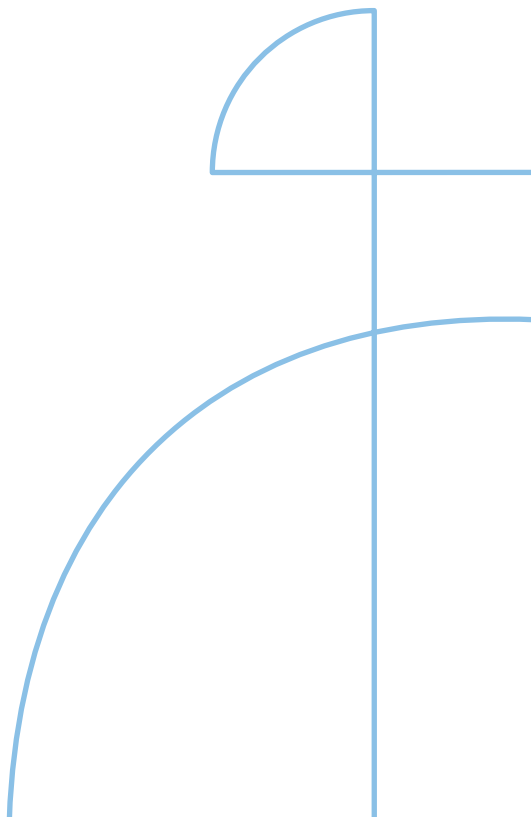
Doctoral Thesis in Industrial Economics and Management

Transitions in-the-making

Towards a performative understanding of sustainability in Swedish aviation

EMILY CHRISTLEY

KTH ROYAL INSTITUTE OF TECHNOLOGY



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Abstract

Research on sustainability transitions offers valuable insights into systemic change across societal systems like energy, mobility, and buildings. These systems, heavily reliant on fossil fuels, now face mounting climate consequences and require fundamental reconfigurations in their modes of production, distribution, and consumption. Yet much of the research field treats sustainability as a pre-existing, stable endpoint, often defined through fixed goals, metrics, or policy targets, which risks obscuring the inherently contested and political nature of sustainability itself.

In response, this thesis advances a performative understanding of sustainability, viewing it not as a fixed target but as continuously enacted, negotiated, and contested through discursive and material practices. Swedish aviation provides a compelling case to explore this perspective. Whilst celebrated for its environmental leadership, Sweden ranks amongst the highest globally for per capita aviation emissions, highlighting deep tensions between global connectivity and climate responsibility.

Drawing on four papers, the thesis examines how competing understandings of sustainability are enacted and contested through transition efforts in Swedish aviation. Paper I reviews mitigation strategies and policy developments. Papers II and III explore how industry actors perform sustainability through narratives and technological innovation. Paper IV analyses the discursive conflict between the aviation industry and the flight-free movement, revealing deeper struggles over what sustainability should mean and require.

This thesis offers an empirical account of two competing discourse-coalitions—*Green flying* and *Staying on the ground*. Each advances divergent visions, narratives, and practices that shape the trajectory of aviation's transition. Conceptually and methodologically, it advances a performative, narrative-oriented approach that foregrounds the politics of meaning-making in transitions. This perspective highlights the complexity of sustainability transitions and calls for more reflexive, pluralistic, and open-ended forms of governance—holding space for disagreement, fostering experimentation, and acknowledging that transitions are ever *in-the-making*.

Sammanfattning

Forskning om hållbarhetsomställningar erbjuder värdefulla insikter i systemförändringar inom samhällsområden såsom energi, mobilitet och byggnation. Dessa sektorer, som är starkt beroende av fossila bränslen, står nu inför växande klimatutmaningar. Sådana omställningar innebär i grunden att produktion, distribution och konsumtion omformas för att upprätthålla centrala samhällsfunktioner. Emellertid tenderar fältet ofta att betrakta hållbarhet som ett förutbestämt och stabilt slutmål, definierat genom fasta mål, indikatorer eller politiska riktmärken. Detta riskerar att dölja hållbarhetens inneboende politiska och omtvistade karaktär.

Denna avhandling utvecklar i stället en performativ förståelse av hållbarhet, där hållbarhet ses som något som ständigt iscensätts, förhandlas och bestrids genom diskursiva och materiella praktiker. Svenskt flyg utgör ett intressant fall för att undersöka detta perspektiv. Trots landets rykte som miljöföregångare har Sverige bland de högsta flygutsläppen per capita i världen, vilket blottlägger spänningar mellan global rörlighet och klimatansvar.

Baserat på fyra artiklar analyseras i avhandlingen hur olika förståelser av hållbarhet skapas och utmanas genom omställningsinsatser i svensk flygsektor. Den första artikeln granskar klimatstrategier och politiska ramverk. De två följande artiklarna utforskar hur branschaktörer gestaltar hållbarhet genom narrativ och teknikutveckling. Artikel fyra analyserar den diskursiva konflikten mellan flygindustrin och flygfrittrörelsen, vilket blottlägger djupare strider om vad hållbarhet bör innebära och kräva.

Avhandlingen presenterar en detaljerad empirisk analys av två diskurskoalitioner—*Grönt flyg* och *Stanna på marken*—som representerar motstridiga visioner, narrativ och praktiker som formar flygets omställning. Konceptuellt och metodologiskt bidrar avhandlingen med ett performativt och narrativt inriktat tillvägagångssätt som synliggör de politiska dimensionerna av meningsskapande i omställningsprocesser. Detta perspektiv framhäver komplexiteten i hållbarhetsomställningar och efterlyser mer reflexiva, pluralistiska och öppna styrformer—där utrymme ges för oenighet, experimenterande och ett erkännande av att omställningar alltid är i rörelse.

List of papers

Paper I

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, 111972.

Paper II

Christley, E., Karakaya, E., Urban, F., 2024. Analysing transitions in-the-making: A case study of aviation in Sweden. *Environmental Innovation and Societal Transitions*, 50, 100790.

Paper III

Christley, E., 2025. Performing legitimacy in electric aviation: The innovation journey of Heart Aerospace. *Energy Research and Social Science*, 127, 104261.

Paper IV

Christley, E., Ullström, S., 2024. Desired or contested futures? Competing discourse-coalitions for sustainable aviation in Sweden. *Critical Policy Studies*.

Author's contributions to papers

Paper I

I co-authored Paper I with colleagues as part of an interdisciplinary research project on alternative aircraft fuels and technologies. Together with Yat Yin Lai, I played a leading role in the conceptualisation, data collection and analysis, as well as the writing and revision of the paper.

Paper II

I am the first author of Paper II and played a leading role in developing all aspects of the paper. Emrah Karakaya supported me in its conceptualisation and both he and Frauke Urban supported its revision.

Paper III

I am the sole author of this article.

Paper IV

My co-author, Sara Ullström, and myself contributed equally in this work and agreed to follow the alphabetical order of our last names when deciding about authorship.

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The most meaningful part of my PhD journey has been the opportunity to meet so many wonderful people. Thank you to my friends and colleagues at INDEK and beyond. There are too many of you to mention everyone here, but I hope you know who you are—and just how grateful I am to have met you. Thank you to Emrah and Frauke for taking a chance and employing me—here we are, finally. Thank you to Erica for being amazing, to Amelie for the adventures, and to Hannes for the small-talk support. Thank you to Sara, co-author of Christley and Ullström (2024), for being the most fantastic writing partner. Thank you to Janneke and Hanna for putting up with (and often sharing in) my rage. Thank you to Elise for everything NORSI and more. Thank you to Ellen, Joachim, Stine and Hanna for supporting my onward journey. Thank you to Marja for reminding me I can be completely myself in this world.

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in-the-making

PHRASE

1. in the process of becoming or being made

Contents

1 Introduction

With growing global temperatures, rising sea levels, and increasing biodiversity loss, the climate crisis is widely recognised as an existential threat—one that can only be averted through "a fundamental transformation towards more sustainable modes of production and consumption" (Markard et al., 2012, p. 955). Achieving such a transformation requires change across all systems of society, from the ways in which we generate electricity, to how we build and heat our neighbourhoods, to how we grow food, and the means by which we travel (Schot and Kanger, 2018). Fossil fuels—coal, oil, and natural gas—have long underpinned these systems, and despite concerns, their consumption continues to grow, fuelling greenhouse gas emissions and exacerbating the climate crisis. As the Executive Director of the United Nations Environment Programme, Inger Andersen (2022) [1], lamented,

> "we still, STILL, aren't doing anywhere near enough to cut greenhouse gas emissions"

Addressing the crisis requires more than technical substitutions or incremental improvements, it demands profound shifts in infrastructures, regulations, behaviours, and cultural meanings (Markard et al., 2012). Beyond the reduction of emissions, these shifts must confront interlinked global challenges such as

[1] Inger Andersen made this statement during the launch of the *Emissions Gap Report 2022* in Nairobi, Kenya. She stressed that, despite prior climate commitments, global efforts remain insufficient, with current national pledges reducing projected 2030 emissions by less than one percent—far below the forty-five percent reduction needed to stay on track for the 1.5 °C target of the Paris Agreement (United Nations, 2015b).

resource overexploitation and social inequality, necessitating a fundamental reconfiguration of production, distribution, and consumption patterns (Ferraro et al., 2015; Schot and Kanger, 2018). These large-scale, interdependent changes are increasingly conceptualised as *sustainability transitions*: long-term transformations of societal systems aimed at tackling these deeply embedded systemic challenges (Hölscher et al., 2018).

Yet whilst the apparent goal of sustainability transitions is to foster more sustainable societal systems, the meaning of *sustainability* itself remains contested. No universally accepted definition exists to guide such transitions, and its meaning has evolved considerably over the past decades in response to changing societal priorities and worldviews (Washington, 2015). Early formulations, such as the 1972 landmark issue of *The Ecologist*, framed sustainability as a radical critique of industrial expansion, warning that "[t]he principal defect of the industrial way of life with its ethos of expansion is that it is not sustainable" (The Ecologist, 1972, p. 1). Here, sustainability demanded a halt to the relentless consumption of energy and raw materials that threatened ecosystems and human survival. By contrast, the 1987 World Commission on Environment and Development (WCED) defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, p. 8), signalling a shift towards reconciling environmental protection with continued economic growth. Today, the United Nations' 2030 Agenda further broadens the concept, embedding sustainability within a framework of 17 Sustainable Development Goals that integrate poverty alleviation, health, education, economic growth, and environmental stewardship under a "shared blueprint for peace and prosperity for people and the planet" (United Nations, 2015a).

These changing meanings reflect not only the expansion but also the dilution of the concept, both enhancing its application and appeal, yet making it susceptible to co-optation and contestation. As scholars argue, sustainability is inherently political (Meadowcroft, 2009), reflecting not only evolving understandings of *what* must be sustained, but also *how*, *by whom*, and *for whose benefit* (Blok et al., 2016; Robinson, 2004). Any definition of sustainability entails particular distributions of power and resources, informed by ideological assumptions about what matters and how society should be organised. Consequently, sustainability transitions are not merely technical or managerial endeavours but are deeply entangled with power dynamics, institutional logics, and socio-cultural struggles (Davidson, 2010). Recognising this, recent scholarship

suggests that the meaning of sustainability is not only political but also performative—emerging through situated practices, interpretations, and enactments rather than fixed definitions (Corvellec, 2016; DuPuis and Ball, 2013; Hallin et al., 2021). This evolving and contested nature suggests that sustainability should be understood not as a stable end-state, but as something continually negotiated and performed.

1.1 Examining sustainability in-the-making

The research field known as *sustainability transitions*—which studies the phenomena from which it takes its name—supports calls for a fundamental transformation of key societal systems, such as electricity, heating, buildings, agro-food, and mobility (Köhler et al., 2019). A central aim of the field is to conceptualise and explain how transitions can occur in ways that continue to fulfil societal functions whilst addressing global challenges. The research field—referred to in this thesis as STR—examines how transitions are shaped by complex interconnections and interdependencies across social, political, institutional, technological, and cultural domains, using the term *socio-technical* to capture these interactions (Geels, 2004, 2002). STR scholars analyse transitions, such as shifts in the electricity system where the integration of renewable energy technologies—wind power and solar photovoltaics—is helping to reduce greenhouse gas emissions and displace fossil fuel-based generation in national contexts such as the United Kingdom (McMeekin et al., 2019), Canada (Rosenbloom et al., 2016), and Sweden (Palm, 2015). Similar transitions are explored in mobility systems, for instance in the substitution of fossil fuels through the adoption of electric vehicles for passenger transport (Sovacool and Axsen, 2018), or the move towards low- and zero-carbon fuels in maritime shipping (Bach et al., 2020) and aviation (Urban et al., 2024).

Whilst studies within STR have contributed valuable insights into the dynamics of systemic change, they often offer limited critical engagement of what *sustainability* itself entails within these transitions. As Feola (2020) notes, it is frequently assumed that a more energy-efficient technology is inherently 'more sustainable' than conventional alternatives. Yet a deeper engagement with the concept reveals that in systems oriented towards endless capital accumulation and economic growth, rebound effects often undermine efficiency gains—where improvements in efficiency paradoxically lead to increased overall consumption (Sorrell et al., 2020). Similarly, Lai and Karakaya (2024) draw attention to the phenomenon of burden-shifting, whereby efforts to address one problem (such

as reducing emissions in a specific region or timeframe) can unintentionally create new forms of environmental degradation or social harm elsewhere. Thus, by equating sustainability with metrics such as emissions reductions or efficiency gains, STR risks reinforcing dominant power dynamics and decision-making logics—particularly those rooted in techno-economic framings—whilst marginalising alternative understandings of sustainability (Stirling, 2015, 2008).

Recognising these limitations, I propose adopting a *performative* understanding of sustainability in the study of sustainability transitions. Rather than treating sustainability as a pre-given endpoint defined by fixed goals and metrics, a performative understanding recognises the concept as continuously contested and co-constructed, shaped through the evolving material and discursive practices across time (Callon, 2007; Latour, 1986). This understanding breaks with *ostensive* definitions—such as those institutionalised by the WCED and the 2030 Agenda—which frame sustainability as a fixed set of objectives, often abstracted from the dynamic and contested realities of social, economic, and political change (DuPuis and Ball, 2013; Hallin et al., 2021).

Emerging from linguistic theory (Austin, 1962), the notion of performativity highlights how realities are not simply described but *brought into being* through practice. Performative speech acts—utterances that enact rather than represent an action—serve as a useful parallel: sustainability, too, does not pre-exist its enactment but is constituted through situated practices of doing, negotiating, and contesting (Corvellec, 2016; Latour, 1986). From this perspective, definitions of sustainability are not neutral descriptions of a shared goal but active interventions that shape ongoing transition efforts, legitimising some pathways whilst silencing others. A performative understanding therefore demands critical attention to *how* sustainability is enacted, *by whom*, and *with what consequences*, rather than treating it as a stable destination to be reached at some point in the future.

Building on this perspective, **this thesis examines how competing understandings of sustainability are enacted and contested through transition efforts in Swedish aviation**. Aviation—the flying and operation of aircraft—offers a compelling case for this inquiry, as it reveals how sustainability is negotiated across diverse actors, interests, and scales. As one of the most carbon-intensive modes of mobility (Åkerman et al., 2021), aviation

sits at the intersection of global connectivity and climate responsibility[2]. It is frequently described as both 'critical' and 'hard to abate,' given the limited availability of scalable low-carbon alternatives to fossil-based jet fuels, the need for international regulatory coordination, and entrenched infrastructural and institutional dependencies (Sharmina et al., 2021; Urban et al., 2024). These characteristics make aviation not just a symbol in debates about sustainability, but a real-world setting where sustainability is actively enacted and contested in practice.

Sweden offers a particularly revealing and paradoxical setting for this thesis. Lauded for its strong environmental credentials, ambitious climate targets, and commitment to sustainable development (Hult, 2017; Jansson et al., 2020), the country also ranks amongst the highest globally in per capita aviation emissions—largely due to the prevalence of international air travel amongst its population (Kamb and Larsson, 2019). The tension is socially and politically salient, influencing both public discourse and policy debates. Sweden is not only the birthplace of the *flygskam* ('flight shame') (Becken et al., 2021), but also home to a social movement calling for a reduction in air travel as a response to the climate crisis (Ullström, 2024). At the same time, its aviation industry—like many around the world—is actively exploring technological innovation, including biofuels and electric aircraft, positioning itself as a pioneer of sustainable aviation (Urban et al., 2024). These contrasting dynamics make Sweden a rich site for analysing how competing understandings of sustainability are enacted and contested.

1.2 Overview and contributions

This thesis consists of four papers, across which I examine the transition efforts of two actor groups involved with aviation in Sweden: the aviation industry, which advocates for continued growth through technological innovation, and the flight-free movement, which promotes a reduction in air travel as a form of climate action. **Paper I** is based on a literature review, whilst **Papers II**, **III**,

[2] In this thesis, *aviation* refers primarily to civil aviation, which encompasses both commercial and general aviation. The focus is on commercial aviation, defined as the scheduled and non-scheduled transport of passengers, cargo, or mail for remuneration or hire. However, there is some overlap with general aviation, which includes all other non-military flying, such as business travel, recreational flying, air ambulance services, aerial firefighting, and law enforcement operations. Military aviation is excluded from the scope of this thesis.

and **IV** present three empirical studies, each examining a distinct dimension of sustainability transitions in Swedish aviation. These studies draw on a diverse range of qualitative materials—including interviews, workshops, digital observations, media coverage, and documentary sources—to examine how transitions are enacted and contested in practice.

Paper I provides a foundational overview of existing mitigation measures and policy developments for aviation in Sweden, establishing the empirical context for the analyses that follow. **Paper II** explores how sustainability transitions are being enacted within the aviation industry, with a focus on the narratives constructed and circulated by industry actors. **Paper III** examines the transition efforts of Heart Aerospace, a Swedish aerospace start-up widely recognised as a leading innovator in the development of sustainable aviation. **Paper IV** extends the scope of the analysis by examining how the sustainability of aviation is contested in public discourse, highlighting the competing visions for the future of aviation in Sweden between industry actors and the flight-free movement.

In this cover essay, I introduce, synthesise, and critically reflect on the findings presented across four papers to examine how competing understandings of sustainability shape the enactment and contestation of transition efforts in Swedish aviation. On the one hand, actors within the aviation industry frame sustainability as a future-oriented achievement, to be realised primarily through technological innovation. On the other, the flight-free movement understands sustainability as a present-day practice, enacted through the deliberate avoidance of air travel. These divergent understandings reveal sustainability not as a neutral or universally agreed-upon objective, but as a contested and political concept that actively shapes the direction, justification, and form of transition efforts. Together, these two actor groups reproduce distinct discourse-coalitions—*Green flying* and *Staying on the ground*—each advancing competing narratives that reflect fundamentally different understandings of sustainability.

Through this analysis, the thesis provides an empirically rich account of how these discourse-coalitions mobilise divergent narratives and practices to define what sustainability entails and how it should be pursued. It challenges dominant approaches in sustainability transitions research that often treat sustainability as a fixed, measurable endpoint, offering instead a performative reconceptualisation: sustainability as a dynamic, situated, and contested process, co-produced through ongoing discursive and material practices. This

perspective foregrounds the complexity and uncertainty inherent in transitions and calls for more reflexive, pluralistic, and open-ended approaches to governance that hold space for disagreement, foster experimentation, and enable the emergence of diverse trajectories of change.

In the next chapter, **Chapter 2**, I outline the conceptual foundations of this thesis, focusing on the research field of sustainability transitions and the concept of performativity. In **Chapter 3**, I detail the methodological approach taken, which details the literature review and three empirical studies, and further motivate the selection of aviation in Sweden as the empirical context for the thesis. In **Chapter 4**, I present the main empirical findings, which I discuss in **Chapter 5**, outlining the thesis's empirical, conceptual, and methodological contributions together with suggested directions for further research.

2 Conceptual foundations

In this chapter, I develop the conceptual foundations that underpin this thesis, focusing on the research field of sustainability transitions and the concept of performativity. I begin by tracing the origins and central aims of sustainability transitions research (STR), providing an entry point for readers less familiar with the field. Whilst STR has contributed valuable insights into systemic change, I highlight how it often treats sustainability as a fixed goal or pre-existing endpoint. In response, I introduce the concept of performativity to critically reframe how sustainability is understood. Rather than viewing sustainability as a stable endpoint, I propose that STR understand the concept performatively—as something continuously enacted through the situated practices of actors.

2.1 Introducing sustainability transitions: field and focus

The research field known today as *sustainability transitions research* (STR) emerged across the 1990s as a way to understand and respond to large-scale societal change (Kemp, 1994; Raskin, 2002). As Loorbach et al. (2017, p. 603) reflect,

> "[t]he field of transitions research was fueled by the realisation that new research approaches are required to investigate the dynamics of complex societal problems and to guide the development of system solutions to address them."

Initial research in the field focussed on analysing societal systems that deliver essential functions and services—such as electricity, heating, buildings, mobility, and agro-food. Over time, this focus has expanded to address more

complex systemic challenges, including resource depletion, biodiversity loss, and climate change—problems increasingly recognised as consequences of unsustainable patterns of production and consumption (Köhler et al., 2019; Markard et al., 2012).

Within STR, societal sectors are conceptualised as *socio-technical systems* to encapsulate the interplay and interactions of actors and their networks, technologies and their material artefacts, and institutions (Markard et al., 2012; Miörner et al., 2021). The term 'socio-technical' is used to denote the interconnectedness of technology and social change, extending beyond techno-economic or biophysical assessments to "encompass the broader political, institutional, cultural, and behavioural dynamics" (Rosenbloom, 2017, p. 43). Actors include users, firms, organisations, and agencies involved in the day-to-day operation as well as longer-term development of systems and their selection environments. Institutions are the regulative, normative and cultural-cognitive structures (Scott, 1995) that guide the activities of actors and lay out the 'rules of the game' in a system (Fuenfschilling and Truffer, 2014; Miörner et al., 2021). Studies in sustainability transitions often depart from an innovation, contrasting the novelty of a new technologies or practice with existing structures that constrain or promote emergence (Köhler et al., 2019; Smith et al., 2010). These innovations—as technologies and material artefacts—are the physical products that, through the goods and services they offer, "embody dominant knowledge, values and beliefs" (Miörner et al., 2021, p. 4).

Early scholarship examined historical transitions in several socio-technical systems, such as mobility (Geels, 2006a, 2002), water (Geels, 2006b, 2005), and energy (Geels and Raven, 2006; Raven and Verbong, 2010; Verbong and Geels, 2010). From then on, STR has expanded into many different areas such as geography (Coenen et al., 2012), socio-economic trends (van den Bergh, 2013), power and politics (Avelino and Wittmayer, 2016), and civil society and grass roots initiatives (Seyfang and Haxeltine, 2012). Thus, as a field,

> "[STR] is broader and more interdisciplinary than many other sustainability approaches, which tend to focus on single dimensions or particular social groups, have a relatively short-term orientation, fail to acknowledge the systemic dimension, or are overly managerial or technocratic" (Köhler et al., 2019, p. 3)

STR seeks to understand that dynamics of transitions as change in societal sub-systems and requires collaboration amongst diverse actors (Hölscher et al., 2018). Transitions are characterised by their multi-dimensional, co-

evolutionary nature, requiring collaboration amongst multiple actors, whilst often being steeped in conflict, struggle, and uncertainty regarding long-term outcomes; thus, STR seeks "to conceptualize and explain how radical changes can occur in the way societal functions are fulfilled" (Köhler et al., 2019, p. 2).

2.2 Performativity and the problem of defining sustainability

At its core, performativity refers to the idea that language and action do not merely describe reality but actively contribute to its formation. The concept stems from linguistics theory, first introduced by J. L. Austin in his seminal work *How to Do Things with Words*. In it, Austin (1962) introduces the idea that some utterances—as spoken statements, words, or sounds—do not merely describe reality but perform an action when spoken in the right context. These utterances are *performative* speech acts. Austin (1962) demonstrates that certain speech acts, such as making a promise, issuing a command, or declaring a marriage, do not merely report an event but instead constitute the event itself[3]. As Austin (1962, p. 12, emphasis in original) writes,

> "to *say* something is to *do* something; or in which *by* saying something or *in* saying something we are doing something"

The concept of performativity has been extended into various disciplines, including gender studies (Butler, 1990), cultural geography (Nash, 2000), economic theory (Callon, 2007, 1998; MacKenzie and Millo, 2003), and management and organisation studies (Diedrich et al., 2013; Gond et al., 2016). In each case, performativity is used to challenge the notion that categories, identities, or truths exist independently of the practices that constitute them, emphasising instead that our notions of the world is in a continual state of 'becoming' (Garud and Gehman, 2019). For instance, in gender studies, Butler (1990) argues that gender is not a fixed identity but is constituted through repeated performances—acts that materialise and maintain the very categories they appear to express. Similarly, in economic sociology, Callon (1998) argues that markets are not pre-existing structures but are continually produced through calculative devices, models, and performances.

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[3] One example of a performative speech act is the act of resignation. When someone says, "I resign," they are not just stating a fact about their intention to resign; they are actually carrying out the act of resignation through the act of speaking.

In this thesis, I draw on Bruno Latour's extension of performativity, which examines how society can be understood. Latour (1987, 1986) highlights the continual construction of the social through practice, contrasting an ostensive definition—where society is treated as a stable entity grounded in abstract principles—with a performative one, in which society is enacted through situated actions. As Strum and Latour (1987, p. 784, emphasis in original) describe,

> "*in principle*, possible to discover the typical properties of what holds society together, properties which could explain the social and link its evolution, although *in practice*, it may be difficult to detect them"

Based on an ostensive definition, society is understood as adhering to predetermined rules and structures. It may be theoretically possible to identify the features that hold society together; however, *in practice* such properties are often obscured or unstable due to the complexities of social life. By contrast, a performative perspective holds that society does not pre-exist itself but is continuously enacted through the everyday actions of actors who, by defining and coordinating their roles, actively produce what society is—both for themselves and in relation to others (Diedrich et al., 2013; Strum and Latour, 1987).

This distinction between ostensive and performative definitions is particularly relevant for sustainability and the pursuit of sustainability transitions. As I introduced in Chapter 1, sustainability is a widely used concept but lacks a universally agreed-upon definition. As Washington (2015) observes, its original connotations—rooted in notions of care, balance, and harmony—have given way to a wide range of interpretations. These include distinctions from 'weak' and 'strong' sustainability (Hediger, 1999), pro- to anti-growth perspectives (Jackson, 2011), pragmatic to idealistic approaches (Wagenaar and Prainsack, 2021), as well as conceptions of sustainability as either a continuous journey or a fixed destination (Garud and Gehman, 2012).

Several scholars have argued that the proliferation—and often polarisation—of sustainability stems not from any particular definition, but from the definitional approach itself (Corvellec, 2016; Ramsey, 2015). Although the concept may appear to offer clear guiding principles, its core terms are often ambiguous and open to multiple, even conflicting, interpretations. A prominent example is the widely cited definition offered by the World Commission on Environment and Development (1987, p. 8),

> "meet[ing] the needs of the present without compromising the ability of future generations to meet their own needs"

What counts as a 'need' can range from basic physiological requirements (e.g. food, water, shelter) to broader aspirations tied to quality of life, such as access to education, mobility, or participation in economic development. As a result, different actors—governments, corporations, and communities—can invoke the same definition to justify vastly different, even contradictory, agendas (Ramsey, 2015). This ambiguity reflects a broader tendency to define sustainability *ostensively*—that is, by pointing to presumed examples of sustainability, whose meaning varies depending on the context in which they are invoked. As Wittgenstein (1958, p. 28 emphasis in original) noted, ostensive definitions "can be variously interpreted in *every* case". This raises important questions about *how* sustainability is enacted, *by whom*, and *with what consequences*.

Today, the 17 Sustainable Development Goals (SDGs) outlined in the United Nations' 2030 Agenda represent one of the most visible and globally endorsed frameworks for achieving sustainability. Framed as a comprehensive roadmap to achieve sustainability "for people, planet and prosperity," the SDGs rest on a set of clearly defined targets and indicators intended to measure progress toward a sustainable future (United Nations, 2015a). Yet, whilst the SDGs are often presented as complementary and mutually reinforcing, they can conflict in practice (Susur and Karakaya, 2021). For instance, policies that promote economic growth (SDG 8) often rely on increased industrial activity and resource use, which may undermine progress on climate action (SDG 13) or biodiversity protection (SDG 15) (Fuso Nerini et al., 2019). Likewise, instruments designed to address climate change—such as carbon pricing or the removal of fossil fuel subsidies—can inadvertently exacerbate gender and social inequalities (SDG 5), particularly in contexts marked by structural disadvantage (Christley et al., 2021). As Susur and Karakaya (2021) argue, the interdependencies and trade-offs between goals are often underemphasised, exposing deeper tensions in how sustainability is conceptualised and enacted. By framing sustainability in terms of predefined, measurable endpoints, the SDGs reflect an *ostensive* definition of sustainability—one that points to fixed goals and indicators as if sustainability were a stable and universally agreed-upon object. This risks obscuring the situated, contested, and evolving ways in which sustainability is *enacted* in practice.

2.3 Rethinking sustainability: ostensive and performative perspectives

As its name implies, sustainability lies at the heart of sustainability transitions research (STR), yet its precise meaning remains contested and often undefined within the field (Susur and Karakaya, 2021). STR commonly conceptualises sustainability as the *outcome* of a successful transition, typically measured through the diffusion and uptake of specific technologies—such as wind turbines, solar photovoltaics, or electric vehicles—within existing socio-technical systems (Feola, 2020; Lai and Karakaya, 2024). For instance, progress in passenger mobility is frequently assessed using metrics like the market share of electric vehicles (Sovacool and Axsen, 2018), whilst transitions in electricity systems are often evaluated based on the installed capacity of renewable energy technologies (Palm, 2015). Similarly, in so-called 'hard-to-abate' sectors like aviation and maritime shipping (Sharmina et al., 2021), indicators such as biofuel adoption or electric propulsion uptake serve as proxies for transition progress (Urban et al., 2024). These approaches reflect an *ostensive* understanding of sustainability—treating it as a fixed and measurable endpoint, often quantified through technological benchmarks or emissions reduction targets.

However, relying on an ostensive understanding of sustainability risks oversimplifying the concept and obscuring the ongoing processes through which its meaning is constructed, contested, and negotiated (Hallin et al., 2021). Such an approach tends to mask the inherently political nature of sustainability—concealing the fact that it always involves competing visions of *what should be sustained*, *for whom*, and *by what means* (Davidson, 2010; Meadowcroft, 2009). This, in turn, can inadvertently reinforce dominant interpretations—particularly those grounded in techno-economic metrics—whilst marginalising alternative perspectives and silencing voices that offer more critical, situated, or pluralistic understandings (Stirling, 2015). These concerns are especially salient given the increasing uptake of STR concepts in policymaking, where frameworks such as transformative innovation policy, are beginning to influence national innovation agendas and institutional strategies (Haddad et al., 2024).

In contrast, a *performative* understanding recognises that sustainability is neither a static nor universally agreed-upon endpoint, but is actively constructed—and continually contested—through the situated practices of diverse actors. Sustainability is not something that simply *is*, it is something that is continually *done*—not defined in theory or prescribed politically, but shaped

"as individual and organizational practices are actually forming it on an everyday basis" (Corvellec, 2016, p. 397).

Building on this view, I focus particularly on the narratives through which the meaning of sustainability is constructed and enacted. These narratives do not merely describe sustainability—they *perform* it. To adopt a such a perspective implies an ontological position in which the world is in constant becoming (Garud and Gehman, 2019), where reality is constituted through evolving relationships, situated practices, and ongoing interpretations (Diedrich et al., 2013). Studying sustainability transitions from this perspective means attending to the discursive and material practices through which sustainability is defined, contested, and stabilised in specific contexts. Narratives are central in this process. They act as coordinating mechanisms, aligning the understandings and actions of diverse actors (Garud and Gehman, 2012). They provide the scaffolding through which actors interpret their roles, make sense of complex issues, and link past experiences to present practices and future aspirations (Emirbayer and Mische, 1998; Hajer and Versteeg, 2005). Narratives also serve to translate meanings, simplify discourse, and render abstract or contested concepts more tangible (Bartel and Garud, 2009; Simoens et al., 2022). Narratives further enable coordination across time by evoking a lived sense of temporality[4], interlinking the past, present, and future in ways that support collective meaning-making (Emirbayer and Mische, 1998; Ricoeur, 1984). As Bartel and Garud (2009, p. 113) write, narratives "serve as a repertoire from which people [actors] can generate approaches that enable real-time problem solving." In this sense, narratives are not passive reflections of pre-existing realities but are themselves generative of the social and material arrangements through which reality is continuously constituted (Garud et al., 2010; Garud and Gehman, 2012).

Narratives are thus both a medium through which actors engage in sustainability transitions and an analytical lens for examining how sustainability is defined, enacted, and contested. By legitimising certain actions, building

[4] Here, time is not understood as a sequential series of moments, but as duration—a continuous flow of lived experience. The notion of *durée,* developed by Henri Bergson (1934), challenges linear, spatialised understandings of time, where time is reduced to measurable units like seconds, minutes, or years. Although 'clock time' provides a useful simplification for coordinating social activities, Bergson (1934) argues that it fails to capture the phenomenological experience of time, in which the present is not a fleeting instant but a thickened moment, imbued with memories of the past and oriented towards the future (Allen, 2023; Sinclair, 2020).

coalitions, and shaping understandings of what counts as sustainable, narratives reveal the inherently contested and political nature of sustainability (Meadowcroft, 2009; Robinson, 2004). Sustainability transitions, then, are not linear or pre-determined shifts from one socio-technical system to another, but unfolding and contingent processes—continually negotiated through situated interpretations of sustainability within specific social, cultural, and political contexts. This reinforces a performative understanding of sustainability, offering a critical alternative to more ostensive, outcome-oriented approaches. This contrasts with dominant framings in STR that treat narratives either as an instrumental starting point,"not in themselves an outcome of a transition process but rather a beginning" (Bauer, 2018, p. 98), or as strategic tools, used to align expectations, justify interventions, and steer transitions toward predefined goals (Geels et al., 2016; Rosenbloom et al., 2016). From a performative perspective, narratives are more than just a tool or a beginning, they influence how sustainability transitions are imagined, negotiated, and enacted, constituting paths *in-the-making* (Garud et al., 2010).

3 Methodology

This chapter presents the methodological approach underpinning this thesis. The research process has been a journey of exploration and discovery—shaped by a growing awareness of the complexity and ambiguity inherent in efforts to address societal challenges. I have come to understand that few problems have straightforward solutions, and even fewer come without trade-offs or unintended consequences. The direction of this thesis has been shaped by a series of choices, circumstances, and shifts in perspective—all of which merit reflection here. As such, I begin the chapter with an account of the research design, which introduces the empirical context, explains the methodological choices made, and outlines how the four papers are connected. I then move on to describe the data collection and analysis processes that underpin the four papers that collectively make up this thesis.

3.1 Research design: process, context and papers

Sustainability transitions are widely considered necessary—if not inevitable—across most sectors, in light of structural challenges such as global temperature rise, sea level rise, and biodiversity loss. Aviation is no exception; it is estimated to contribute approximately five percent of global anthropogenic climate change (Grewe et al., 2021; Lee et al., 2021). Although aviation operates on a global scale under international legislation, national rules and regulations differ across countries and the implementation of change is, to a certain extent, geographically bound. Sweden presents a particularly compelling context for this study. The country is often held up as a leader in social and environmental sustainability (Hult, 2017; Jansson et al., 2020), but it also has amongst the

highest per capita emissions from aviation—around five times the global average (Kamb and Larsson, 2019).

Throughout this research journey, I have been struck by the conviction with which different actors express their ideas—each confident that their approach is the right one, that sustainability is achievable if only we follow their course of action. These encounters have prompted me to reflect on the concept of 'sustainability' itself: what it means, how it is mobilised, and what is at stake in its competing interpretations. This led to the overarching aim of the thesis *to examine how competing understandings of sustainability are enacted and contested through transitions efforts in Swedish aviation.*

The four papers that make up this thesis—one literature review and three empirical studies—explore different dimensions of sustainability transitions in the context of Swedish aviation, each employing distinct empirical materials and methodological approaches. Whilst each paper is self-contained, they collectively contribute to a more layered and nuanced understanding of how sustainability transitions are enacted and contested.

The first of these, **Paper I**, served as a starting point in the research process and was written in collaboration with colleagues as part of an interdisciplinary research project on alternative aircraft fuels and technologies. It is based on a semi-systematic literature review that identifies existing mitigation measures aimed at reducing the climate impact of aviation, whilst also highlighting the challenges and opportunities associated with them, and pointing to areas for further research. Although aviation is not formally included in Sweden's national climate targets, the industry participates in the government's *Fossil Free Sweden* initiative, launched in 2015 to support national ambitions for carbon neutrality by 2045 (Ministry of Environment and Energy, 2016). Under this initiative, each sector was asked to submit its own roadmap outlining how it plans to become fossil-free by 2045. Represented by *Svenskt Flyg*[5] ('Swedish Air Transport Society'), the aviation industry committed to making all domestic flights fossil-free by 2030 and all flights departing from Swedish airports fossil-free by 2045, largely through the adoption of biofuels and electric aviation (Svenskt Flyg, 2018). This roadmap and the surrounding activities sparked my

[5] *Svenskt Flyg* is a membership organisation representing actors in the Swedish aviation industry, including airports, airlines, aircraft and component manufacturers, and air navigation service providers. Its mission is to promote better regulation, policy, innovation and sustainable growth for the benefit of Swedish society.

interest in understanding the transition efforts of industry actors and led directly to **Paper II**, which examines contemporary sustainability transitions in Swedish aviation industry.

Whilst working on Paper I and II, I became aware of the Swedish start-up Heart Aerospace, often described as a leading innovator in electric aviation. I began following the company more closely—attending events and monitoring public discourse. Founded in 2018 and headquartered at Säve Airport in Gothenburg, Heart Aerospace initially aimed to deliver the 'ES-19', a 19-seat all-electric regional aircraft, by 2025. In July 2022, I reached out to the company for an interview and was subsequently invited to attend their Hangar Day event that September. At the event, I witnessed the announcement of a significant design shift: the company would now pursue the 'ES-30', a 30-seat hybrid-electric aircraft, with a revised commercial launch target of 2028 (Heart Aerospace, 2022). What stood out was the enthusiastic stakeholder response—marked by whoops and applause—despite the increased technical complexity and delayed timeline. This prompted me to reflect on how and why the company and its innovation was perceived as legitimate despite lacking a market-ready product.

I was particularly struck by how Heart Aerospace mobilised material artefacts—prototypes, digital renderings, and demonstrations—to support the design shift and bolster the evolving narratives used to explain and justify it. I decided to explore this further in **Paper III**, which examines how legitimacy is enacted through the entanglement of discursive and material elements that I conceptualise as sociomaterial legitimation. The paper adopts a longitudinal process study approach, tracing the company's evolution from its pre-launch phase in 2018 through to its most recent strategic developments in the spring of 2025.

At the same time, it became clear that transition efforts in Swedish aviation are not only a story of technological innovation and industrial ambition, but also one of growing contestation. Sweden is the birthplace of *flygskam* ('flight shame'), a social movement that gained momentum in 2016 in response to increasing public concern over the climate impact of flying (Becken et al., 2021; Wormbs and Söderberg, 2021). Around the same time, a grassroots *flight-free movement* began to take shape, crystallising in the campaign *Vi håller oss på jorden* ('We stay on the ground'), where individuals pledged to avoid flying for climate reasons (Ullström et al., 2023). Amongst the high-profile figures who publicly embraced this commitment was opera singer and mother of Greta

Thunberg, Malena Ernman, who wrote in *Expressen* that "it is up to us [...] to secure the future for everyone"(Ernamn, 2016).

This flight-free movement was the empirical focus of Sara Ullström's PhD thesis[6]. After reading one of her publications on travel discourses in Sweden (Ullström et al., 2023), I recognised a shared research interest and reached out to her in late 2021. We began meeting regularly for informal discussions and gradually realised that discourses about aviation are, at their core, also discourses about the future. Whilst different actor groups envision different futures, each claims theirs is the sustainable one. These insights sparked new questions: What kinds of futures are being imagined? What arguments support these competing futures? And what do they reveal about the present? These shared questions formed the basis for a collaborative comparative study, which became **Paper IV**.

Table 1 summarises the research aim, empirical material, methodological approach, and analytical focus of each paper. In the remainder of this chapter, I elaborate on the methodology underpinning each contribution, beginning with the literature review (Paper I) and then turning to the qualitative empirical studies presented in Papers II, III, and IV.

[6] Sara defended her PhD on 29th November 2024. Our co-authored paper appears as the third paper in her PhD thesis, *Toward low-carbon ways of life: The cultural politics of contesting aeromobility*.

Table 1. Overview of the four paper in this thesis

Paper	Title	Research aim	Empirical material	Methodological approach	Main focus
I	Analysing the opportunities and challenges for mitigating the climate impact of aviation: A narrative review	To analyse the challenges and opportunities for reducing the climate impact of aviation through mitigation measures	Academic literature, government reports, industry publications	Semi-systematic literature review	Mapping mitigation strategies and framing future research directions
II	Analysing transitions in-the-making: a case study of aviation in Sweden	To analyse contemporary transitions in the aviation industry	Interviews (16), workshop (1), media articles (63), documentary material	Argumentative discourse analysis	Interpreting narratives constructed by industry actors that coordinate transitions
III	Performing legitimacy in electric aviation: The innovation journey of Heart Aerospace	To examine how legitimacy is enacted through the entanglement of discursive and material practices	Media articles (171), digital observations, documentary material	Longitudinal process study	Understanding the sociomaterial practices through which actors legitimate early-stage technologies
IV	Desired or contested futures? Competing discourse-coalitions for sustainable aviation in Sweden	To examine competing discourses around the future in the aviation in Sweden	Interviews (30), workshop (1), media articles (18 + 11), documentary material	Argumentative discourse analysis	Comparing conflicting representations of the future

3.2 Literature review

For the semi-systematic literature review that forms the basis of Paper I, my co-authors and I gathered literature from academic sources—such as peer-reviewed journal articles and conference proceedings—by conducting keyword searches in Web of Science, Scopus, and Google Scholar. We used various combinations of terms related to aviation, emissions, and climate. Whilst the review was primarily focused on the Swedish context, we also conducted targeted searches for relevant grey literature from organisations including the International Civil Aviation Organization, the European Commission, the Swedish government, and commercial actors within the Swedish aviation industry.

Although semi-systematic reviews do not offer the same degree of replicability as systematic literature reviews (Sovacool et al., 2018), this approach enabled us to draw from a diverse set of perspectives and disciplines. We intentionally included sources from the social sciences and humanities alongside natural science and engineering to develop a more comprehensive understanding of mitigation measures—encompassing both technological innovation and the social conditions under which they are implemented (Köhler et al., 2019).

We assessed the relevance of the literature by screening abstracts and introductions, and sought to limit bias by maintaining a reflexive stance within our co-authorship team. We regularly discussed the selection in relation to our research aim and iteratively refined our searches to address potential knowledge gaps. The final selection of literature was shaped through collaborative dialogue, drawing on our multidisciplinary expertise to evaluate the relevance of mitigation strategies for Swedish aviation, along with the challenges and opportunities they present. In line with calls for greater transparency in semi-systematic reviews (Sovacool et al., 2018), we clearly outlined our review process both in text and visually (see Figure 1, Paper I).

The selected material was organised into three thematic areas, adapted from Åkerman et al. (2016), each corresponding to a distinct strategy for reducing aviation's climate impact: reducing travel volume, decreasing energy intensity, and lowering emissions intensity. These themes primarily focus on emissions arising from aircraft operations and the combustion of fossil-based jet fuels, which continue to represent the dominant source of greenhouse gas emissions in aviation (ICAO, 2022).

3.3 Empirical studies

The empirical work presented in this thesis builds on three qualitative studies, forming the basis of Papers II, III, and IV. Each study examines a distinct dimension of sustainability transitions in Swedish aviation, drawing on a range of qualitative materials—including interviews, workshops, digital observations, media coverage, and documentary sources—to capture how transition efforts are enacted and contested in practice. Data was collected at different stages of the research process and for specific analytical purposes. I was directly involved in the data collection for all four papers, with the exception of 11 media articles and 14 interviews with actors from the flight-free movement used in Paper IV, which were collected by my co-author, Sara Ullström[7]. Table 2 provides an overview of the key data sources used in the thesis, indicating who collected the material, the time period of collection, and the papers in which each source was applied. Whilst some sources—such as interviews and media articles—appear across multiple papers, they are re-analysed through distinct analytical lenses tailored to the specific research aim of each paper. In the sections that follow, I provide a detailed account of the data collection process, followed by an explanation of the analysis employed in each of the three empirical papers.

[7] See Ullström (2024) for a detailed account of this data collection.

Table 2. Overview of data sources and their use across the papers

Data source	Collected by	Time period	Used in Paper(s)
16 semi-structured interviews with 19 actors from the aviation industry (including one group interview) focused on interviewees' anticipations for the future of aviation, low-carbon innovations and their challenges and opportunities	Emily Christley	March–June 2021	II, IV
Online workshop with 16 participants on visions for aviation in the next 25 years and steps necessary to achieve them through group discussions	Emily Christley together with colleagues	September 2021	II, IV
63 media articles from six Swedish newspapers retrieved from media archive database Retriever with search string ("aviation" AND "Sweden" AND ("technology" OR "energy"))	Emily Christley	2005–2023	II, IV
147 media articles from Swedish regional and national newspapers retrieved from media archive database Retriever with search string (("electric aircraft" OR "electric aeroplane")) AND "Sweden")	Emily Christley	2018–2024	III
24 media articles from Swedish regional and national newspapers retrieved from media archive database Retriever with search string ("Heart Aerospace")	Emily Christley	January–May 2025	III
Digital observations of company presentations at Heart Aerospace Hangar Days from 2020, 2022, 2024 (available on YouTube)	Emily Christley	2020, 2022, 2024	III
Interviews with 14 actors from the flight-free movement on reducing flying	Sara Ullström	June–September 2022	IV
11 media articles collected from four Swedish newspapers	Sara Ullström	2016–2022	IV
Documentary materials including governing documents, reports, press releases, mission statements from the Swedish aviation industry the flight-free movement	Emily Christley, Sara Ullström	2015–2024	II, III, IV

Interviews

Interviews were conducted to gain in-depth insights into how key actors within and around the Swedish aviation industry understand, interpret, and engage with sustainability transitions. Between March and May 2021, I conducted 16 interviews with 19 actors working within the aviation industry, summarised in Table 3. Many of these interviewees contributed to the roadmap, which set the target for the industry to be fossil-free by 2045 and the semi-structured interviews sought to explore the current state of the aviation industry, the impact of the COVID-19 pandemic, and future expectations for transitions, particularly the development of electric aviation, advanced biofuels, and hydrogen-based fuels. The interviews, which ranged from 25 to 80 minutes in length, were semi-structured and recorded with the informed consent of the participants. I transcribed each interview verbatim for subsequent data analysis in Paper II and Paper IV.

Table 3. Overview of interviews

No.	Role of interviewee	Date and duration
1	Sustainability manager in aviation fuels	March 2021, 58 minutes
2	Airport sustainability manager	March 2021, 50 minutes
3	Airport sustainability manager	March 2021, 25 minutes
4	Aviation consultant	April 2021, 75 minutes
5	Airport sustainability manager	April 2021, 42 minutes
6	Project leaders in research for regional aviation	April 2021, 45 minutes
7	Project leader in research for regional aviation	April 2021, 31 minutes
8	Airline sustainability manager	April 2021, 49 minutes
9	Aviation consultant	April 2021, 42 minutes
10	Municipal airport manager	April 2021, 67 minutes
11	Project leader in research for regional aviation	May 2021, 78 minutes
12	Aviation network leader	May 2021, 43 minutes
13	Aviation network leader	May 2021, 26 minutes
14	Sustainability manager in aviation fuels	May 2021, 31 minutes
15	Aviation network leader	May 2021, 29 minutes
16	Airline sustainability manager	May 2021, 75 minutes

Workshop

In September 2021, I co-hosted an online workshop with colleagues as part of a broader interdisciplinary project focused on advancing alternative aircraft fuels and technologies. We invited stakeholders from across the Swedish aviation industry, resulting in participation from 16 actors—half of whom had also taken part in the interviews I conducted in spring 2021. The workshop provided an opportunity for an exploration of how visions for the future of aviation are articulated, negotiated, and contested in a collective setting. By bringing together a diverse group of stakeholders, the workshop facilitated the exchange of perspectives, the identification of shared themes and points of tension, and the co-construction of potential transition pathways within the industry.

To facilitate meaningful dialogue, participants were divided into three breakout groups, each led by a moderator responsible for introducing the tasks and guiding the discussions. A designated note-taker in each group documented key insights. The workshop was structured in two stages. In the first stage, participants were asked to reflect on their vision for the future of aviation over the next 25 years and share these ideas within their breakout group. The groups then reconvened in a plenary session, where the note-takers summarised the discussions. After a short break, participants returned to their groups to consider what would be required to realise their envisioned futures, before once again coming together to share their reflections in the plenary. Both the breakout and plenary sessions were recorded and later transcribed verbatim. These transcripts were included in the analysis for Paper II and Paper IV.

Media articles

As public-facing texts, media articles play a significant role in shaping and disseminating narratives about sustainability, innovation, and the future of aviation. Their inclusion enabled me to trace the discursive and material strategies used to legitimise particular visions of sustainable aviation, to observe shifts in public discourse over time, and to examine how emerging technologies and controversies are framed in relation to broader societal expectations (Konrad, 2006; Ruef and Markard, 2010). I completed three targeted searchers for media articles using the Swedish media archive database *Retriever*.

The first search focused on broader developments in aviation and sustainability. It was conducted across Sweden's highest-circulating newspapers: *Aftonbladet*, *Expressen*, *Dagens Nyheter*, *Svenska Dagbladet*, *Dagens Industri*, and *Göteborgs-Posten*. The search string—originally applied in Swedish—combined

terms ("aviation" AND "Sweden" AND ("technology" OR "energy")) and covered the period from 1st January 2005 to 1st March 2023. This initial search returned 849 articles, which were screened for relevance and reduced to a dataset of 63 articles. All 63 articles were included in the analysis for Paper II, whilst 18 were also used in the analysis for Paper IV[8].

The second search focused specifically on developments in electric aviation. Using *Retriever* once again, I searched both national and regional Swedish news outlets with the terms (("electric aircraft" OR "electrical aeroplane") AND "Sweden")[9], covering the period from 1st January 2018 to 31st December 2024. This search yielded 730 articles, which were screened based on relevance—primarily through reviewing headlines and leading paragraphs—and refined to a final dataset of 147 articles.

The third search followed the announcement of Heart Aerospace's relocation to the United States in April 2025. I conducted an additional search using the term ("Heart Aerospace") in both national and regional Swedish news outlets covering the period from 1st January to 5th May 2025. This returned 24 additional articles, which together with the articles from the second search captured how Heart Aerospace was represented, received, and reframed over time and formed the core of the data analysed in Paper III.

Digital observations

I included 131 minutes of recorded video content from Heart Aerospace's welcome presentations at their Hangar Day events in 2020, 2022, and 2024. The presentations function as carefully staged moments in which Heart Aerospace publicly constructs its narrative—showcasing key developments, material decisions, and its envisioned future to a diverse audience of stakeholders, industry partners, media representatives, and the general public. They offer valuable insight into how the company communicates technological progress, manages expectations, and builds legitimacy throughout its innovation journey. As such, they served as a complement to the media coverage analysed in Paper III, providing additional perspectives on how legitimacy is constructed and reinforced in the public domain.

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[8] We excluded 14 articles published before 2016 and 31 articles that covered specific topics or events rather than general views on the future of aviation.
[9] Original search in Swedish.

The presentations are publicly available on the company's YouTube channel. The 2022 and 2024 events are recorded in full, each lasting approximately one hour, whilst the 2020 presentation is available as an 11-minute highlights video. I watched each presentation multiple times, took detailed notes, and transcribed the spoken content verbatim. For the 2022 event, I also drew on field notes from my in-person attendance. These observations were integrated into the data analysis for Paper III.

Documentary material

To triangulate the data collected through interviews, workshops, and media articles, I collected and analysed a range of documentary material in Papers II, III, and IV. This included press releases, industry reports, and legislative and policy documents—some of which had been identified during the literature review in Paper I. Key sources included strategy documents from *Fossil-Free Sweden* and *Svenskt Flyg*, as well as policy texts from the Swedish government, the European Commission, and the International Civil Aviation Organization. This material provided insight into how institutions and organisations articulate their visions, strategies, and commitments toward sustainable aviation, enabling me to trace official narratives and policy framings, situate actor perspectives within broader institutional and regulatory contexts, and examine how transitions are structured and legitimised through written discourse and material performance. This supported a more robust and layered analysis across the empirical papers, helping to enrich my understanding of how sustainability is enacted and contested in practice.

3.3.1 Analysis of empirical material

Paper II—Analysing transitions in-the-making within Swedish aviation

To analyse contemporary sustainability transitions in the aviation industry, we employed argumentative discourse analysis, an approach developed by Maarten Hajer (2006, 1995) to examine how environmental issues are socially constructed. A central concept in this approach is the *storyline*, which Hajer (1995, p. 2) defines as "narratives through which elements from many different domains are combined that provide actors with a set of symbolic references that suggest a common understanding" (Hajer, 1995, p. 62). In other words, storylines—which we understood as a synonym of narratives—merge ideas from across society, offering actors a shared symbolic framework that simplifies complexity and facilitates mutual understanding, enabling actors to make sense of *who is saying what*, *to whom*, and *in what context* (Hajer, 2006).

The approach allowed us to understand how sustainability is understood within the Swedish aviation industry and how this informs ongoing transitions efforts. We began by reviewing secondary sources to develop a preliminary overview of how the climate impact of aviation has been framed, particularly by industry actors. This helped identify dominant problem framings and proposed solutions (Hajer, 2006; Hajer and Versteeg, 2005). Despite their differing roles, resources, and perspectives, these actors converged on a shared narrative for a sustainable future in Swedish aviation, one in which technological innovation—through developments such as alternative fuels and new propulsion technologies—is the key to mitigating aviation's climate impact.

We then turned to the primary data to examine how narratives are constructed and mobilised by actors to coordinate transition efforts in the present. Through this, we identified three prominent narratives focused on different technologies: advanced biofuels, electric aviation, and hydrogen-based propulsion. Although tensions exist both within and between these narratives, each constructs a future that is framed as both desirable and achievable. We interpreted the actors advancing these visions as forming a *discourse-coalition* (Hajer, 1995)—a group that continuously rearticulates shared narratives over time by integrating changing visions of the past, present, and future, underpinned by a common belief in technological innovation as the central solution to aviation's climate impact. These discursive dynamics are further explored in Paper IV.

Paper III—Examining how Heart Aerospace constructs and maintains legitimacy

To examine how legitimacy is enacted through the entanglement of discursive and material practices, I developed the concept of *sociomaterial legitimation*. This concept extends Vaara et al.'s (2024) synthesis of discursive legitimation to incorporate materiality[10], recognising the agency of artefacts in anchoring narratives in tangible forms and shaping what actors perceive as desirable and appropriate. It integrates (socio)materiality into the elements of strategies, positions, foundations, arenas, and temporalities, acknowledging that the physical form and properties of a technology can actively shape and sustain processes of legitimation (see Figure 2, Paper III).

To illustrate the concept, I draw on a longitudinal study of Heart Aerospace, tracing its development from 2018—a year before its public launch—through to its decision to relocate operations to the United States in April 2025. I began with a chronological review of media articles and company presentations to construct a case history (Pettigrew, 1997), examining how narratives evolved, turning points were framed, and material artefacts were mobilised to enact the company's vision of developing an electric aircraft. These accounts were triangulated with press releases, investor updates, policy documents, and industry commentaries. I then analysed the innovation journey using an abductive coding strategy, refining my ideas on discursive legitimation whilst integrating materiality insights from the data. I paid attention to episodes where material artefacts and discursive narratives became entangled—moments when prototypes, demonstrations, and technical specifications intersected with visionary accounts to enrol stakeholders, stabilise expectations, and navigate disruptions. I traced these episodes across four analytically defined phases in the company's innovation journey: *Taxiing* (2018–2020), *Take-off* (2020–2021), *Turbulence* (2022–2023), and *Re-routing* (2023–2025).

[10] Paper III marks my first attempt to engage with the concept of materiality and its relationship to performativity. In the paper, I draw on Leonardi's (2012, p. 31) definition of materiality as "the arrangement of an artefact's physical and/or digital materials into particular forms that endure across differences in place and time and are important to users." From this definition, I understand that whilst the material form of an artefact may remain stable, its meanings and uses are always shaped through social interpretation. What is considered social and what is considered material are *constitutively entangled*—they are not separate domains but mutually shaping through ongoing practice (Orlikowski, 2010). This entanglement also extends to narratives. Narratives do not merely interpret material artefacts; they are themselves produced, circulated, and stabilised through material forms—reports, diagrams, prototypes, media, and more (Doganova and Eyquem-Renault, 2009). As such, narratives are not purely discursive constructs, but sociomaterial practices that actively shape how sustainability transitions are imagined, enacted, and contested (Garud and Gehman, 2012).

Paper IV—Examining competing discourses on the future of aviation in Sweden

Paper IV examines competing discourses on the future of aviation in Sweden by focusing two actor groups—the aviation industry and the flight-free movement. Our analytical approach drew on argumentative discourse analysis, with a particular focus on the concept of *discourse-coalitions*, defined by Hajer (2005, p. 302, emphasis in original) as "a group of actors that, *in the context of an identifiable set of practices*, shares the usage of a particular set of storylines over a particular period of time." This approach allowed us to identify underlying tensions and discursive conflicts between two discourse-coalitions with divergent understandings of sustainability.

We began by identifying and coding storylines within each actor group independently, before conducting cross-case comparisons to uncover commonalities, divergences, and underlying discursive patterns. Although we did not begin with the assumption that distinct discourse-coalitions exist, the storylines revealed two clearly differentiated and competing narratives. These were later conceptualised as two discourse-coalitions: *Green flying*, representing industry actors who advocate for technological innovation as the pathway to sustainable aviation, and *Staying on the ground*, representing the flight-free movement, which promotes a reduction in air travel as essential to meeting climate goals.

After identifying the discourse-coalitions, we returned to the data to refine and deepen our interpretation of their storylines, ensuring they reflected the perspectives and rationales of each actor group. This iterative process resulted in four central storylines for each coalition: two expressing their visions for a desirable future, and two outlining strategies for how to achieve that future. To examine the tensions between these discourse-coalitions, we focused on areas of thematic overlap—topics addressed by both groups, yet interpreted in divergent ways. For instance, whilst both discourse-coalitions acknowledged the importance of technology, their views differed sharply on its potential to make aviation sustainable. This divergence illustrates a key site of conflict between the competing visions of the future.

4 Analysis

In this chapter, I expand on the findings of the four papers that make up this thesis. I begin by contextualising the climate impact of aviation, both globally and within the Swedish context, before examining the current and proposed measures aimed at mitigating these effects. This first section draws primarily on the findings of **Paper I**, whilst also incorporating more recent developments—recognising that transitions are continually unfolding in real-time. The chapter then turns to the narratives constructed by industry actors, drawing on the analysis presented in **Papers II** and **III**. These narratives, centred on technological innovation, function as coordinating mechanisms that guide and legitimise transition efforts. Together, they constitute a discourse-coalition labelled *Green flying*, which is examined in greater depth in **Paper IV**. In the final section of the chapter, this discourse-coalition is contrasted with a competing one, labelled the *Staying on the ground*, and is advanced by actors in the flight-free movement.

4.1 The climate impact of Swedish aviation

Since its rise as a mainstream mode of transport in the 1950s, aviation has become deeply embedded in modern life, with demand for air travel growing at an average annual rate of five percent since the 1990s (Kaiserfeld, 2015; Ullström et al., 2023). Advocates frequently point to its wide-ranging economic and social benefits, highlighting how the sector supports over 86 million jobs worldwide and contributes USD 4.1 trillion to the global economy by transporting billions of passengers and millions of tonnes of freight annually

(ATAG, 2024)[11]. As the UN special agency, International Civil Aviation Organization affirms:

> "Aviation provides the only rapid worldwide transportation network, generating economic growth, creating jobs, and facilitating international trade and tourism" (ICAO, 2025)

However, these benefits come with significant environmental costs. Aircraft operations contribute directly to climate change through the combustion of fossil-based jet fuel, which releases substantial amounts of greenhouse gases into the atmosphere. Currently, aviation accounts for around three percent of global carbon dioxide emissions—but this is only part of its climate impact. Aircraft also emit nitrogen oxides, sulphate aerosols, particulates, and water vapour, particularly at high altitudes, where these substances have an amplified radiative forcing effect. When such non-carbon dioxide effects are considered, aviation's overall contribution to anthropogenic climate change rises to approximately five percent (Grewe et al., 2021; Lee et al., 2021).

Looking ahead, this impact is expected to intensify with the growth in air travel projected to outpace emissions reduction despite anticipated technological advancements and efficiency gains. The International Civil Aviation Organization forecasts that global air travel demand will continue to grow by at least four percent annually over the next two decades (ICAO, 2023). Aircraft manufacturers predict the delivery of more than 40,000 new aircraft by 2040, effectively doubling the size of the global fleet (Airbus, 2018; Boeing Commercial Aviation, 2020). By 2050, carbon dioxide emissions from aviation could rise to 1.9 gigatonnes—nearly 2.6 times 2021 levels (Bergero et al., 2023).

Sweden, whilst a relatively small player in global aviation, is deeply entangled in these trends. Aviation accounts for approximately five percent of Sweden's national climate impact (Naturvårdsverket, 2025). Sweden's aviation system connects over 40 airports and facilitates the movement of millions of passengers within, into, and out of the country (see Figure 1, Paper II). This connectivity has enabled a high level of air mobility, particularly for international travel, which has more than tripled since 1990, reaching nearly 30 million passengers

[11] Figures according to ATAG's 'Benefits Beyond Borders 2024' report. ATAG stands for the 'Airport Transport Action Group' and is a representative organisation for aviation with approximately 40 members including airframe and engine manufacturers, airline associations, airports, air navigation service providers, industry suppliers, fuel companies, leasing companies, and chambers of commerce.

annually prior to the COVID-19 pandemic (Trafikanalys, 2025). During the same period, emissions from international aviation almost doubled (Naturvårdsverket, 2025). Although international travel dropped sharply during the pandemic—falling to around eight million passengers in both 2020 and 2021—it has rebounded rapidly. By 2024, international passenger volumes had surged back to 26 million, nearing pre-pandemic levels[12] (Trafikanalys, 2025). In contrast, domestic aviation in Sweden has shown more modest trends. Passenger numbers remained relatively stable between six and eight million annually from 1990 to 2020 but have more than halved since the onset of the pandemic (Trafikanalys, 2025). Whilst smaller in scale than international travel, these domestic trends also carry important implications for national climate policy.

Together, these developments underscore Sweden's dual position: it is both shaped by and contributes to global aviation trends. On the one hand, Sweden mirrors broader patterns of aviation growth; on the other, its high per capita emissions and active public debate—exemplified by the emergence of the *flight-free movement*—make it a rich site for analysing how competing definitions of sustainability are enacted and contested.

4.1.1 Measures to mitigate the climate impact of Swedish aviation

Against this backdrop of intensifying environmental pressures and growing political scrutiny, a range of initiatives have emerged to mitigate aviation's climate impact—both globally and within Sweden. These reflect the growing urgency to align aviation policy with climate targets, whilst also exposing tensions over which pathways should be prioritised. Reviewing the current and proposed measures to mitigate aviation's climate impact, **Paper I** finds that most mitigation efforts—both in Sweden and globally—are policy-driven, targeting either technological advancements or behavioural change. These initiatives span from international regulatory frameworks to national policy tools and voluntary industry commitments, each attempting to reconcile the growth of the industry with its climate impact.

At the international level, the International Civil Aviation Organisation has adopted several aspirational targets, including a two percent annual

[12] Top destination for travellers in 2024 were Spain (1.7 million passengers), Germany (1.3 million passengers), and the UK (1.1 million passengers) (Trafikanalys, 2025)

improvement in fuel efficiency from 2010 to 2050, alongside a carbon dioxide emissions standard for new aircraft introduced in 2017 (ICAO, 2017). These have driven various technical and operational efficiency improvements, such as optimised flight paths, aircraft retrofitting, and increased average payloads. As a result, fuel efficiency has improved globally by approximately 2.5 percent per year since 2010 (IEA, 2025). In Sweden, these global efforts have been reinforced by national initiatives such as differentiated take-off and landing fees at state-owned airports[13], which reward airlines operating more fuel-efficient aircraft or using lower-emission fuels (Swedavia, 2021).

Sweden also engages in international market-based mechanisms including Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) and the European Union's Emissions Trading System (EU ETS). Both rely on carbon pricing to incentivise emissions reductions. Whilst the EU ETS operates as a cap-and-trade system with a declining cap and tradable emissions allowances (Efthymiou and Papatheodorou, 2019), CORSIA requires airlines to offset emissions above 2019 levels by purchasing carbon credits (ICAO, 2021). However, both systems face criticism for their limited coverage—particularly the exclusion of non-carbon dioxide effects—and their reliance on offsetting rather than direct emission reductions (Larsson et al., 2019; Scheelhaase et al., 2018).

A nationally significant policy intervention identified in **Paper I** was Sweden's aviation ticket tax, introduced in 2018 by the Social Democrat–Green Party coalition government. Framed as a demand-management tool, the tax aimed to reduce air travel via demand elasticity, with projected revenues of up to SEK 1.8 billion annually (Skatteverket, 2024). However, in 2024, the incoming centre-right coalition government announced its repeal, arguing that aviation is vital for regional connectivity and national competitiveness: "Sweden is dependent on a competitive aviation industry. Companies and people need aviation to be able to transport themselves, not least within Sweden" (Jönsson, 2024).

Despite its climate impact, aviation is not included in Sweden's national climate targets under the Climate Act, which mandates a 70 percent reduction in domestic transport emissions by 2030 (compared to 2010 levels) and net-zero emissions by 2045 (Ministry of Environment and Energy, 2017). In lieu of this, the aviation industry has taken a voluntary approach under the government-led

[13] The ten state-owned airports are Åre Östersund, Göteborg Landvetter, Kiruna, Luleå, Malmö, Ronneby, Stockholm Arlanda, Stockholm Bromma, Umeå, Visby and are operated by Swedavia AB.

Fossil Free Sweden initiative, committing to fossil-free domestic flights by 2030 and fossil-free international departures by 2045 (Svenskt Flyg, 2018).

The 2018 fossil-free roadmap developed by *Svenskt Flyg* prioritised sustainable aviation fuels (SAF)—particularly advanced biofuels—as the key strategy for decarbonisation, due to their compatibility with existing aircraft and airport infrastructure (Svenskt Flyg, 2018). SAF can be blended with conventional fossil-based jet fuel[14] in varying ratios, depending on the feedstock and processing method (ASTM, 2018). Advanced biofuels[15] are typically derived from non-food biomass like forestry residues or waste oils, whilst electrofuels—or power-to-liquid fuels—are synthesised using hydrogen and captured carbon dioxide (Dahal et al., 2021).

However, by 2024, *Svenskt Flyg* released an updated roadmap, recognising that this singular focus on SAF had become too narrow. In response to new technological developments—hydrogen propulsion and electric aircraft—as well as evolving international regulations, the updated roadmap embraces a broader, systems-oriented approach. This strategy incorporates multiple technological trajectories and policy levers, signalling a more adaptive vision for the future of aviation in Sweden (Svenskt Flyg, 2024). Electric and hydrogen propulsion technologies are included, with hydrogen used either directly in combustion engines or fuel cells, although such applications require major technological and infrastructural overhauls (Baroutaji et al., 2019). Similarly, battery-electric aviation, which is gaining traction for short-haul routes, would necessitate not only new aircraft designs but also substantial upgrades to grid capacity and airport infrastructure (Bergero et al., 2023).

The findings of **Paper I**—summarised in Table 4—highlight the main challenges and opportunities in the aviation industry's efforts to become fossil-free by 2045. Innovative technologies offer alternatives to fossil-based jet fuel, but each faces obstacles not only in cost and investment, but also in market formation, political backing, and public acceptance. The evolving roadmap from *Svenskt Flyg* shows a shift toward more flexible, multi-trajectory strategies, yet progress still depends on overcoming major technological and infrastructure barriers.

[14] Fossil-based jet fuels refers to hydrocarbon blends Jet A, Jet A-1, and Jet-B commonly used for commercial aviation.
[15] Also known as second-generation biofuels.

Table 4. Overview of mitigation measures

Purpose	Measure	Description	Key challenges
Reduce travel volume	Aviation ticket tax	Introduced in Sweden in 2018 to reduce demand. Removed in July 2025	Limited impact; risk of aviation leakage to neighbouring countries (e.g., Denmark)
	Virtual mobility	Use of digital tools to replace business travel	Unclear long-term effects; limited impact on leisure travel
Decrease energy intensity	Aircraft operational improvements	Adjustments to cruise speed, altitude, fuel load, etc.	Mostly incremental; effectiveness depends on aircraft type
	Fleet retrofits	Upgrades such as winglets and engine modifications	Costly; not always technically or economically viable
	New aircraft	Deployment of more energy-efficient aircraft	High investment costs; long fleet turnover times
	Increased payload/cabin density	Higher seat density improves fuel efficiency	Comfort and health concerns, especially post-COVID
	Differentiated landing/take off fees	Fees at state-owned airports based on emissions and fuel type	Risk of airlines shifting to lower-cost airports without such fees
Lower emission intensity	EU Emissions Trading Scheme	Cap-and-trade system covering aviation emissions since 2012	Excess free allowances; non-CO_2 effects not accounted for
	CORSIA	ICAO scheme offsetting emissions above 2019 levels	Limited real impact; excludes non-CO_2 effects; over-reliance on offsets
	Sustainable aviation fuels	Includes advanced biofuels and electrofuels	High cost; limited supply; concerns over sustainability and feedstock competition
	Hydrogen-powered aviation	Zero-emission fuel; long-term potential	Requires new aircraft designs and infrastructure; public acceptance uncertain
	Electric aviation	Battery-powered aircraft for short-range flights	Limited range; infrastructure and battery sustainability concerns

4.2 Performing innovation: industry narratives in transitions

Building on the contextual foundations established in Paper I, **Paper II** turns to an analysis of contemporary transitions within the Swedish aviation industry. The focus here is on industry actors—understood as possessing critical agency in shaping transitions through their capacity to create, maintain, or disrupt existing socio-technical configurations (Berggren et al., 2015; Farla et al., 2012). Much of this agency is exercised discursively: actors engage in meaning-making as they advocate for political and regulatory support, defend incumbent technologies and practices, or contest and reframe dominant visions of the future (Löhr et al., 2022). By focusing on the narratives constructed by industry actors, we gain insight into how contemporary transitions are enacted through narratives which serve as a coordinating mechanism, offering a shared framework for interpretation and action amongst actors with differing strategies, resources, and capacities (Garud and Gehman, 2012).

Paper II identifies three interwoven narratives, each centred on a distinct technological alternative to fossil-based jet fuels: advanced biofuels, electric aircraft, and hydrogen-based fuels. These narratives are both temporal and relational, stretching across time and space, as actors forge connections between technologies, institutions, and social values—drawing on memories of the past and aspirations for the future to justify and guide present-day actions.

Underlying each narrative is a shared belief that a sustainable future is achievable through technological innovation. This conviction builds in part on the aviation industry's long-standing self-image as a locus of rapid innovation—frequently underscored by claims of substantial reductions in greenhouse gas emissions over the past half-century (Gössling and Peeters, 2007). It is also culturally and spatially situated. Sweden is frequently portrayed—both within national discourse and internationally—as a global leader in sustainability (Hult, 2017; Jansson et al., 2020). Industry actors actively leverage this identity, pointing to the country's technical expertise and abundant natural resources—particularly forestry and low-carbon electricity—as key enablers of sustainable aviation. These place-based narratives help to reinforce the idea that Sweden is uniquely positioned to lead the global transition toward fossil-free aviation.

The three narratives outlined in Paper II are summarised in Table 5, alongside their performative effects and implications for how sustainability transitions are being coordinated and contested in practice.

Table 5. Narratives for technological alternatives in Swedish aviation

Narrative	Advanced biofuels	Electric aircraft	Hydrogen-based fuels
Framing and positioning	Pragmatic, near-term solution leveraging existing infrastructure and bioenergy expertise; seen as compatible with current aviation systems	Low-emission solution for short-haul and regional routes; framed as a way to revitalise underused airports and restore national connectivity	Long-term, future-oriented solution centred on electrofuels and direct hydrogen combustion; electrofuels framed as scalable and resource-efficient
Key enablers	Forestry-based feedstock, existing bioenergy competences, national blending mandate	Electrification momentum from passenger mobility; support from national and regional actors; ongoing innovation by Heart Aerospace	Innovation in hydrogen production and carbon capture; pilot projects in adjacent sectors including fossil-free steel
Challenges and uncertainties	Unclear domestic production capacity vs. export of feedstock; adjustment needed to align with ReFuelEU Aviation blending targets	Technical immaturity, certification delays, and relocation of Heart Aerospace	High production costs, infrastructure gaps, limited investment; only two of six sustainable aviation fuel facilities pursuing electrofuels
Performative effects	Institutionalises sustainability as quantifiable and aligned with domestic innovation; legitimises biofuels as cornerstone of transition	Narrative flexibility maintains legitimacy and investment; positions Sweden/Nordics as testbed for scalable innovation	Sustains ambitious visions and actor alignment despite long timelines; mobilises future promises whilst deferring present action

4.2.1 Advanced biofuels

The narrative for advanced biofuels in Sweden is rooted in the country's longstanding expertise in bioenergy and its past experience with ethanol-gasoline blending in the road transport sector (Sprei, 2018). Framed as a pragmatic and near-term solution, advanced biofuels are seen to offer the advantage of compatibility with existing aircraft and airport infrastructure.

Amongst Swedish industry actors, there is an expectation that these fuels will be derived from forestry-based feedstock—leveraging Sweden's abundant natural resources and institutional competence in biomass utilisation, particularly in the transport and heating sectors. This view reflects a belief in the transferability of existing expertise to aviation. Yet, there remains some ambiguity about whether Sweden will develop domestic production capacity for advanced biofuels or act primarily as a supplier of feedstock to production facilities abroad.

Policymakers have institutionalised this framing through a national blending mandate, which requires jet fuel suppliers to increase the share of sustainable aviation fuel (SAF) from one percent in 2021 to thirty percent by 2030, with an anticipated emissions reduction of 27 percent by the end of the decade (Ministry of Infrastructure, 2021). In doing so, the Swedish state has not only endorsed advanced biofuels as a cornerstone of aviation transitions but also actively performed a particular vision of sustainable aviation—one that aligns sustainability with quantifiable targets, domestic innovation, and continuity.

However, this policy is now being re-evaluated in light of ReFuelEU Aviation, a regulation from the European Commission which mandates comparatively lower blending targets than Sweden's national mandate: two percent by 2025, six percent by 2030, and seventy percent by 2050 (EU, 2023). In response, the Swedish Energy Agency is reviewing the national mandate to ensure compliance with EU legislation (Energimyndigheten, 2025).

4.2.2 Hydrogen-based fuels

Electrofuels—produced by combining hydrogen with captured carbon—occupy a prominent place in forward-looking industry narratives, particularly those centred on hydrogen-based solutions. These narratives are driven by growing expectations that hydrogen will become a central carbon-free energy carrier, underpinned by pilot projects for the production of fossil-free steel utilising 'green hydrogen' (Öhman et al., 2022). Unlike advanced biofuels, electrofuels do

not rely on forestry-derived feedstock, which are increasingly contested for their sustainability credentials. This distinction lends electrofuels greater legitimacy amongst certain actors, who view them as a more scalable and politically palatable long-term solution as their production does not put pressure on land and water resources (Lai et al., 2022).

The realisation of hydrogen-powered aviation—through direct combustion—remains distant. Whilst the concept has been explored since the 1950s (Brewer, 1976), current initiatives continue to face systemic challenges. Airbus's ZeroE programme—cited as a flagship effort to deliver a commercial hydrogen aircraft by 2035 (Airbus, 2021)—was postponed in 2025. The delay was attributed to the immense challenge of developing a complete hydrogen ecosystem, including production, liquefaction, storage, airport refuelling infrastructure, and new certification standards (Hepher, 2025).

These complexities also affect the production of electrofuels. Of the six SAF production facilities currently planned in Sweden, only two are focused on electrofuels; the remainder continue to pursue biomass-based pathways, particularly those leveraging Sweden's forestry sector (EASA, 2024). This indicates a divergence between the aspirational narrative of hydrogen-based solutions and the practical realities of investment and infrastructure development on the ground.

4.2.3 Electric aircraft

The narrative surrounding electric aircraft is strongly influenced by the growing societal and policy momentum behind the electrification of passenger mobility (Kester et al., 2020). Drawing inspiration from the success of electric vehicles, industry actors frame electric aviation as a promising low-emission solution for short-haul and regional travel.

The narrative for electric aviation amongst industry actors evokes a return to the past—specifically, to the era before the deregulation of domestic flight networks in the 1990s (Trafikanalys, 2020a). As such, innovation is framed not merely as technological progress, but as a means of restoring national cohesion and promoting equitable access to mobility—particularly through the revitalisation of underused routes and airstrips in rural or remote regions. This framing has inspired a number of regional initiatives (see Figure 3, Paper III), such as the FAIR project (Finding Innovation to Accelerate Implementation of Electric Regional Aviation), launched in 2020 to assess the feasibility of electric flight

routes in the Kvarken region, connecting northern Sweden and Finland (Kvarken Council, 2021).

Much of the anticipation for electric aviation in Sweden rests on the activities of Heart Aerospace. Founded in 2018, the aerospace start-up initially aimed to support regional climate targets with a vision to create "the fastest, cheapest, and most environmentally friendly means of regional transport" (Heart Aerospace, 2024). The company initially aimed to deliver the 'ES-19', a 19-seat all-electric regional aircraft, by 2025, however, since its launch, it has twice postponed its commercialisation timeline, undertaken a complete redesign of its aircraft, and—most recently—announced the relocation of its operations from Sweden to the United States. Nevertheless, Heart Aerospace has continued to sustain legitimacy, securing over 250 aircraft orders and more than USD 100 million in investment despite these shifts and pivots. **Paper III** examines how this legitimacy is enacted, tracing how the company mobilises both narratives and material artefacts to portray its innovation journey as legitimate.

Throughout the company's innovation journey, Hangar Days have served as key arenas for the enactment of legitimacy, as occasions to enrol stakeholders and temporally coordinate activities (Garud et al., 2014). By bringing together stakeholders from across the government, the aviation industry, and the media, Heart Aerospace enacts their vision, reinforcing its narratives for electric aviation through strategic use of material artefacts, whilst simultaneously imbuing these artefacts with meaning through their carefully constructed narratives.

Initially, Heart Aerospace established legitimacy by anchoring its vision in narratives of national competence and regional transformation, closely aligning with the framings advanced by industry actors (as analysed in Paper II). These narratives began to take material form at the 2020 Hangar Day, where the company displayed a scale model of the 'ES-19' alongside a functioning electric motor. Through these artefacts, the envisioned future was made materially present—transforming the company's ambition into a tangible, demonstrable reality, and securing the company USD 35 million in Series A funding[16].

[16] Series A and B funding rounds follow seed funding, offering external investors equity in the start-up. After joining Y Combinator in 2019, Heart Aerospace raised USD 2.1 million in seed funding from EQT Ventures and Norrsken Foundation. It secured USD 35 million in Series A funding in 2021 followed by USD 107 million in Series B funding in 2024.

At the 2022 Hangar Day, where Heart Aerospace announced the major redesign of its aircraft to a 30-seat hybrid-electric model ('the ES-30'). The company framed the redesign as a strategic decision and the result of accumulated learning and deeper market engagement. To legitimise the redesign, the company once again mobilised material artefacts—most notably the 'integrated test rig', a full-scale test bench for the design and integration of key aircraft systems, which attendees—including myself—were invited to interact with. This provided a concrete demonstration of engineering progress, signalling that the development of the ES-30 was already well underway. The strategic decision to redesign the aircraft was reinforced through endorsements from prominent stakeholders, including United Airlines and Air Canada, who publicly voiced their support at the event. These carefully orchestrated performances helped reposition Heart Aerospace from a visionary Swedish start-up to a globally recognised actor in sustainable aviation.

This repositioning was further amplified by Heart Aerospace's recent decision to relocate its operations to the United States—reversing earlier commitments to remain headquartered in Gothenburg, Sweden. In doing so, the company has shifted the basis of its legitimacy, seeking to embed itself within the world's largest regional aviation market. Nevertheless, although no longer anchored in a distinctly Swedish identity, Heart Aerospace continues to reproduce the belief shared by industry actors that a sustainable future can be achieved through technological innovation, reinforcing the dominant narrative of progress through electrification.

4.3 Contesting sustainability: competing discourse-coalitions

By sharing in the construction of and use of narratives centred on advanced biofuels, electric aircraft, and hydrogen-based fuels, industry actors reproduce a discourse-coalition that supports the continued reproduction of aviation for the transport of goods and people across the globe. In **Paper IV**, we refer to this discourse-coalition as *Green flying* and contrast it with a competing set of narratives articulated by the flight-free movement, which together form an alternative discourse-coalition we term *Staying on the ground*. Both discourse-coalitions are sustained through four interrelated narratives that collectively articulate a vision for the future of aviation—two describing what a desirable future might look like, and two outlining the strategies deemed essential to realise it. The key findings of Paper IV are summarised in Table 6.

Table 6. Comparison of Green flying and Staying on the ground

Dimension	Green flying	Staying on the ground
Narratives	*Technology development* together with appropriate *policy support*, aviation can become *a puzzle piece in a sustainable society* with *continued growth*.	*A good life beyond flying* is possible with *reduced air travel* through *travelling less overall* and *low-carbon travel alternatives*.
Framing of aviation	Essential for socio-economic development, connectivity, and innovation	Largely non-essential; a luxury contributing to environmental degradation
Key actors	Industry actors	Flight-free movement
Institutional alignment	Increasing alignment with national policies (e.g. R&D funding, SAF mandates, tax reforms)	Largely outside formal institutions; emerging through grassroots mobilisation
Performative effects	Mobilises resources, shapes policy agendas, legitimises technological investment	Challenges dominant growth narratives, redefines sustainability in terms of sufficiency

The vision for *Green flying* is sustained by two interrelated narratives: first, that the *continued growth of aviation* is not only viable but also desirable; and second, that aviation can serve as a *puzzle piece in a sustainable society*. Within this discourse-coalition, aviation is framed as essential to socio-economic wellbeing—enabling innovation, supporting trade and tourism, and facilitating cultural exchange and social inclusion.

The three narratives examined in Paper II—focused respectively on *advanced biofuels*, *electric aircraft*, and *hydrogen-based fuels*—reinforce a broader narrative in which *technology development* is positioned as the primary pathway to a sustainable aviation industry in Sweden. Whilst *Green flying* advocates for stronger *policy support*, this discourse is increasingly being institutionalised, as current climate policy embeds the promise of technological innovation. Beyond the implementation of the SAF blending mandate, recent political developments have further aligned Swedish national policy with the interests of the aviation industry. Since the 2022 general election, which brought a centre-right coalition government to power, this alignment has become more pronounced. The new administration has not only announced the repeal of the aviation ticket tax but has also expanded subsidies for regional airports and increased funding for research and development in electric aviation (Ministry of Rural Affairs and Infrastructure, 2024, 2023).

Although *Green flying* currently dominates both public and policy discourse, its vision of continued aviation growth is not without contestation in Sweden. In **Paper IV**, we interpret a competing discourse-coalition, which we label *Staying on the ground,* articulated by actors within the flight-free movement.

The desired future of *Staying on the ground* is one of significantly *reduced air travel*. Within this discourse-coalition, air travel is framed not as a social necessity, but as a largely unnecessary luxury. This framing underpins a narrative that a meaningful, fulfilling—and more sustainable—life is not only possible but also preferable without aviation. We refer to this as a narrative for a *good life beyond flying*. In contrast to the technology-focused strategies of Green flying, this discourse-coalition promotes behavioural change, advocating for *low-carbon alternatives*—most notably train travel—as well as broader societal shifts towards *travelling less overall*.

4.3.1 Contrasting logics: techno-solutionism vs. prefiguration

Together, *Green flying* and *Staying on the ground* illustrate how competing discourse-coalitions shape the meaning and trajectory of sustainability transitions in Swedish aviation. *Green flying* centres on the promise of technological innovation to reconcile continued aviation growth with climate goals. It reinforces aviation's socio-economic importance—framing it as essential to connectivity, innovation, and national development—and promotes its institutionalisation within Sweden's sustainability strategies.

In contrast, *Staying on the ground* challenges the assumption that aviation is indispensable for modern life. Instead, it envisions a low-carbon future grounded in *sufficiency*, *equity*, and *behavioural change*. This discourse-coalition promotes alternatives such as train travel and emphasises the need to reduce overall demand for long-distance mobility, rather than relying on technological substitution alone.

Paper IV reveals that these discourse-coalitions do not merely propose different solutions, but perform fundamentally different understandings of sustainability—each reshaping how mobility, technology, and climate responsibility are enacted. *Green flying* presents technological decoupling as the key to sustainable aviation, with the belief that once fossil-free fuels and aircraft are in place, there will be no need to limit flying. Behavioural changes, such as flying less, are typically seen as short-term sacrifices or even undesirable, often associated with the phenomenon of flight shame, which proponents assume will fade with technological progress.

However, this characterisation reflects a misinterpretation of *Staying on the ground*. This discourse-coalition does not seek to provoke shame, but to *reimagine norms* and *values* around travel. Rather than treating sustainability as a future condition to be achieved through innovation, it calls for immediate shifts in practice—reducing reliance on aviation as part of a wider cultural and economic transformation. Whilst not anti-technology, it avoids overstating the speed or certainty of its deployment and instead advocates for a reimagination of the role of mobility in a just and sustainable society.

The two discourse-coalitions rest on fundamentally different logics. *Green flying* is underpinned by *techno-solutionism*—the belief that environmental harms can be solved primarily through technological innovation (Stein, 2024). This logic aligns with long-standing assumptions in the aviation industry, typified by Gössling and Peeters' (2007, p. 410) observation that "environmental impacts exist, but technology will solve the problem." As such, *Green flying* reinforces dominant sustainability discourses that privilege market-based solutions and technical fixes, whilst normalising hypermobility and sustaining the aspirational status of frequent air travel (Cohen and Gössling, 2015; Köves and Bajmócy, 2022). This framing situates sustainability as a distant, achievable future, contingent on the development of new technologies. Critics have described such framing as promoting *technology myths*—narratives that exaggerate the transformative potential of innovation whilst deflecting attention from deeper systemic change (Peeters et al., 2016). Lamb et al. (2020) argues that the promotion of such myths act as a form of *climate delay*, as the promise of future solutions risks reinforcing existing power structures and postponing urgent action.

In contrast, *Staying on the ground* engages with aviation through the logic of *prefiguration* (Yates, 2015). By choosing not to fly and embracing low-carbon lifestyles, actors in this discourse-coalition enact the very futures they advocate. Rather than relying on speculative technologies and deferring action to an imagined future, they embody change in the present, repositioning sustainability as an ongoing, lived practice rather than an abstract end goal. It questions the centrality of aviation and the broader values underpinning high-consumption, growth-oriented societies. Instead, it fosters alternative imaginaries grounded in a more local, less materialistic way of life (Jackson, 2011; Levy and Spicer, 2013). In doing so, *Staying on the ground* demonstrates how everyday practices can challenge dominant norms and offer new pathways for transitions, not in the future, but in the here and now.

5 Contributions and conclusions

In this final chapter, I synthesise the contributions of the thesis and reflect on its broader implications for studying and governing sustainability transitions. Grounded in a performative understanding of sustainability, the thesis examines how competing meanings are enacted and contested through transition efforts in Swedish aviation. Drawing on insights from four papers, the analysis traces how the aviation industry and the flight-free movement mobilise competing understandings of sustainability. **Paper I** reviews mitigation measures and policy developments, identifying dominant strategies and highlighting overlooked areas of inquiry. **Paper II** explores how industry actors perform sustainability through narratives they construct and circulate. **Paper III** examines Heart Aerospace, a Swedish start-up positioned as a leading innovator in sustainable aviation, to analyse how legitimacy is enacted through the entanglement of discursive and material elements. Finally, **Paper IV** broadens the analysis to public discourse, revealing how aviation's sustainability is contested through competing visions for the future of air travel in Sweden. In doing so, the thesis offers both empirical and conceptual insights. It provides a detailed account of how divergent discourse-coalitions shape transition pathways through competing narratives and practices. At the same time, it reconceptualises sustainability as dynamic, situated, and performative—foregrounding the politics of meaning-making in socio-technical change. These contributions also inform governance, pointing to the need for more reflexive, pluralistic, and open-ended approaches that hold space for contestation and experimentation.

5.1 Enacting and contesting sustainability in Swedish aviation

This thesis has identified and analysed two competing understandings of sustainability that shape how transition efforts are enacted and contested in Swedish aviation. The aviation industry frames sustainability as a future-oriented achievement to be realised primarily through technological innovation. In contrast, the flight-free movement understands sustainability as a present-day practice, enacted through the deliberate avoidance of air travel. These two actor groups reproduce two distinct discourse-coalitions—*Green flying* and *Staying on the ground*—each advancing competing narratives. Together, they reveal that sustainability in the context of Swedish aviation is neither a neutral nor universally agreed-upon objective, but a contested concept that actively shapes the direction and form of transition efforts.

For actors in the aviation industry, sustainability is understood as a predefined, measurable goal—namely, the achievement of fossil-free aviation by 2045. Sustainability is conceptualised primarily as a technical challenge, centred on reducing greenhouse gas emissions from fossil fuel combustion and addressed through innovations in advanced biofuels, electric aircraft, and hydrogen-based propulsion. Sustainability is temporally positioned as a future goal, with the present cast as a transitional phase characterised by incremental innovations, pilot initiatives, and policy alignment.

The narratives advanced by industry actors dominate sustainability discourse in Sweden and are becoming increasingly institutionalised. This is particularly evident under the current centre-right government, which has implemented policy measures such as increased subsidies for regional airports and regulatory frameworks supporting the commercialisation of alternative propulsion systems (Ministry of Rural Affairs and Infrastructure, 2024, 2023). In doing so, policymakers reproduce the *Green flying* discourse-coalition, drawn by its promise to preserve economic competitiveness whilst appearing to address environmental concerns—without challenging existing power structures or introducing politically costly restrictions (Levy and Spicer, 2013). This reflects a long-standing discourse of *ecological modernisation*, which holds that environmental degradation can be addressed through technological innovation, market mechanisms, and continued economic growth (Hajer, 1995; Machin, 2019).

However, these technological innovations have been criticised as non-transformative and overly optimistic, with industry narratives exaggerating

their feasibility and timeliness whilst deflecting attention from more immediate, systemic forms of change (Lamb et al., 2020; Peeters et al., 2016). Reflective of a logic of techno-solutionism (Stein, 2024), this perspective frames sustainability as a *tame* problem—solvable through linear, standardised solutions—when in fact sustainability is a *wicked* problem, marked by uncertainty, value conflicts, and political contestation (Rittel and Webber, 1973).

By contrast, actors in the flight-free movement do not understand sustainability as achievable through future technological innovation, but as a dynamic and contested process realised through present-day, situated actions (Corvellec, 2016; Hallin et al., 2021). Through *prefigurative practice* (Yates, 2015), these actors enact the low-carbon futures they seek to create, reproducing a discourse-coalition of *Staying on the ground*. This discourse-coalition does not frame aviation's (un)sustainability solely in terms of emissions. Instead, it emphasises excessive and unequal consumption—particularly by high-income groups—as a core problem. Aviation is thus seen as symptomatic of broader systems that normalise and incentivise hypermobility (Cohen and Gössling, 2015; Köves and Bajmócy, 2022).

From this perspective, achieving sustainable aviation is not merely a technical challenge but requires confronting the deeper structural conditions that sustain our ways of living. The solution lies not in technological innovation alone, but in reimagining how we live, travel, and relate to one another (Inayatullah, 2007; Prainsack, 2022). The flight-free movement promotes more localised, grounded lifestyles that decentre aviation and instead emphasise forms of mobility and social organisation rooted in values of sufficiency, equity, and community. These values challenge dominant imaginaries of global connectivity and perpetual growth, instead prioritising slower, less extractive ways of life. As Levy and Spicer (2013, p. 665) note, such movements offer,

> "a radically different set of values, encompassing stronger community, more leisure time, experiments with alternative economic structures and market forms based on small-scale production, co-ops and community-based services."

In this sense, *Staying on the ground* does not merely critique aviation—it articulates an alternative vision of sustainability, one that reconfigures the foundations of mobility, wellbeing, and progress. It calls for more immediate and systemic change in both individual and collective practices. This position is supported by a growing body of research highlighting the carbon intensity and

inequity of air travel, with studies showing that aviation is amongst the most emission-intensive forms of consumption and that these emissions are highly unequally distributed[17] (Gössling and Humpe, 2023; Ivanova et al., 2020).

Whilst industry narratives remain dominant, there are early signs that the flight-free movement is beginning to gain influence. A number of organisations and public institutions in Sweden have adopted alternative travel policies—for example, restricting air travel and promoting rail-based alternatives—that reflect the values of the counter-narrative from the flight-free movement. As Ullström (2024) highlights, the movement gained significant visibility and support prior to the COVID-19 pandemic, with 2019 witnessing a measurable decline in Swedish air travel compared to the previous year (Trafikanalys, 2020b). Although the pandemic complicates efforts to isolate the long-term behavioural impacts, domestic and international passenger numbers in Sweden have been slow to return to pre-pandemic levels[18]—unlike the more rapid rebound observed in many other countries—that may suggest a more enduring cultural shift in travel behaviour. However, these trends could also reflect broader influences, particularly economic conditions, making it difficult to attribute them directly to the flight-free movement.

5.2 Governing plural and performative sustainability transitions

The prevailing paradigm for policy action assumes that diverse actors share a consensus on predefined sustainability goals, and that change can be deliberately steered through targeted interventions with minimal resistance (Patterson et al., 2024). This assumption reflects an ostensive understanding of sustainability—treating it as a fixed endpoint rather than a contested, evolving process. Yet, as this thesis has shown, sustainability transitions are inherently political, shaped by conflicting interests, normative tensions, and shifting societal values (Köhler et al., 2019). Societal change is, after all, a messy, contingent, and people-centred process (Nightingale et al., 2020). As a result, dominant policy approaches are often ill-equipped to navigate this complexity,

[17] According to Gössling and Humpe (2023) approximately half of all flights globally are taken by residents of North America and Europe with less than one percent of the global population responsible for more than fifty percent of emissions from commercial passenger aviation.
[18] According to Swedavia (2025), total passenger numbers in 2024 were 18 percent lower than 2019.

and tend to reflect idealistic, and often biased, models of consensus and control (Muiderman et al., 2020; Stirling, 2023).

In this context, Patterson et al. (2024) introduce the concept of *partial political settlements* as a pragmatic and politically honest approach to prevailing models of policy action. Rather than treating conflict, resistance, and pushback as anomalies to be overcome, they propose recognising such tension as the fundamental condition under which sustainability transitions unfold. Partial political settlements are defined as

> "negotiated but uncomfortable compromises to realise a minimal degree of productive cooperation amongst key actors who influence a policy outcome in a situation that otherwise risks intractable conflict and failed transformation" (Patterson et al., 2024, p. 5).

Rather than pursuing a singular, unified vision of sustainability, this approach calls for provisional agreements—settlements that stakeholders can 'live with' in the short-term and that remain open to ongoing contestation and renegotiation (Paffenholz, 2021). This approach acknowledges that transitions are not driven by consensus around fixed objectives, but by dynamic, negotiated processes marked by friction, uncertainty, and competing values.

Such an approach to policy action would be particularly relevant in the aviation industry. Although policy debates are dominated by techno-economic framings, driven by industry efforts to preserve aviation's status as economically and socially indispensable (Gössling and Peeters, 2007; Peeters et al., 2016), such narratives are far from uncontested. In Sweden, an institutional foundation for participatory governance exists through the *remissinstanser* ('referral bodies') system (Regeringskansliet, 2025), which invites a broad range of stakeholders—including government agencies, municipalities, trade unions, civil society organisations, academics, and occasionally citizens—to comment on proposed legislation. However, this system rests on the assumption that competing interests and normative positions can be reconciled through consultation and consensus. In practice, recent public inquiries relating to aviation, such as those concerning aviation taxes (SOU 2016:83) and biofuel blending mandates (SOU 2019:11), have tended to reflect the priorities and framings of dominant industry actors, with limited inclusion of critical or dissenting perspectives.

As this thesis has shown, disagreement over the sustainable future of Swedish aviation is not merely a matter of competing interests but reflects fundamentally different worldviews, making reconciliation through consensus-driven

processes particularly unlikely (Patterson et al., 2024). This does not mean that policy paralysis is inevitable. Rather, it highlights the need for political strategies that can navigate disagreement and broker compromises across conflicting visions. The concept of *partial political settlements* offers such an approach, allowing space for coexistence between divergent pathways—such as advancing technological innovation (e.g., sustainable aviation fuels, electric aircraft) whilst also accommodating behavioural and structural change (e.g., demand reduction, sufficiency narratives). Instead of prematurely closing down debates around a singular 'solution', policy could aim to keep multiple options open, thus responding to critiques of overly techno-optimistic transition discourse (Stirling, 2009).

For example, the Swedish government could continue to support technological innovation whilst simultaneously mandating interim emissions reduction targets for the aviation industry. This approach would preserve the long-term vision of fossil-free aviation by 2045, but demand concrete, near-term action. Requiring industry actors to demonstrate measurable progress at regular intervals—such as every five years—and linking this to public support would introduce time-bound accountability. Such an approach does not foreclose future innovation but situates it within a framework of ongoing evaluation, adjustment, and public scrutiny.

To complement this, a progressive aviation tax scheme could offer a politically pragmatic compromise: exempting essential domestic routes—particularly those serving northern Sweden, where viable alternatives are limited—whilst imposing higher levies on short-haul flights to destinations with strong rail connections. Although such a policy may affect only a small number of flights, it acknowledges differentiated needs and responsibilities, helping to preserve regional connectivity whilst discouraging unnecessary air travel. Whilst evidence from other national contexts—such as the short-haul flight bans in France and Austria—suggests such measures may have limited direct impact on overall emissions (Dobruszkes et al., 2022), they avoid blanket restrictions and instead symbolise a reorientation of political priorities.

Together, these actions illustrate how policy can hold space for multiple, sometimes conflicting transition pathways—technical, behavioural, and structural—without demanding premature consensus or suppressing normative disagreement. They show how *partial political settlements* can offer pragmatic ways forward. As it stands, current policymaking is failing to reduce aviation emissions, which are projected to almost triple in coming decades (Bergero et

al., 2023). If meaningful action is to be taken, a different approach may be needed. Partial political settlements, as Patterson et al. (2024) propose, may offer a workable path to relieve Inger Andersen's frustrations,

"we still, STILL, aren't doing anywhere near enough."

Whilst such arrangements do not resolve all conflicts or deliver definitive solutions, they enable provisional cooperation and avoid the pitfalls of an idealised, consensus-driven model of policy action (Patterson et al., 2024). The emphasis on *partial* is critical here. It acknowledges that settlements are necessarily incomplete, provisional, and subject to ongoing negotiation. From this perspective, contestation is not a failure of consensus-building but a generative force. As Stirling (2015) argues, embracing dissent can help unlock diverse transition pathways and unsettle dominant, often technocratic, framings. Political disagreement, in this view, is not something to be overcome, but something to work with—an enduring feature of transformative processes rather than a temporary obstacle. As Patterson et al. (2024, p. 5) note, such outcomes "require ongoing work through the dispersed activities of many different actors in multiple spaces, both within and beyond the formal political arena." This openness allows for the expression of divergent positions and alternative imaginaries—particularly those that emerge outside established political institutions and dominant discourses (Feola, 2020; Wagenaar and Prainsack, 2021).

5.3 Transitions in-the-making: towards a performative understanding of sustainability

This thesis set out to examine how competing understandings of sustainability are enacted and contested through transition efforts in Swedish aviation. Anchored in a performative understanding of sustainability, it has traced how two distinct discourse-coalitions—*Green flying* and *Staying on the ground*—mobilise divergent narratives, practices, and visions of the future. Rather than treating sustainability as a fixed, universally agreed-upon endpoint, the thesis has shown how it is continually constructed in situated struggles over what counts as sustainable, for whom, and at what cost.

These insights contribute to current debates in sustainability transitions research (STR), where calls to accelerate transitions in response to the climate crisis are growing louder (Köhler et al., 2019; Markard et al., 2020). Such calls often frame acceleration as "increasing the speed of innovation, or speeding up the diffusion of green technologies or socio-technical systems" (Skjølsvold and

Coenen, 2021, p. 5). However, they often assume transitions can be steered towards predefined goals through innovation and top-down interventions, adopting a managerial logic that may overlook the contested, messy, and inherently political nature of transition processes (Stirling, 2024; Susur and Karakaya, 2021). By contrast, this thesis adopts a performative understanding of sustainability that moves beyond treating it as a fixed, measurable endpoint.

This shift is crucial because theory itself is performative. As Callon (1998) observed in the context of economics, theories do not simply describe the world—they help bring it into being[19]. The frameworks and concepts developed within STR do not stand outside of practice; they shape problem framings, legitimise specific solutions, and influence how transitions unfold (Wittmayer and Schäpke, 2014). As STR increasingly shapes public policy and institutional practice, the frameworks and concepts we develop and use do more than observe transitions; they help constitute them. When sustainability is understood as a predetermined destination or when technological innovation and top-down governance are privileged, the scope of what can be imagined and enacted is constrained (Corvellec, 2016; Hallin et al., 2021). A performative perspective, by contrast, embraces ambiguity, multiplicity, and experimentation. It invites us to see sustainability not as a static goal, but as an ongoing and ever unfinished process of *becoming*.

Recognising the performativity of STR scholarship calls for greater reflexivity. Researchers are not detached observers but embedded participants in the evolving and politicised landscapes they study (Christley et al., 2025; Staddon, 2017). It is therefore essential to interrogate the assumptions underpinning our work and consider its implications. Rather than reproducing dominant techno-economic framings of sustainability, we can cultivate more pluralistic, situated, and critical perspectives (Garud and Gehman, 2012; Hallin et al., 2021). This reflexivity becomes especially important in an academic context increasingly geared toward actionable, prescriptive recommendations for policy and

[19] In economics, the Black–Scholes–Merton model of option pricing is often given as an example as to the performativity of theory. The model does not simply reflect how financial markets for derivatives function; it influences how market actors behave as they align their actions with the model's assumptions. In this way, the model becomes prescriptive as well as descriptive (MacKenzie, 2008). Likewise, economic indicators used to evaluate organisational performance do not merely measure outcomes—they help construct what 'performance' means in the first place (Corvellec, 1997; Muniesa, 2014). In both cases, tools designed to observe reality end up shaping it.

practice[20]. By embracing a performative understanding of sustainability, we not only deepen our insight into how transitions are enacted and contested, but also acknowledge that our own scholarly practices are implicated in the futures we seek to understand—and transform.

In this thesis, I have offered narratives as an analytical lens for examining how sustainability is defined, enacted, and contested. Attending to narratives enables scholars to trace how sustainability is not merely described but performed—through the stories actors tell, the visions they promote, and the material practices they embed in everyday life (Garud et al., 2010; Garud and Gehman, 2012). This approach shifts attention from assessing transitions as linear, measurable processes to exploring their ongoing, contested construction. It highlights the temporal and relational dimensions of transitions: how actors draw on past experiences, imagine future possibilities, and act in the present to reconcile these horizons (Emirbayer and Mische, 1998; Ricoeur, 1984). It also reveals the anticipatory practices—projections, promises, expectations—that shape decision-making and influence transition pathways (Hawxwell et al., 2024; Muiderman et al., 2020).

This perspective is particularly timely in the context of aviation—an industry where transitions are both urgently needed and profoundly difficult. Whilst aviation is receiving growing attention in STR, much of the existing literature focuses on developing and diffusing low-emission fuels and technologies such as biofuels, electric aircraft, and hydrogen propulsion (e.g., Fantini et al., 2025; Kim et al., 2019; Urban et al., 2024). These studies often adopt technocratic framings that equate sustainability with efficiency gains or emissions reductions, frequently overlooking questions of justice, power, and legitimacy (Christley et al., 2025; Lai and Karakaya, 2024). By contrast, this thesis demonstrates that sustainability transitions in Swedish aviation are not guided by a single, unified definition of sustainability, but are instead shaped by competing interpretations advanced by two distinct discourse-coalitions: *Green flying* and *Staying on the ground*. Each mobilises divergent narratives and practices to define what sustainability entails, what kinds of futures are

[20] The journal, *Environmental Innovation and Societal Transitions*, which was established in 2011 as a dedicated outlet for STR, was founded with the "ultimate aim [of contributing] insights about the formulation and implementation of strategies and public policies aimed at resolving fundamental barriers to environmental innovations and sustainability transitions" (van den Bergh et al., 2011, p. 2).

desirable, and how those futures should be pursued—revealing sustainability not as a neutral goal but as a contested and performative process.

Whilst some may argue that if sustainability can mean anything, it risks meaning nothing, this thesis takes the opposite view. It is precisely by recognising the multiplicities of sustainability—its contested and evolving meanings—that we can engage meaningfully in transitions (Hallin et al., 2021). Acknowledging this complexity does not paralyse action; it provides the conditions for it. By holding space for divergent visions and provisional compromises, policymakers and practitioners can help shift political conditions, foster experimentation, and open pathways for new forms of agency—even if such settlements are imperfect, tentative, and subject to reversal (Patterson et al., 2024). This is neither naïve nor idealistic. On the contrary, it reflects a hopeful yet pragmatic embrace of accountability—a recognition of the collective agency we hold to enact transitions and "to narrate and re-narrate, preserving both continuity and change, even as a journey is unfolding" (Garud and Gehman, 2012, p. 986).

However, if sustainability transitions are *in-the-making*, this thesis captures only a snapshot of ongoing change, situated in the narratives present at the moment of analysis. Even during the years of this research, narratives around aviation in Sweden have shifted—and they will continue to do so as policies evolve, social movements rise and fall, and new imaginaries of sustainability emerge. These findings, therefore, are not definitive but provisional, situated within a dynamic and contested field.

Whilst I have introduced a countervailing perspective through the flight-free movement, the analysis as a whole centres largely on industry actors. In doing so, it reflects a broader tendency within STR to operate at the *meso-level* (Geels, 2004)—privileging structured, visible, and relatively powerful actors whilst leaving more marginal or everyday perspectives underexplored. Other meanings of sustainability are almost certainly circulating in parallel. Some may resonate with *Staying on the ground*, whilst others may offer entirely different values, strategies, or political claims. For instance, in the UK, aviation is a contested domain particularly in relation to airport expansion. Groups like Heathrow Pause have engaged in direct action, articulating critiques of aviation growth and situating their claims within broader climate justice narratives (Griggs and Howarth, 2023). These perspectives challenge industry-led framings, but may also differ from Swedish sufficiency discourses in important ways.

Beyond activist groups, more research is needed into everyday and ambivalent positions. The perspectives of ordinary travellers—those who fly occasionally for

work or leisure—are largely absent in this thesis, yet they represent a crucial site for future inquiry. Many individuals occupy ambiguous positions—neither aligning with hypermobile elites nor the flight-free movement—navigating tensions between climate awareness and the practicalities of modern life in partial, fragmented, or ambivalent ways. Some may embrace the technological optimism of *Green flying*, whilst others may hold more fragmented or situated understandings that defy easy categorisation. Attending to these less visible interpretations of sustainability—across social positions, life circumstances, and geographies—will be essential to broadening the empirical and conceptual scope of sustainability transitions. This is not just an academic exercise; it is crucial for building more inclusive, democratic, and transformative pathways. By engaging with the plural ways in which people make sense of and enact sustainability, researchers and practitioners can support transitions that are grounded not only in expert visions or policy targets, but also in the lived complexities of contemporary life.

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