paris Agreement including COVID-19 effects. *Nature Communications*, *12*, Article 3841. https://doi.org/10.1038/s41467-021-24091-w

Guix, M., Ollé, C., & Font, X. (2022). Trustworthy or misleading communication of voluntary carbon offsets in the aviation industry. *Tourism Management*, *88*, 104430. https://doi.org/10.1016/j.tourman.2021.104430

Gürçam, S. (2022). The neoliberal initiative of the aviation industry to fight the climate crisis: Greenwashing. *International Journal of Environment and Geoinformatics*, *9*(3), 178–186. https://doi.org/10.30897/ijegeo.1098510

Higham, J., Cohen, S. A., Cavaliere, C. T., Reis, A., & Finkler, W. (2016). Climate change, tourist air travel and radical

emissions reduction. *Journal of Cleaner Production*, *111*, 336–347. https://doi.org/10.1016/j.jclepro.2014.10.100

Higham, J., Ellis, E., & Maclaurin, J. (2018). Tourist aviation emissions: A Problem of collective action. *Journal of Travel Research*, *58*(4), 535–548. https://doi.org/10.1177/0047287518769764

Higham, J., Hanna, P., Hopkins, D., Cohen, S., Gössling, S., & Cocolas, N. (2022). Reconfiguring aviation for a climate-safe future: Are airlines sending the wrong message? *Journal of Travel Research*, *61*(6), 1458–1473. https://doi.org/10.1177/00472875221089078

Hopkins, D., Gössling, S., Cohen, S., Hanna, P., & Higham, J. E. S. (2023). Aeromasculinities and the fallacy of sustainable aviation. *Energy Research & Social Science*, *106*, Article 103319. https://doi.org/10.1016/j.erss.2023.103319

Huwe, V., Hopkins, D., & Mattioli, G. (2025). Aviation exceptionalism, fossil fuels and the state. *Review of International Political Economy*, *32*(1), 76–100. https://doi.org/10.1080/09692290.2023.2216362

IATA. (2020). *Dossier: Set for sustainability*. https://airlines.iata.org/2020/03/16/dossier-set-sustainability?utm

IATA. (2022a). *IATA statement to the 41st ICAO Assembly, Executive Committee*. https://www.iata.org/en/pressroom/pressroom-archive/2022-releases/2022-09-28-04/

IATA. (2022b, June 21). *Incentives needed to increase SAF production*. https://www.iata.org/en/pressroom/2022-releases/2022-06-21-02/

IATA. (2024). *IATA releases enhanced policy and finance net zero roadmaps*. https://www.iata.org/en/pressroom/2024-releases/2024-09-24-01

IATA. (2025). *Carbon dioxide removal (CDR) technologies*. https://www.iata.org/globalassets/iata/publications/sustainability/carbon-dioxide-removal-cdr-technologies-facts.pdf

ICAO. (2025a). *2025 ICAO Aviation climate week*. https://www.icao.int/Meetings/2025AviationClimateWeek/Pages/default.aspx

ICAO. (2025b). *Preserving ICAO principles on taxation and countering emerging air transport taxes*. https://www.icao.int/sites/default/files/Meetings/a42/Documents/WP/wp_181_en.pdf

International Energy Agency. (2024). *CO2 emissions in 2023*. IEA. https://www.iea.org/reports/co2-emissions-in-2023

International Energy Agency. (2025). *Aviation*. https://www.iea.org/energy-system/transport/aviation

Johnstone, B., & Andrus, J. (2024). *Discourse analysis*. John Wiley & Sons.

Klöwer, M., Allen, M. R., Lee, D. S., Proud, S. R., Gallagher, L., & Skowron, A. (2021). Quantifying aviation's contribution to global warming *Environmental Research Letters*, *16*(10), Article 104027. https://doi.org/10.1088/1748-9326/ac286e

Köves, A., & Bajmócy, Z. (2022). The end of business-as-usual? A critical review of the air transport industry's climate strategy for 2050 from the perspectives of degrowth. *Sustainable Production and Consumption*, *29*, 228–238. https://doi.org/10.1016/j.spc.2021.10.010

Laclau, E., & Mouffe, C. (1985). *Hegemony and socialist strategy*. Verso.

Lai, Y. Y., Christley, E., Kulanovic, A., Teng, C. C., Björklund, A., Nordensvärd, J., Karakaya, E., & Urban, F. (2022). Analysing the opportunities and challenges for mitigating the climate impact of aviation: A narrative review. *Renewable and Sustainable Energy Reviews*, *156*, Article 111972. https://doi.org/10.1016/j.rser.2021.111972

Lamb, W. F., Mattioli, G., Levi, S., Roberts, J. T., Capstick, S., Creutig, F., Minx, J. C., Müller-Hansen, F., Culhane, T., & Steinberger, J. K. (2020). Discourses of climate delay. *Global Sustainability*, *3*, Article e17. https://doi.org/10.1017/sus.2020.13

Larsson, J., Elofsson, A., Sterner, T., & Åkerman, J. (2019). International and national climate policies for aviation: A review. *Climate Policy*, *19*(6), 787–799. https://doi.org/10.1080/14693062.2019.1581131

Lee, D. S., Fahey, D. W., Skowron, A., Allen, M. R., Burkhardt, U., Chen, Q., Doherty, S. J., Freeman, S., Forster, P. M., & Fuglestvedt, J. (2021). The contribution of global aviation to anthropogenic climate forcing for 2000 to 2018. *Atmospheric Environment*, *244*, Article 117834. https://doi.org/10.1016/j.atmosenv.2020.117834

Lin, W. (2017). Aviation and climate change: practising green governmentality across the north-south divide. *Geopolitics*, *22*(1), 129–150. https://doi.org/10.1080/14650045.2016.1210130

Lyle, C. (2018). Beyond the ICAO's CORSIA: Towards a more climatically effective strategy for mitigation of civil-aviation emissions. *Climate Law*, *8*(1–2), 104–127. https://doi.org/10.1163/18786561-00802004

Lyle, C. (2025). *A necessarily changed emphasis for driving reduction in aviation emissions*. https://www.linkedin.com/pulse/necessarily-changed-emphasis-driving-reduction-aviation-chris-lyle-2ahxe/?trackingId=pZJGFZsR3DSDrOCH8i9l4g%3D%3D

Maclaurin, J., Ellis, E., & Higham, J. (2025). On all fronts: How to end aviation exceptionalism. *Journal of Sustainable Tourism*, 1–17. https://doi.org/10.1080/09669582.2025.247590

Mayring, P. (2021). *Qualitative content analysis: A step-by-step guide*. Sage Publications.

McConnell, A. R., Niedermeier, K. E., Leibold, J. M., El-Alayli, A. G., Chin, P. P., & Kuiper, N. M. (2000). What if I find it cheaper someplace else?: Role of prefactual thinking and anticipated regret in consumer behavior. *Psychology & Marketing*, *17*(4), 281–298. https://doi.org/10.1002/(SICI)1520-6793(200004)17:4<281::AID-MAR1>3.0.CO;2-D

Muehlberger, C.-M., Gruen, L., Liefner, I., & Losacker, S. (2024). Socio-technical imaginaries of climate-neutral aviation. *Energy Research and Social Science*, *114*, Article 103595. https://doi.org/10.1016/j.erss.2024.103595

Neiva, R., Pons, A., Horton, G., Lutz, C., Distelkamp, M., Iglesias, R., Brajterman, O., & Pirlot, A. (2021). *Study on the taxation of the air transport sector*. European Commission. https://taxation-customs.ec.europa.eu/system/files/2021-07/Aviation-Taxation-Report.pdf

Neureiter, A., Hirsch, M., Matthes, J., & Naderer, B. (2024). Sustainable flying? The effects of greenwashed claims in airline advertising on perceived greenwashing, brand outcomes, and attitudes toward flying. *Environmental Communication*, *18*(7), 873–890. https://doi.org/10.1080/17524032.2024.2321093

Nyberg, D., & Wright, C. (2025). Confronting the climate crisis: Fossil fuel hegemony and the need for decarbonization, degrowth, and democracy. *Journal of Management Studies*, *62*(8), 3659–3676. https://doi.org/10.1111/joms.13198

Olk, S. (2021). The effect of self-congruence on perceived green claims' authenticity and perceived greenwashing: The case of EasyJet's CO_2 promise. *Journal of Nonprofit & Public Sector Marketing*, *33*(2), 114–131. https://doi.org/10.1080/10495142.2020.1843179

ORF. (2023). *Greenwashing bei der AUA*. https://wien.orf.at/stories/3225531/

Peeters, P., Higham, J., Kutzner, D., Cohen, S., & Gössling, S. (2016). Are technology myths stalling aviation climate policy? *Transportation Research Part D: Transport and Environment*, *44*, 30–42. https://doi.org/10.1016/j.trd.2016.02.004

Penner, J. E., Lister, D. H., Griggs, D. J., Dokken, D. J., & McFarland, M. (1999). *Aviation and the global atmosphere: A special report of IPCC Working Groups I and III*. Cambridge University Press.

Popp, R. K., & Mendelson, A. (2022). Cover images of inflight magazines as airlines' methods of impression management: *Ulisse* and *Blue Wings*. *Corporate Reputation Review*, *25*, 41–52. https://doi.org/10.1057/s41299-022-00138-8

Possible. (2022). *Missed targets: A brief history of aviation climate targets of the early 21st century*. https://static1.squarespace.com/static/5d30896202a18c0001b49180/t/6273db16dcb32d309eaf126e/1651759897885/Missed-Targets-Report.pdf

Pozzer, A., Steffens, B., Proestos, Y., Sciare, J., Akritidis, D., Chowdhury, S., Burkart, K., & Bacer, S. (2024). Atmospheric health burden across the century and the accelerating impact of temperature compared to pollution. *Nature Communications*, *15*, Article 9379. https://doi.org/10.1038/s41467-024-53649-w

Quadros, F. D., Snellen, M., Sun, J., & Dedoussi, I. C. (2022). Global civil aviation emissions estimates for 2017–2020 using ADS-B data. *Journal of Aircraft*, *59*(6), 1394–1405. https://doi.org/10.2514/1.C037235

Reuters. (2025a, April 2). *IATA Airlines chief warns aviation industry falling behind on net zero*. https://www.reuters.com/sustainability/climate-energy/iata-airlines-chief-warns-aviation-industry-falling-behind-net-zero-2025-04-02/

Reuters (2025b). Airbus postpones development of new hydrogen aircraft. https://www.reuters.com/business/aerospace-defense/airbus-postpones-development-new-hydrogen-aircraft-2025-02-07

Roese, N. J. (1994). The functional basis of counterfactual thinking. *Journal of Personality and Social Psychology*, *66*(5), 805–818. https://doi.org/10.1037/0022-3514.66.5.805

Roese, N. J., & Olson, J. M. (1995). Outcome controllability and counterfactual thinking. *Personality and Social Psychology Bulletin*, *21*(6), 620–628. https://doi.org/10.1177/0146167295216006

Rubin, D. B. (1974). Estimating causal effects of treatments in randomized and nonrandomized studies. *Journal of Educational Psychology*, *66*(5), 688–701. https://doi.org/10.1037/h0037350

Sanna, L. J. (1996). Defensive pessimism, optimism, and simulating alternatives: Some ups and downs of prefactual and counterfactual thinking. *Journal of Personality and Social Psychology*, *71*(5), 1020–1036. https://doi.org/10.1037/0022-3514.71.5.1020

Schneider, A., Stern, C., Sachdeva, N., & Mounier, M. (2024). Can airports be a catalyst for reducing aviation's effect on the climate? *Journal of Airport Management*, *18*(3), 222–236.

Scott, D., & Gössling, S. (2025). Beyond ambition: a review of tourism climate change declaration outcomes and prospects from Baku. *Journal of Sustainable Tourism*, 1–22.

Shue, H. (2023). Unseen urgency: Delay as the new denial. *WIRES: Climate Change*, *14*(1), Article e809.

Sobieralski, J. B., & Hubbard, S. M. (2020). The effect of jet fuel tax changes on air transport, employment, and the environment in the US. *Sustainability*, *12*(8), Article 3352. https://doi.org/10.3390/su12083352

Soni, N., & Pattanaik, F. (2025). Mapping gender wage gaps in regular employment: A counterfactual decomposition analysis for India. *International Journal of Manpower*, *46*(5), 867–898. https://doi.org/10.1108/IJM-10-2023-0540

Stauber, J. C., & Rampton, S. (1995). *Toxic sludge is good for you*. Common Courage Press.

Stubenvoll, M., & Neureiter, A. (2021). Fight or flight: How advertising for air travel triggers moral disengagement. *Environmental Communication*, *15*(6), 765–782. https://doi.org/10.1080/17524032.2021.1890176

Teoh, R., Engberg, Z., Shapiro, M., Dray, L., & Stettler, M. E. (2024). The high-resolution Global Aviation Emissions Inventory based on ADS-B (GAIA) for 2019–2021. *Atmospheric Chemistry and Physics*, *24*(1), 725–744. https://doi.org/10.5194/acp-24-725-2024

The Conversation. (2023). *Airlines are being hit by anti-greenwashing litigation – Here's what makes them perfect targets*. https://theconversation.com/airlines-are-being-hit-by-anti-greenwashing-litigation-heres-what-makes-them-perfect-targets-214501

The Guardian. (2023, December 6). *Air France, Lufthansa and Etihad ads banned for misleading claims*. https://www.theguardian.com/media/2023/dec/06/air-france-lufthansa-etihad-ads-banned-misleading-claims-advertising-environmental

Thepchalerm, T., & Pinsuwan, S. (2025). CEO voices on sustainable aviation: An analysis of environmental communication in the airline industry. *Green Technologies and Sustainability*, *3*(3), Article 100194. https://doi.org/10.1016/j.grets.2025.100194

The Times. (2024). *Virgin Atlantic ad banned over sustainable fuel claim*. https://www.thetimes.com/uk/environment/article/virgin-atlantic-ad-banned-over-sustainable-fuel-claim-gdvgjt8fp

Time. (2024). *United Airlines: Seeding greener fuel*. https://time.com/6979584/united-airlines/

Tol, R. S. (2023). Social cost of carbon estimates have increased over time. *Nature Climate Change*, *13*(6), 532–536. https://doi.org/10.1038/s41558-023-01680-x

Truxal, S., & Aras, T. (2025). Charting a "green" flight path for European consumers?: Allegations of greenwashing in the airline industry. *Journal of European Consumer and Market Law*, *14*(1), 15–20.

Undavalli, V., Olatunde, O. B. G., Boylu, R., Wei, C., Haeker, J., Hamilton, J., & Khandelwal, B. (2023). Recent advancements in sustainable aviation fuels. *Progress in Aerospace Sciences*, *136*, Article 100876. https://doi.org/10.1016/j.paerosci.2023.100876

Valdés, R. M. A., Comendador, V. F. G., & Campos, L. M. B. (2021). How much can carbon taxes contribute to aviation decarbonization by 2050? *Sustainability*, *13*(3), Article 1086. https://doi.org/10.3390/su13031086

Warnick, B. (2007). *Rhetoric online: Persuasion and politics on the World Wide Web*. Peter Lang.

Wee, B. V. (2023). Is it really a stupid idea? The counterfactual check. *Transport Reviews*, *43*(6), 1055–1057. https://doi.org/10.1080/01441647.2023.2263554

Wizz Air. (2024, November 20). *Wizz Air welcomes collaboration at COP29 and calls for decisive policy action to drive aviation's net-zero future*. https://www.wizzair.com/en-gb/information-and-services/about-us/news/2024/11/20/wizz-

air-welcomes-collaboration-at-cop29-and-calls-for-decisive-policy-action-to-drive-aviation-s-net-zero-future

Wozny, F., Grimme, W., Maertens, S., & Scheelhaase, J. (2022). CORSIA – A feasible second-best solution? *Applied Sciences*, *12*(14), Article 7054. https://doi.org/10.3390/app12147054

Yilmaz, S., Kim, H., & Ko, Y. (2021). Counterfactual thinking in sustainable tourism context. *Journal of Travel Research*, *61*(6), 1252–1266. https://doi.org/10.1177/00472875211031036

Young, M., Higham, J. E. S., & Reis, A. C. (2014). "Up in the air": A conceptual critique of flying addiction. *Annals of Tourism Research*, *49*, 51–64. https://doi.org/10.1016/j.annals.2014.08.003

Zhang, B., Ritchie, B. W., Mair, J., & Driml, S. (2022). Air passengers' preferences for aviation voluntary carbon offsetting: A co-benefits perspective. *Journal of Travel Research*, *61*(6), 1437–1457. https://doi.org/10.1177/00472875211030340

Zurich Airport. (2025). *Energy and climate*. https://report.flughafen-zuerich.ch/2022/ar/en/energy-and-climate/

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