

Reasoning and Rationale behind The Carbon Offsetting and Reduction Scheme in the Aviation Sector

Adam Elias Laugesen

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Supervisor: Wim Carton, LUCSUS, Lund University

Abstract:

To reach the Paris-agreement target of no more than a 1,5 to 2 degree rise in global temperature, CO2 emissions need to reach net zero by 2050. This includes emissions from aviation. The International Civil Aviation Organisation (ICAO) has been designated emission reduction responsibility for transnational emissions. It is crucial to keep ICAO accountable for their responsibilities and for the policies they set out.

ICAO has decided to implement a Carbon Offsetting and Reduction Scheme (CORSIA) to begin in 2021. This is meant to add to their aspirational goals from 2012 of increasing aviation efficiency by 2% per year. Offsetting has been widely criticised for not being effective in terms of addressing climate change, and yet ICAO has non-the less chosen CORSIA as their key measure to address aviation's emissions.

Following a poststructuralist tradition of governmentality I analyse CORSIA contextually and relationally using Carol Bacchi's '*What's the Problem Represented to Be?*' (WRP) approach. I thus try to answer *why ICAO is promoting CORSIA rather than other measures*, by analysing various ICAO documents.

I conclude my thesis by arguing that ICAO promotes CORSIA as a compromise between the diverging interests of external pressures versus internal organisational principles, external pressures demanding that the aviation sector takes measures to reduce their emissions and internal organisational principles requiring continued aviation development. The current governmentality of ICAO prevents the Organisation from pursuing measures that would lead to actual deep emission cuts. A shift of aviation governmentality will likely not come from ICAO unless the organisation undergoes a reform renewing the objectives of the organisations conventions.

Keywords: Aviation, ICAO, CORSIA, Offsetting, Governmentality, Sustainability Science

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I dedicate this thesis to my little sister and to all future generations to whom our unique and beautiful planet belongs.

1. INTRODUCTION	2
2. BACKGROUND	4
2.1 ENVIRONMENTAL GOVERNANCE OF AVIATION	4
2.2 MARKET-BASED MEASURES AS ENVIRONMENTAL POLICY	5
3. THEORETICAL ENTRY POINT	6
3.1 PHILOSOPHY OF SCIENCE	6
3.2 GOVERNMENTALITY	7
3.3 WHAT IS THE PROBLEM REPRESENTED TO BE? (WPR)	8
4. METHODOLOGY	9
4.1 CASE SELECTION	9
4.2 DATA	10
4.3 ANALYTICAL STRATEGY	12
4.4 DATA ANALYSIS	13
4.5 LIMITATIONS	14
4.6 BIAS	14
5. ANALYSIS	14
5.1 Q1 WHAT IS THE PROBLEM REPRESENTED TO BE IN CORSIA?	14
5.2 Q2 WHAT ASSUMPTIONS UNDERLIE THESE PROBLEM REPRESENTATIONS?	16
5.3 Q3 HOW HAVE THESE PROBLEM REPRESENTATIONS COME TO PROMINENCE?	19
5.4 Q4 WHAT DO THESE PROBLEM REPRESENTATIONS TAKE FOR GRANTED AND LEAVE UNQUESTIONED?	24
6. DISCUSSION	26
6.1 Q5 WHAT EFFECTS ARE PRODUCED BY THIS REPRESENTATION?	26
6.2 Q6 HOW AND WHERE IS THIS REPRESENTATION OF THE PROBLEM PRODUCED, DISSEMINATED AND DEFENDED? AND HOW COULD IT BE CHALLENGED	31
7. CONCLUSION	35
8. CONTRIBUTION TO SUSTAINABILITY SCIENCE	37
9. REFERENCES	38

1. Introduction

In 2009 aviation emissions represented around 4-5% of the global GHG emissions when including non-CO₂ emissions (David S. Lee et al., 2009). With a predicted annual growth rate of 4,3% (ICAO, 2015), forecasts predict that emissions could grow by over 200-400% in the absence of measures to curb or reduce them (D S Lee et al., 2010).

To reach the Paris-agreements target of no more than 1,5 to 2 degree temperature change, CO₂ emissions need to reach net zero by 2050 (Masson-Delmotte et al., 2018). The Intergovernmental Panel on Climate Change (IPCC) has warned that it can be detrimental to life on earth if we continue to emit GHGs to the extent emitted today. They emphasise that deep emissions reductions are necessary in all sectors (Masson-Delmotte et al., 2018) including the aviation sector.

Governing emissions in aviation has proved to be challenging. It has been especially challenging for parties to reach an agreement on responsibilities for emissions from international aviation. The discussions is known from the COP-meetings as the question of common but differentiated responsibilities (CBDR), which look into if and how to differentiate emission reduction responsibilities, according to who has historically emitted the most (United Nations, 1997, art. 10). Discussions regarding aviation emissions have focussed upon CBDR too. However, aviation discussions involve an extra dimension to these CBDR discussions on emission responsibility, namely whether it should be the country owning the aircraft, the countries travelled between, or one or all countries traversed en route, that bear responsibility for the emissions (Erling, 2016).

In article 2.2 of the Kyoto protocol all parties agreed to recognize the specialized United Nations (UN) agency International Civil Aviation Organisation (ICAO) as the responsible governing body to ensure limitation or reduction of emissions of greenhouse gases from international aviation (United Nations, 1997, para. 2.2).

Although the Kyoto protocol states that ICAO is responsible for limitation or reduction of emissions of greenhouse gasses from international aviation, no actual goals were set to the extent of the

limitations or reduction. Delegating emission reduction responsibility so loosely to ICAO thus only moved the heated debates of responsibility to within ICAO (Erling, 2016; Leclerc, 2019).

Between 2010-2016 ICAO developed a set of measures to limit aviation emissions:

Firstly in 2010, adopting what they call their *aspirational goals* to increase fuel efficiency annually by 2% and to achieve carbon neutral growth from 2020 onwards (ICAO, 2010, art. A37-19).

And then in 2016 agreeing to implement a Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) that is to run from 2021, offsetting CO₂ emissions and ensuring carbon neutral growth within international aviation (ICAO, 2018).

Although it is unprecedented for a whole sector to agree on extra environmental cost, there are many critical voices arguing that the goals set out in CORSIA are inadequate, i.e. (Erling, 2016; Gudmundsson, 2019; Larsson et al., 2019; Lindenthal, 2014). While there are several in-depth studies on the effects of CORSIA, there is a gap in research as to why ICAO has decided to promote offsetting as their environmental strategy. This gap is what I will try to investigate in this thesis.

In section 2 I will outline the background for my study, introducing the relevant contextual setting for the analysis as well as the most common environmental policy instruments used to reduce emissions. Section 3 will introduce the theoretical framework that I apply. Section 4 describes the methodological reflections of the thesis. Section 5 contains the two analyses of the thesis. Section 6 is a discussion of the findings in the analyses, conceptualising them with the theoretical framework introduced in section 3. Section 6 contains the conclusion of the thesis and suggests further research.

Research question:

To understand the underlying reasoning and rationality of ICAO's choice of CORSIA as environmental policy measure I raise the question:

Why is ICAO promoting CORSIA rather than any other policy measures?

To answer the question I use Carol Bacchi's problematisation methodology called '*What is the Problem Represented to be (WPR)?*' which raises 6 guiding questions. These questions structure the analysis and discussion.

A further elaboration of my theory and methodology is to be found in section 3 and 4, but before putting forth my theoretical framework; I will outline the most important background information relevant for the analysis. This involves background knowledge of *environmental governance in aviation* as well as an introduction to Market-Based Measures as environmental policy.

2. Background

2.1 Environmental governance of aviation

ICAO consists of 193 member states and was formed in 1944 to administer and govern international aviation following a set of principles set out in the Convention on Civil Aviation also known as Chicago Convention (ICAO, 2020a). Decisions are to be reached as far as possible through consensus amongst its Member States and industry groups to insure global norms for international aviation (Höhne, 2013; ICAO, 1944, 2020e). This makes the decision making slow, which ICAO has pointed out as a challenge at several assembly meetings (ICAO, 2019a, art. A32-1, A33-3 & A40-20).

Environmental issues were not considered when writing and signing the Chicago Convention in 1944 (ICAO, 2006b). Some scholars argue, that environmental issues are alluded to in a section of article 44, stating ICAO's objectives, as having a responsibility to "*ensure development of principles and techniques of international air navigation*" (ICAO, 1944, art. 44), which includes responding to environmental issues in the aviation sector (Claude & Mahoro, 2019). However, such an interpretation is theoretical and disputable.

The convention rather reflects that it was written in a war context (World War II), where concerns of territorial rights and state sovereignty outshone socio-environmental considerations (Frankopan, 2015; O'Brian & Williams, 2013, Chapter 10). Nonetheless, ICAO was mandated to ensure climate governance of international aviation, by the Kyoto protocol in 1997.

As mentioned, decision-making is notoriously slow and it took ICAO 4 years, from getting their mandate in 1997, to declare that they would take into account adverse environmental impacts related to civil aviation (ICAO, 2001, art. A33-7, Anx. A1; Truxal, 2011). Initially ICAO was determined to develop an open emission trading system for international aviation, urging member states to refrain from unilateral action to address GHG emissions (Truxal, 2011). With slow progress the following years ICAO opened up, in 2010, for the possibility that 'some States may take more ambitious actions to offset an increase in emissions prior to 2020 (Bartels, 2012; Staniland, 2012). Consequently EU decided to include all aviation in the European emission-trading scheme (EU ETS) which they had advocated since setting up the ETS in 2005 (Staniland, 2012; Truxal, 2011). The EU ETS will be explained briefly below.

Besides the EU, several other environmental governance initiatives were made throughout the 2000's including, airlines establishing voluntary carbon offset programs for their passengers. Moreover various European airline companies started cooperating with rail companies to limit short-haul flights on routes where fast train links existed and IATA pledged to stabilize aviation's carbon emissions from 2020 and reduce carbon emissions of 50% by 2050 compared to 2005 (Balch, 2009; IATA, 2009).

2.2 Market-Based Measures as environmental policy

There are a whole range of different environmental policy measures available to deal with emissions from the aviation sector. Including different market-based measures, such as tradable permits, charges, taxes and fees or non-marked based measures such as restrictions, rules, permissions and control hereof (J. Evans, 2012, Chapter 6; Stavins, 2003). It is good to know that there exists these different policies, I will, however not describe them further, but focus on CORSIA. Besides CORSIA I will also describe the EU-ETS, as it is relevant background knowledge for the further analysis.

CORSIA is a market-based measure, which falls into the category of a tradable permit. Tradable permits set a cap (limit) on the permissible level of emissions required to reach the environmental objectives. Emission permits are divided between actors who can subsequently trade with the permits. The assumption here is that market dynamics will price the permit so emitters that can most cheaply reduce their emissions will do so, and that they will sell excess permits to emitters for whom it is expensive to reduce emissions. This way the desired reductions are reached most cheaply (J. Evans, 2012, Chapter 6; Stavins, 2003).

Whilst CORSIA has an emission cap, which is set by a CO₂ emission peak in 2020, the main purpose is not for the sector to trade excess permits with one another but rather to buy permits to emit. These permits can be bought by programmes, which are approved by CORSIA. The programmes are designed to create projects that reduce CO₂ emissions somewhere. The idea is, like for market based measures, that the emissions will be offset where it is most cost efficient rather than stipulating that it has to be the aviation sector reducing the emissions (Gudmundsson, 2019; Larsson et al., 2019; Preston et al., 2012).

A more traditional cap and trade measure is the European Union's Emission Trading Scheme (EU ETS). Like with CORSIA, a fixed cap is set on an amount of emission allowances for participants of the system. EU ETS on the other hand can only trade allowances within the system¹. Furthermore the cap is reduced every year so that total emissions fall, subsequently raising the price of the allowances (EU, 2020). Two more factors that distinguish the EU ETS from CORSIA are firstly that the EU ETS includes all EU member states, and secondly, measures allowances in CO₂ equivalents, whereas CORSIA does not include all members of ICAO but is voluntary until 2027 and includes only CO₂ and not CO₂eq in their allowances² (Erling, 2016).

3. Theoretical entry point

3.1 Philosophy of science

In this thesis my aim is to understand and expose the reasoning and rationality behind CORSIA rather than having an approach that seeks to evaluate or assess of the policy. I am inspired by a Post-structuralist philosophy of science believing that social realities should not be studied as objective entities with an objective truth but are constructed through subjective exchanges.

In the Post-structuralist tradition, social reality is understood relationally and contextually. Meaning that social reality is created between subjects (Juul & Pedersen, 2013). In trying to understand the rationale behind ICAO's scheme of Carbon Offsetting and Reduction, I find the Post-structural tradition is useful in explaining how reasons and rationality are socially constructed through

¹ Until 2020 it has been able to include a smaller portion of allowances from offsetting schemes, but as of 2020 it is possible to include them (Realistwizards, 2020).
² Although it is difficult to measure, non-CO₂ emissions make up of aviation emissions, the best scientific estimates suggest it is about 2-3 times higher (David S. Lee et al., 2009)

subjective exchange and therefore that they must be studied through language and in context. This will be elaborated further in section 2.2 below about governmentality.

Accepting that the social reality, I am studying, is subjectively constructed means that I will necessarily, to some extent, impose my own preconceptions on my argumentation. To try to limit my doing so I aim to restrict my questions to relational and contextual questions rather than interpretive questions. In practise this means framing my questions as *how* rather than *why*, to reveal the relational context rather than my interpretation of it (Lövbrand & Stripple, 2015).

3.2 Governmentality

Governmentality is made up of the words 'Government' and 'mentality'. In short the concept aims at understanding the mentality surrounding the governor and the governed, and create awareness of the past as well as the on-going struggles of influencing and defining the mentioned mentality (N. Miller & Rose, 2008).

The concept Governmentality was first described by Michelle Foucault, who defined it as "the conduct of conduct", playing on the double meaning of the word conduct It can be used both as the verb, 'to conduct' where the meaning refers to, *to direct* or *to lead*, but also as the noun 'conduct' where it refers to our behaviours or our actions (Lövbrand & Stripple, 2015).

While the concept of governmentality is mostly applied with the aim of understanding the relationship between a 'conductor' as a governor and the 'conducted' as a group of people, I apply it with the aim of understanding how the conduct of CORSIA affects the self-perception of ICAO and affects the overall environmental governance of international aviation.

Governance can be explained as "*the purposeful effort to steer, control or manage sectors or facets of society.*" (J. Evans, 2012, p. 4). A governance analysis can thus entail analysing, how sectors or facets of society are steered controlled or managed (J. Evans, 2012). Governmentality is based upon the same themes of steering, controlling or managing sectors or facets of society, whilst, a governmentality approach studies how the actors governing, rationalise and instrumentalise their governance, exercising power by governing people's perception of social reality. Miller and Rose

describe rationalities as styles of thinking that harness what is thinkable and instrumentalisation as the technologies and instruments that enable the thinkable to materialise. Rationalities and technologies are thus closely linked, reproducing one another (Miller & Rose, 2008).

Studying CORSIA from a governmentality approach thus entails trying to reveal how ICAO rationalises and instrumentalises their perception of social realities.

A central entry point to studying governance is through problematisation.

Carol Bacchi describes problematisation as a practice that disrupts taken-for-granted “truths” by studying the historical processes by which things become a problem for the governor (Bacchi, 2012). This is effective because problems as they are represented are constructed through the rationale of the actor presenting the problem and often include an idea of a solution. Problematisation can thus help identify the subjective reality of the governor, broaden what is thinkable, make visible the political aspects of governmentality and open up for critical judgement (Bacchi, 2012; Lövbrand & Stripple, 2015; Miller & Rose, 2008).

3.3 What is the Problem Represented to be? (WPR)

To answer my research question of why ICAO promotes CORSIA rather than any other policy measure, I have chosen to apply Bacchi’s WPR method (2009) that was developed to problematise policies whilst also identifying the impact of such a representation (Bacchi, 2009). The WPR method involves the following six questions (Q):

- Q1. What is the ‘problem’ represented to be?
- Q2. What assumptions underpin this representation of the ‘problem’?
- Q3. How has this representation of the ‘problem’ come about?
- Q4. What is left unproblematic in this problem representation?
- Q5. What effects are produced by this representation of the ‘problem’?
- Q6. How/where has this representation of the ‘problem’ been produced, disseminated and defended? How has it been (or could it be) questioned, disrupted and replaced?

The questions have their starting point in notions of discourse and history of thought (Bletsas & Beasley, 2012), discourse being “*a particular way of talking about and understanding the world*” (Jørgensen & Phillips, 2002, p. 1) and history of thought meaning that, social reality can be understood by understanding the historical and cultural circumstances leading to this reality because reality is a reproduction past realities adapted to the present circumstance (Jørgensen & Phillips, 2002).

Besides revealing the problematisation of the policy studied, Bacchi’s WPR reveals how “*some problem representations benefit the members of some groups at the expense of others*” (Bacchi, 2009, p. 44). In this respect, Bacchi’s approach goes beyond the problematisation described above, as it does not only question the rationale underlying a problem representation but also challenges problematisations with negative effects. In section 4.3 I will elaborate the purpose of the different questions and how they can be applied in the case of CORSIA.

4. Methodology

This chapter contains an overview of the methodological considerations taken throughout the thesis. This includes a justification for selecting CORSIA as case; an introduction to the data included and excluded; a description of my analysis strategy; an explanation of the actual analysis process and finally a brief section on limitation and bias reflections.

4.1 Case selection

As mentioned in section the introduction, ICAO’s emission reduction strategies are stated in their ‘Global Aspirational Goals’ document. They include:

- A 2% annual fuel efficiency improvement and
- Carbon neutral growth from 2020 onwards, to be achieved through:
 - i. New aircraft technology and operational improvements,
 - ii. Sustainable aviation fuels
 - iii. And the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) (ICAO, 2020h).

ICAO's main long-term strategy, is to introduce alternative fuels and technological and operational improvements, these aims are not anticipated achievable in the near future (David S Lee, 2018). CORSIA is thus particularly relevant to study because it is the main means by which ICAO aims to achieve its 2% annual fuel efficiency goal in the short term (David S Lee, 2018), starting from 2021 (ICAO, 2018).

It would be interesting to make an in depth study of all aspects of ICAO's Aspirational Goals but due to the time constraint set for the thesis, I have decided to concentrate on the policy of CORSIA whilst only touching upon the other aspects superficially where they have relevance to CORSIA.

4.2 Data

The purpose of my thesis is to understand ICAO's choice of promoting CORSIA from a contextual, and relational starting point. I have therefore prioritized data that could explain CORSIA's existence from a historical context, as well as in relation to ICAO's historical context. I have selected and studied a range of documents from ICAO that are relevant to gaining an understanding of these contexts.

The main empirical document I have chosen to study is Part I of ICAO's General Assembly Resolution from November 2019. This section of the Resolutions consists of chapters describing Constitutional and organisational matters of ICAO, how the organisation works and has come to work the way it does, as well as describing the development of general policy in special programmes such as CORSIA.

The General Assembly is ICAO's sovereign body with representatives from all 193 member states of ICAO (ICAO, 2020g). The Assembly meets every three years to discuss and review ICAO's complete work programme and agree on guidelines for the continuing and future work of the organisation (ICAO, 2020g).

The narrative set out in the Assembly Resolutions provides an understanding of the main narrative of the organisation, whilst simultaneously providing a contextual understanding of internal developments over the years, making the document relevant to study for my case.

Besides part I of the General Assembly Resolution from November 2019 I have studied relevant sections, of the General Assembly Resolutions dating from 2001 with insight in developments on ICAOs position in the area of emission reduction policies. 2001 was when ICAO first ICAO recognized aviation having a responsibility to mitigate their emissions. I have also chosen to study various documents referred to throughout the Assembly Resolution (2019) including:

- The Convention on Civil Aviation (The Chicago Convention) with Annex 16, Volume IV on CORSIA; (2018)
- The ICAO Business Plan, 2017-2019;
- The IPCC special report, *Aviation and the Global Atmosphere*, on the effect of aviation on the global atmosphere from 1999
- And a few other relevant documents that I came across whilst engaging in other literature.

To gain an understanding of the relational aspects of CORSIA I have used the available documents of providing country statements, giving an insight into how various countries view CORSIA. This includes statements of reservation from Brazil, China, India, Russia, Saudi Arabia, The United States and Venezuela as well as commentary notes from China and Russia on suggested alterations to the Assembly Resolution.

I would have liked to have gained a more nuanced understanding of the internal dynamics of ICAO, by gaining access to the minutes from various Assembly discussions. Unfortunately documents were only sporadically available, and if they were available, I could not find them. In fact data on the internal workings of ICAO was generally difficult to find, as their homepage was not very user friendly, and it was difficult to know what was publically available and what was not. It is worth noting that it is not just me that has had this problem. ICAO has previously been criticised for not being transparent (Murphy, 2019; Petsonk, 2019; Zürich, 2019).

As the aim of this thesis has not been to gain deep technical knowledge of the reach of CORSIA, but rather to understand the reasons and rationale behind the scheme, I have refrained from including documents referring to technical aspects of CORSIA. To gain sufficient knowledge of these aspects, I have reviewed academic literature on technical aspects of CORSIA, on aviation emissions, aviation environmental governance and the effects of offsetting.

4.3 Analytical strategy

I have analysed my material using the six questions from Bacchi's WPR (What is the Problem Represented to be) approach from 2009.

The process of analysing the six questions was not linear as each question was interrelated. It was thus necessary to continuously reassess the six questions at different stages of the analysis and add new findings that appeared along the way.

Question 1 involves identifying the problems that the policy is intended to solve, i.e. In the case of this thesis what are the problems that CORSIA is supposed to solve?

Question 2 relates to the underlying assumptions behind the problem representations. Under this question I have also chosen to include the assumptions behind the solution to the problems, as doing so is useful later in the analysis. The assumptions are identified, by identifying the key concepts and categories of the problem representation. I then deconstruct the problem representation to what is factual, based on natural science, and what is normative based, and point out the latter as assumptions.

Question 3 involves a contextual analysis of how the particular problem representations have come about. Tracing the background of the representation destabilizes the assumption and helps reveal the power relations that have formed the problem representation.

Question 4 questions what is considered unproblematic, or what is taken for granted as acceptable, thus questioning what is not problematized and what sort of solutions are left out as a consequence. This builds especially on the findings from the previous questions.

Question 5 looks at the symbolic and material effects of the problematisation. It does so by looking at: the *discursive effects*, i.e. how the problematisation effects the constructed reality; the *subjectification effects*, i.e. how it effects ICAO's self-understanding, as well as *lived effects*, or what material effects it has on the outside world.

Question 6 discusses how and where the problem representations have been produced, disseminated and defended and discusses how these problem representations could be challenged (Bacchi, 2009; Bletsas & Beasley, 2012)

4.4 Data analysis

I have analysed the selected documents using Bacchi's analytical framework.

I coded the main document³ using the computer software NVivo. NVivo is useful in helping to organise and manage large amounts of text, thus making it easier to organise the text and my own comments into codes (Brinkmann & Tanggaard, 2015, Chapter 23). These codes then helped me to find the appropriate references whilst writing the analysis. I initially coded the text into three categories guided by the three main governmentality elements presented by Rose and Miller, *Problem, Rationale and Instrumentalization*.

I soon found that these codes were not detailed enough so I added more categories.

For the problem representations of ICAO I created the following 5 categories: *Technological, Economic, Environmental, Legal, Organisational*. I could thus code passages into different categories e.g. *rationale* and *organisational* or *problem* and *legal* natures theming the text in greater detail.

I also created categories for *Narratives/responsibilities* and *mention of MBM*, as I considered it necessary to have independent categories for themes in text dealing with this. To identify other relevant documents for my analysis I created a category called *Reference documents*. I also created some other categories on-going that I did not actively use in the analysis.

When I searched the reference documents I had identified whilst reading the Assembly Resolutions, I was able to contextualise them in relation to where I had identified them in the Resolution. E.g. I was able to find The Assembly Resolution mentioned in the IPCC special report on Aviation and the global atmosphere in a passage I had coded as *Environmental* and *organisational* and *rationale*. When I read the IPCC report I was thus reading it within the framework of these categories, which helped to give me an understanding of the background for what was written in the Assembly Resolution.

I have reviewed academic literature on the technical aspects of CORSIA, aviation emissions, aviation environmental governance and the effects of offsetting. This was done in a semi-structured way. I used the Danish Royal Library's search machine and narrowed the search appropriately. Due to time constraints during my research, I chose only to include the articles I deemed relevant after reading the different abstracts and relevant articles identified through snowballing (Wohlin, 2014). I wrote

³ Part I of the Assembly Resolutions as in force of 4 October 2019

review of the literature I had read so I had an overview of the different arguments in the literature and could include them where relevant.

4.5 Limitations

The aim of this thesis' is to understand why ICAO promotes CORSIA rather than other policies, and it is limited to an actual evaluation of CORSIA or an overall evaluation of environmental governance of international aviation.

Due to the available time and data, I do not go into depth with the aspect of the analysis, questioning the internal relations of ICAO as an organisation. I can only assess more general tendencies, based upon the overall narrative that is available in my data.

4.6 Bias

I have tried to remain unbiased in my research, however, I am personally engaged in questions of flying and sustainability, and was critical of the aviation sector at the outset of this thesis. I have throughout the analysis, however, been aware of this bias and have tried to remain nuanced by staying open to ICAO'S agendas and trying to understand and explain them.

5. Analysis

This chapter presents the analytical findings. Q1 to Q4 reveal the reasoning and rationale behind CORSIA as perceived through the empirical material available. These findings are then discussed using Q5 and Q6 in relation to my theoretical approach in section 3.

5.1 Q1 What is the Problem Represented to be in CORSIA?

There are three main problems represented by CORSIA:

1. An emission problem
2. A problem of inadequate technological development and
3. A problem of possible duplicative state or regional Market Based Mechanisms (MBM)

These three problem representations are identified recurrently throughout the general assembly meetings as well as in all other ICAO documents dealing with CORSIA.

The first problem, regarding emissions is identified in CORSIA's purpose statement, acknowledging that CORSIA is to *"address the increase in total CO2 emissions from international aviation above the 2020 levels"* (ICAO, 2020a).

To be more specific, the main problem represented here is aviation CO2 emissions to the atmosphere above 2020 emission levels, contributing to global warming (GW)

The second problem, regarding inadequate technological development, is mentioned in CORSIA's statement of the necessity for MBMs to reduce emissions, at their 37th general assembly in 2010. Here they recognize that the technological efficiency improvement goals of 2% annually, set by their aspirational goals, are unlikely to be adequate to reduce aviation's emissions contributing to Climate Change (CC) and they write that *"a comprehensive approach, consisting of a basket of measures including [...] market-based measures to reduce emissions is necessary"* (ICAO, 2019a, art. A40-18). Technological development is simply not moving fast enough to mitigate aviation's increasing emissions.

As part of ICAO's medium-term aspirational goals, CORSIA represents a key component, aiming to keep global net carbon emissions from international aviation at 2020 levels. Meanwhile CORSIA is presented as a temporary measure in several other documents (ICAO, 2018, 2019a, art. A40-19, art. 9e; Steele, 2020) In ICAO's long-term aspirational goal of reducing international carbon emissions by 50% by 2050 compared to 2005 levels, technological measures are expected to play a much larger role than CORSIA (ICAO, 2020h; Steele, 2020).

The third problem represented in CORSIA, regarding possible duplicative state or regional MBM, is likewise mentioned in several documents Indeed it is explicitly announced in A40-19, where they note that the aim for CORSIA is to work as a *"single global carbon offsetting scheme, as opposed to a patchwork of State and regional MBMs"*. The emphasis on CORSIA being the single global carbon

offsetting scheme is intended to prevent emissions being accounted for in several schemes as might be the case in a *patchwork* of MBM's (ICAO, 2019a, art. A40-19).

5.2 Q2 What assumptions underlie these problem representations?

For each of the three problems, a number of assumptions are made. Some assumptions occur in several of the problem representations, as will become apparent when I present them.

Assumptions behind the emissions problem:

Several assumptions are made in the main problem representation, that CO₂ emissions to the atmosphere above 2020 emission levels from aviation, contributing to global warming.

In so far, as climate science on anthropogenic global warming is accepted as true, it is incontestable that aviation emissions contribute to global warming (Penner et al., 1999).

On the other hand, it is an assumption that only CO₂ is the problem in reality, CO₂ emissions make up only part of an airplane's emissions. Non-CO₂ emissions also take up a significant share of aviation emissions. The best scientific estimates suggest that CO₂ emissions only constitute 25-50% of aviation's GHG emissions (Lee et al., 2009), and yet these are not included in CORSIA

Secondly, there is the eye-catching assumption that aviation emission levels from 2020 are an acceptable emissions limit for aviation, to mitigate global warming, resulting in unambitious goals for tackling emissions.

Another assumption that is apparent, both with the emissions problem representation as well as in the other two problem representations is that ICAO has and continues to have sole responsibility as governing body to "*exercise continuous leadership on environmental issues relating to international civil aviation, including GHG emissions*" (ICAO, 2019a, pt. A40, para. 2a). This *leadership* has been subject to many discussions both internally in ICAO (ICAO, 2016b, 2016a) as well as amongst scholars, remarking that this *leadership on environmental issues* conflicts with several of the objectives of ICAO as stated in the Chicago Convention on civil aviation (Larsson et al., 2019; Preston et al., 2012),

one example being that *leadership on environmental issues* is not included in the Convention, whilst it is included that growth of aviation is a priority (ICAO, 1944).

Meanwhile, it is also an assumption that offsetting aviation's CO₂ emissions will mitigate the problem. Historically offsetting has been notorious for not performing as promised. A study by the Stockholm based research institute Öeko-Institut evaluating 5.500 offsetting projects, found that 85% of these project were not delivering the CO₂ reductions that they were certified for (Lazarus Carrie Lee Pete Erickson Randall Spalding-Fecher, 2016). Even if CORSIA develops offset standards with projects delivering actual CO₂ reductions, scholars raise concerns regarding the long-term efficacy of the offsetting schemes, because whilst the emitted GHGs will remain in the atmosphere for a long time, unexpected events can affect the offsetting projects. For example, a forest planted as part of an offset scheme can be felled, technological investments in mitigating technologies can fail, the offsetting providers can go bankrupt. All these possible scenarios that are quite likely to happen within the atmospheric lifetime of the greenhouse gasses emitted. (Gudmundsson, 2019; Schmidt, 2004).

Assumptions behind the problem of inadequate technological development

The second problem, of inadequate technological development reflects the basic assumption that climate change and emissions from aviation are a technical problem and need a technological solution. This is evident throughout ICAO's statements (ICAO, 2017b, 2020b). Tim Schwanen et al. (2011) argues that this assumption is made not only in the aviation sector but that it is an overall trend for mitigation strategies in the whole transport sector, to see GHG-emissions and climate change as a technical problem needing technical solutions. Following this claim Schwanen argues that achieving the deep cuts in carbon use in transport, requires far more radical solutions than technical innovation (Schwanen et al., 2011).

Another assumption behind the second problem of inadequate technological development is that technological development is limitless. ICAO thus refers to "*the significant technological progress made in the aviation sector, with aircraft produced today being about 80 per cent more fuel efficient per passenger-kilometre than in the 1960's*" (ICAO, 2019a, art. A40-18). In reality, the main efficiency gains were made in the early years of aviation development. Since 1999 aircraft fuel efficiency has

only increased with 10% (Penner et al., 1999) suggesting that the technological development curve is flattening.

The final main assumption of this second problem is that increased growth in aviation is a priority. Aviation growth is argued as a priority because, it plays a “*vital role [...] in global economic and social development*” (ICAO, 2019a, art. A40-18). This is an important assumption for ICAO that is both emphasised in the assembly resolution as well as in the objectives of the International Aviation Convention (ICAO, 2006a, pt. 44). This is why technological efficiency is a priority rather than MBM, as efficiency gains represent an advantage for aviation development, whereas MBM risk distorting the market and inhibiting development.

Assumptions behind possible duplicative state or regional MBMs

The third problem representation has several assumptions, some of which are identical or similar to assumptions identified above.

The two main assumptions of the problem of possible duplicative state or regional MBM’s are, firstly, that ICAO has to make a global market-based mechanism (GMBM) if they want to remain the sole global leader on environmental issues, because if ICAO does not make a GMBM to mitigate GHG emissions, a patchwork of State and regional MBMs will occur. Secondly, ICAO assumes that multiple State and regional MBMs involve the risk of companies having to account for their emissions multiple times, which will distort the market (ICAO, 2019a, art. A40-19 para.8).

Behind these assumptions are another set of assumptions, firstly that a GMBM is most efficient (ICAO, 2013, art. A38-18), secondly that aviation development is a priority (ICAO, 2006a, pt. 44) and finally there is also the assumption, as mentioned previously, that ICAO has responsibility to exercise leadership on environmental issue.

5.3 Q3 How have these problem representations come to prominence?

To identify how these problem representations have come to prominence requires a relational and contextual understanding of the problem representations. I seek this understanding, partly by tracing when the ‘problems’ were first represented at ICAO’s general assemble, and partly by drawing on findings from other studies. I present the findings below in accordance with the identified problem representations. Whilst some of the problem representations are developed in parallel, influencing one another, I present them separately to reduce complexity.

Emission problem representation

The problem representation of anthropogenic emissions to the atmosphere contributing to global warming first became prominent globally at the Earth Summit in Rio de Janeiro in 1992. Karin Bäckstrand and Eva Lövbrand argue that global awareness on climate change caused by anthropogenic GHG emissions actually originated from environmental debates from the 1970s that became prominent by the mid1980s (Lövbrand & Bäckstrand, 2007).

In aviation, environmental concerns were problematised parallel to environmental concerns being problematised publically in the late 1970s (Ndikum, 2013). In 1981 ICAO, thus, adopted recommendations on limiting emissions of smoke and certain pollutants into an annex (*Annex 16 - Aircraft Noise*) that had been added to the Chicago Convention a decade earlier on aircraft noise and renamed the annex *Annex 16 - Environmental Protection* (Ndikum, 2013, pp. 468–469).

Meanwhile, the problem representation of emissions took longer to become prominent in Aviation. As mentioned in the background section, it was first in 2001 that ICAO recognized aviation’s responsibility for the adverse environmental impact related to civil aviation activity (ICAO, 2001, art. A33-7 Anx. A1). This was after they had been urged to do so in the Kyoto Protocol (1997) and after the release of the special report, *Aviation and the Global Atmosphere* by the IPCC in 1999, reviewing the adverse effects of aviation on the climate (Penner et al., 1999; United Nations, 1997). Furthermore, ICAO’s recognition of aviation’s responsibility for the adverse environmental impact caused by civil aviation activity did not result in further amendments or extra annexes in the Chicago Convention until 2017 and 2018 when ICAO added two additional volumes to annex 16; volume 3 -

Aeroplane CO₂-Emissions and Volume 4 Carbon offsetting and Reduction Scheme (CORSIA) (ICAO, 2017a, 2018).

The slow speed of the recognition of this problem representation suggests that there were other priorities preventing ICAO from acting as resolutely with regards to emission problems as with pollution problems in the 1980s. Scholars suggest that there were conflicting opinions, especially with regard to the CBDR within ICAO member states as mentioned in the introduction (Bartels, 2012; Erling, 2016). This conflict is traceable in the official member state reservation documents to resolutions at the 40th General Assembly meeting in 2019. It shows that of the opposing reservations all revolve around statements regarding climate change or CORSIA and mostly by developing countries (ICAO, 2019b, 2019c, 2019d, 2019f, 2019e, 2019g, 2019h).

Two publicly available work papers, with suggestions for changes, from the previous 39th Assembly Resolution reveal how China, India and Russia wanted the language regarding aviation's responsibility for emissions downplayed (ICAO, 2016b, 2016a).

Meanwhile, the United States had reservations to the 39th Assembly Resolutions Guiding principles for MBM (ICAO, 2013, art. A37-2 Anx. p), that states that MBMs should take into account the CBDR (ICAO, 2016c).

Other scholars argue that ICAO's final decision to publically admit to the problem of aviation emissions was a consequence of external pressure from external actors and that their changing position, reflected a pragmatic conclusion to "*jump before they were pushed*" (Staniland, 2012). They argue that this conclusion was reached because of a fear that if ICAO did not propose emission reductions at the Conference of the Parties (COP) 15 meeting in 2009, then a fundamental re-examination of environmental governance of international aviation might be proposed, which could potentially lead to an inclusion of aviation in the UNFCCC, and to the adoption of very harsh regulatory systems (Henriksen & Ponte, 2018; Soria Baledón & Kosoy, 2018; Staniland, 2012).

Inadequate technological development problem representation

The problem representation of inadequate technological development first became prominent when the IPCC published their special report on Aviation and the Global Atmosphere in 1999. Until that

point the common notion was that technological innovation and operational improvements would be enough of cope with potential CO2 problems (Staniland, 2012). Meanwhile, the IPCC report stated clearly that:

“Although improvements in aircraft and engine technology and in the efficiency of the air traffic system will bring environmental benefits, these will not fully offset the effects of the increased emissions resulting from the projected growth in aviation” (Penner et al., 1999, p. 11)

This meant that aviation growth was predicted to outpace technological development, and with this finding, the problem representation of inadequate technological development came to prominence.

Many external factors enhanced this technological problematisation. Angela Oels (2005) argues that the UNFCCC from the outset framed the climate challenge as an issue of planetary management and that the IPCC were likely to come up with a technological solution, due to their natural scientific approach (Oels, 2005). As mentioned in the assumption section above, Tim Schwanen makes a similar argument for technological bias, suggesting also that there is a similar trend visible regarding science and emissions mitigation in the transport sector and that it focuses mainly on technological solutions (Schwanen, Banister, & Anable, 2011).

John S. Dryzek suggests that the technology bias has been prominent throughout society from the 1980s and is still widespread today, following modernity’s belief in progress and especially an *“unlimited confidence in [...] technologies to overcome any problems, including environmental problems”* (Dryzek, 2013, p. 52).

Besides the tendency in society to have faith in technology, Mónica Soria Baledón and Nicolás Kosoy (2018) suggest another significant reason as to how the technological problem representation came to prominence in aviation. Namely that oil prices have historically been fluctuating a lot. When the first successful bio-fuel blends were made, the sector focused even more on developing increased fuel efficiency and fuel-blends with biofuel, as reduced dependency upon oil would make aviation

less vulnerable to geopolitical turmoil, with biofuel being a more stable source of fuel (Soria Baledón & Kosoy, 2018).

Finally there are some structural and organisational circumstances that have contributed to bringing the technological problem representation to prominence. Firstly, the practical fact of, depreciation, resulting in an aircraft losing its value after only 15-25 years (IATA, 2016). Aviation as a sector competes on very small margins (Henriksen & Ponte, 2018), meaning that improvement of technology and development of biofuels is in the interest of industry. Secondly, unlike the previously mentioned CBDR discrepancies in ICAO, technology is something that is easier to agree upon as a solution because all involved actor's gain with technological improvements.

Possible duplicative state or regional MBM problem representation

The problem representation of possible duplicative state or regional MBM was already apparent in 2001, when ICAO recognized aviation's responsibility to mitigate the adverse environmental impacts.

In the 33rd Assembly resolutions from 2001 ICAO thus urged "*States to refrain from unilateral action to introduce emission-related levies [...]*" (ICAO, 2001, art. A33-7 appx. I) implying that unilateral action would be a problem. This early awareness that some states could wish to implement unilateral action to address aviation emissions shows that the discussions about if or how to mitigate aviation emissions were already prominent in the early 2000's. However, the exact problem representation of possible duplicative state or regional MBMs was first presented in the latest General Assembly resolution in 2019 (ICAO, 2019a, art. A40-19 para. 18), despite the question having been much discussed earlier.

Several scholars argue that the EU has played an important role in bringing the problem representation of state and regional MBMs to prominence i.e. (Erling, 2016; Lindenthal, 2014; Preston et al., 2012).

Since the Kyoto Protocol, the EU has seen themselves as climate advocates (Lövbrand & Bäckstrand, 2007) and at ICAO Assembly meetings the EU has consistently advocated for a more climate-oriented

agenda, pushing for ICAO to introduce more emission reductions.(Lindenthal, 2014; Staniland, 2012). Meanwhile, the EU only has an observer status in ICAOs political negotiations, because it is not a member of ICAO. Therefore it has no direct voting power at t Assembly meetings (Erling, 2016).

In 2010 ICAO removed their 33rd Assembly statement on refraining from unilateral action to reduce aviation emissions, and recognized that *“some States may take more ambitious actions to offset an increase in emissions prior to 2020”* (ICAO, 2010, art. A37-18 appx. C). Subsequently the EU began to advance their emission trade scheme (ETS) (see section X) to include aviation emissions in the ETS from 2012 (European Commission, 2019; Lindenthal, 2014).

The inclusion of aviation in the EU ETS initially affected both air traffic within the EU, as well as air traffic from non-EU countries either departing from or arriving in a country within the EU (Larsson et al., 2019).

Several scholars argue that the EU was in practise trying to forcefully govern the whole aviation sector (Lindenthal, 2014; Staniland, 2012). The allowances issued for airlines corresponded to 95% of aviation’s emissions between 2008-2012. The decision was taken that from 2021 there should be a linear annual reduction until 2054, by which year no more airline allowances are to be issued. If airlines need additional allowances, they can buy the regular allowances that are sold at market price (Larsson et al., 2019).

The inclusion of third-party aviation emissions was decided upon without the agreement of the states concerned (Lindenthal, 2014). International opposition to the EU’s move was significant. China blocked billions of US\$ worth of sales agreements with the EU and prohibited their national airlines to comply with the EU’s scheme. The US also threatened sanctioning the EU 23 countries formed a declaration with various threats and a coalition of states and industries took the EU to court (Bartels, 2012).

The main reason for this outrage was, that the opposition claimed that the EU was violating the Chicago Convention. They claimed that the Convention prohibits the taxation of jet fuel⁴, and a scheme addressing international aviation emissions, should be set up by ICAO (A. Evans, 2016).

Whilst the EU won the case in court, international pressure was too big, and the EU set the global reach of the ETS on hold until 2024, so the scheme would in the mean time only cover inter-EU flights (Larsson et al., 2019).

It can be argued that this background is what brought into prominence the new problem representation of possible duplicative state or regional MBMs. ICAO's articulation of this problem poses a signal to the EU indicating that ICAO does not wish CORSIA to run parallel to and EU ETS having international aviation included in their scheme.

5.4 Q4 What do these problem representations take for granted and leave unquestioned?

There are two things that are taken for granted and recur in all-three problem representations; the first one being, that the Chicago Convention on International Civil Aviation is incontestable and the second being that the notion of sustainable development within aviation is taken for granted.

Incontestability of the Chicago Convention

Regarding the incontestability of the Chicago Convention, this is apparent in all three problem representations. All three refer to the priority of ensuring the growth of international aviation, which was first mentioned in the founding objectives of ICAO. This can be seen in the Chicago Convention article 44, which states amongst other things, that ICAO must:

⁴ This is in fact not in the convention, but a resolution from 1996 (Larsson, 2019)

"Insure the safe and orderly growth of international civil aviation throughout the world; [...] Meet the needs of ... safe, regular, efficient and economical air transport; [...] Prevent economic waste caused by unreasonable competition"(ICAO, 1944, 2006a).

The assumption of the incontestability of the Convention can be seen throughout the Assembly resolution where the principles of the Chicago Convention are mentioned parallel to the principles of the UNFCCC and the Paris Agreement (ICAO, 2019a), which they refer to as equally incontestable.

Sustainable development

The second thing that is taken for granted in all-three problem representations, is the notion of how sustainable development is understood. Sustainable development is frequently mentioned in ICAO (ICAO, 2017b, 2019a, 2020c), referring to the concept developed by the Brundtland commission from 1987, where economic growth, social development and environmental protection are linked (Brundtland, 1987). When ICAO mentions sustainable development, however, it is linked more to the socio-economic aspects of sustainable development, emphasising that: *"aviation is important for future economic growth and development, trade and commerce, cultural exchange and understanding among peoples and nations"* (ICAO, 2019a, art. A40-17 appx. A) and that measures to obtain sustainable development must guarantee *"[...] safeguards [...] against inappropriate economic burden on international aviation"* (ICAO, 2019a, art. A40-19 para. 16).

ICAO links their notion of sustainable development to the UN's 17 Sustainable Development Goals (SDG), claiming that *"the work of the Organization on the environment contributes to 14 of the 17 United Nations Sustainable Development Goals (SDGs)"* (ICAO, 2019a, art. A40-17 appx. A).

The broadness of the SDG's and the lack of measurability of the goals have been widely criticized since the goals were set out in 2015. It is argued that it is too easy to claim to be pursuing sustainable development, by interpreting the goals to suit desired objectives (McArthur & Rasmussen, 2019; The economist, 2015).

ICAO's interpretation of the SDG's also relates to the premises of substitutability; meaning that different elements of sustainability can be measured and substituted relative to one another (Faran, 2010). Essentially, the problem representations presented through CORSIA and its aspirational goals, argue that socio-economic growth can justify a tolerable degree of carbon emissions – namely the cap set in ICAO's aspirational goals of 2020 (ICAO, 2019a, art. A40-18, 2020h).

To summarise what is taken for granted in the problem representations and what effects these have; the incontestability of the Chicago Convention means that CORSIA is rooted in a set of objectives that have the growth of aviation as their main objective; which is not very compatible to the objective of reducing emissions from aviation. The objectives from the Chicago Convention are furthermore supported by the second thing that is taken for granted; that sustainable development is about balancing economic, social and environmental concerns, and that these are substitutable with one another.

6. Discussion

As was stated previously in the analysis section, Q5 and Q6 of the WPR approach are not included in the analysis, but will be discussed in the light of the theoretical framework I presented in section X, whilst drawing on the analytical findings from Q1-Q4. Q5 What effects are produced by this representation?

6.1 Q5 What effects are produced by this representation?

Bacchi's WPR approach suggests that problem representations produce both symbolic and material effects (Bletsas & Beasley, 2012, p. 33). It is relevant and important to identify both types of effect, as they co-create governmentality, defining our social reality and thus how our lives are lived, or in the case of ICAO, how aviation emissions are governed (Miller & Rose, 2008).

These effects are explored in this section, by considering: 1. the *discursive effects*; 2. the *subjectification effects*; and 3. the *lived effects* (Bletsas & Beasley, 2012, p. 33).

Considering that CORSIA will not be fully implemented until 2021 the current effects of CORSIA are limited. However, I will discuss the anticipated effects of the identified problem representation, based on my analytical findings and existing research on offsetting

The *discursive effects* of any problem representation relate to the idea that systems of thought are constructed in a social reality, which in turn serves to limit what can be thought of or said, and subsequently also affect what is done (Bacchi, 2012). As argued in section 3.1 and 3.2 the discursive effects are constructed through subjective exchange of what is said and done.

The most obvious discursive effect of CORSIA must thus be the reproduction of the existing notion that aviation growth can be sustainable, meaning that aviation traffic can grow whilst subsequently addressing the resulting GHG emissions. This notion is visible in the introductory statement *About ICAO* on ICAO's homepage. Here they state their purpose of reaching consensus on practices that support an economically sustainable and environmentally responsible civil aviation sector (ICAO, 2020d). A notion that is also visible in the statement of intent with MBMs, stating that the intention to “[...] *support sustainable development of the international aviation sector [including to] support the mitigation of GHG emissions from international aviation [whilst insuring to] not impose an inappropriate economic burden on international aviation*” (ICAO, 2019a, art. A40-18 annex. A).

These statements establish and reinforce the discursive notion, that aviation growth can be sustainable. The resulting action taken includes for example ICAO creating advisory boards such as the Advisory Group on CORSIA (AGC), ICAO's Technical Advisory Body (TAB) and its Committee on Aviation Environmental Protection (CAEP) (ICAO, 2019a, art. A40-19). These advisory boards are established as independent advisory boards, but with the aim of making recommendations and advising on matters regarding MBM and the development of technological goals (ICAO, 2019a, art. A40-19).

The discursive notion that aviation growth can be sustainable is backed up internationally by the Special Report on Aviation Emissions by the IPCC from 1999. The report has a section proposing ways to address aviation emissions whilst not significantly affecting the growth of the sector, suggesting cooperative schemes to reduce emissions. Practically this means that the aviation sector should

cooperate with other sectors where it is cheaper to reduce emissions and thus help finance their own mitigation by sharing the total sum of emission reductions made⁵.

As mentioned in section 3. several scholars argue that this is a societal discourse. They argue in different ways that the societal discourses' common premise is that economic growth and industrialisation can be linked to environmental protection (Dryzek, 2013; Lövbrand & Bäckstrand, 2007; Oels, 2005; Schwanen et al., 2011).

The main discursive effect of CORSIA I thus argue is to reinforce the discursive notion that aviation growth can be sustainable both internally in ICAO as well as in a broader societal context.

The *subjectification effect* builds on a Foucauldian explanation of *subjectification* as shaping who we are and what we know (Lövbrand & Stripple, 2015, p. 96). The subjectification effect of CORSIA, thus looks at the effect that the various problem representations have on ICAO's self-understanding.

The two subjectification effects created through CORSIA that I have identified, build on the findings in the analysis, and resonate both through CORSIA and in ICAO's general attitude to environmental matters. The first subjectification effect relates to how the scheme takes for granted, ICAO's role as exclusive global leader of aviation, including within environmental governance, claiming this by stating that CORSIA is to be the *only* global MBM (ICAO, 2019a, art. A40-19 para. 18).

The second subjectification effect builds on the finding in Q4, where I argue that ICAO justifies a tolerable degree of carbon emissions for the sake of socio-economic growth. . This substitutable approach to carbon emissions and socio-economic aspect results in a state, I argue, where ICAO downplays the importance of aviation's emission-impacts and juxtaposes emission responsibilities with socio-economic responsibilities.

This is exemplified by the way ICAO plays down the adverse impact on the climate of international aviation. Whilst it is arguably one of the biggest challenges for aviation, it is not even mentioned in the Chicago Convention. Moreover, questions of aviation emissions and environmental concerns are

⁵ The effects of this advice are discussed below in the section of *lived effects*.

grouped together in an annex on aviation noise, that was added in the 1970's (ICAO, 2020f; Kalsi, 1974). ICAO also consistently mentions *aircraft noise and aircraft engine emissions* together, leaving an impression that noise and climate change are equally important (Ndikum, 2013, pp. 468–469)..

Likewise when mentioning the aviation sector's responsibilities to address GHG emissions, ICAO juxtaposes the statement to the socio-economic responsibilities of ICAO. An example of this was when ICAO stated their recognition of aviation's responsibility to address GHG emissions in 2001. Here, they juxtaposed the GHG issue to ICAO's objectives of assuring aviation development, emphasising their responsibility to "*achieve maximum compatibility between the safe and orderly development of civil aviation and the quality of the environment*"(2001). This leaves the impression that ICAO's main concern is that climate policies must not affect the future development of aviation, as the socio-economic benefits of aviation outweigh environmental concerns.

Other scholars make similar arguments, tracing this as a historical tendency for the aviation sector (Ghosh, 2014; Soria Baledón & Kosoy, 2018).

My assertion is that this existing subjectification effect is reinforced through CORSIA.

The lived effects refer to any material impact that the problem representations might have on the world at large. As previously stated, CORSIA has not had much time to generate any material impact yet, so it is only possible to speculate about the effect it may have on people's lives and habits. One can be hopeful, that an increased awareness of the consequences of present day aviation emissions will arise, motivating people to change their flying habits. However, such a scenario cannot be taken for granted. In fact Kate Raworth describes in a micro-level experiment, how pricing behaviour and putting behavioural actions that were previously valued ethically, on the market, can have the reverse effect, increasing unethical behaviour because the monetary value is lower than what the moral value was (Raworth, 2017).

Whilst the lived effects on people's habits are difficult to anticipate, hypothetical lived effects of an offsetting programme can be estimated, as a broad range of research already exists on the subject. Since carbon offsetting emerged as a concept, it has met much critique for being misleading, in some cases having no impact and in the worst case, creating more harm than good (Gudmundsson, 2019; Lazarus Carrie Lee Pete Erickson Randall Spalding-Fecher, 2016; Lyons et al., 2014; Vidal, 2019).

William Boyd and Scott Prudham (2017) warn of the risk of adverse ecological effects caused by land-use change in places where offsetting projects are implemented, due to it being economically feasible to manage nature differently, thus changing the natural ecological state. Offsetting projects have also been known to cause food scarcity and displacement of the local population, because the projects often interfere with the lands the people's livelihood was dependent upon (Lyons et al., 2014). Furthermore the temporality aspect mentioned in section 5.1 is worth mentioning again. i.e. that GHGs will remain in the atmosphere for a long time, whereas offsetting programmes have a tendency to fail long before the GHG-emission has left the atmosphere. (Gudmundsson, 2019; Schmidt, 2004). Finally, the ethical concern is also relevant, as offsetting normally involves rich privileged countries letting poor countries lift the burden of emissions that that the rich countries have historically been responsible for (Táiwò, 2019).

In relation to this critique, one can be hopeful, that a global offsetting program like CORSIA will demand ethical practises with visible results. Unfortunately, initial evaluations made by TAB, ICAO's Technical Advisory Body on CORSIA, of the organisations that are to be eligible to sell offsets under CORSIA do not in fact live up to the Eligibility Criteria (TAB, 2020). Besides this critique the previous mentioned Öko-insitute draws attention to the conflict in time scenarios mentioned above, as CORSIA offsets only require that projects guarantee that carbon is stored until 2037, whereas the IPCC estimate that a CO₂ molecule remains in the atmosphere for 100 years. (Lang, 2020; Zürich, 2019).

Regarding the problem representation related to technical development within aviation, there is a wide concern, that increased reliance on biofuel could have a series of negative spin-off effects, both ecologically and economically. The need for large amounts of specific crops for fuel production is likely to increase intensified cultivation as well as causing global food prices to rise, due to increased land-use demand, especially affecting most vulnerable populations (Boyd & Prudham, 2017; Kovacs, 2015).

Lastly concerning the lived effect of ICAO announcing that CORSIA is to be the only Global Market Based Measure, (GMBM), one of the highly discussed topics is what this will mean for the European Union's offsetting project, EU ETS. While it is in the EU's interest to keep intra-European aviation

within EU ETS, because of a number of political factors⁶ (Efthymiou & Papatheodorou, 2020), ICAO has currently no plans for ETS allowances to be accepted as offset credits under CORSIA (EASA, 2020) which means that EU ETS on aviation credits will most likely be withdrawn in 2021 (Erling, 2016))

6.2 Q6 How and where is this representation of the problem produced, disseminated and defended? And how could it be challenged

The following section examines how and where the represented problems that CORSIA is expected to tackle, are produced, disseminated and defended, discussing the analytical findings from a theoretical point of view. The first part interprets the reasoning and rationale behind CORSIA whilst the second part evaluates the significance for the governance surrounding aviation and assesses future alternative mitigation possibilities for aviation.

Pressures leading to the problem representations in CORSIA

Through my analysis of CORSIA I have found that it was mainly external pressures that forced ICAO into an awareness of the represented problems. Accelerating climate change forecasts and international awareness of GHG emissions' adverse impact on the climate constitute the overriding catalyst to these pressures (Lövbrand & Bäckstrand, 2007), resulting in aviation emissions being addressed at both intergovernmental levels (United Nations, 1997), Supranational levels (Lindenthal, 2014; Staniland, 2012), national level as well as within NGO's and industries (Balch, 2009; T&E, 2010).

This new international awareness of the link between aviation emissions and climate change resulted in global pressure for the aviation sector to accept accountability for their GHG emissions and try to limit them. This put pressure on ICAO to take action to reduce aviation GHG emissions, ICAO being historically the global governor for international aviation (Höhne, 2013). Meanwhile ICAO could not agree internally on appropriate measures to address GHG-emissions. There were discrepancies

⁶ 1. They are more ambitious than CORSIA, 2. They are included in EU's goal to reduce the regional emission reaching the Paris agreement, if they are not included, EU will have to find a different way of reducing their emissions or reduce their ambitions (Efthymiou & Papatheodorou, 2020)

between this *new rationale* and the existing rationale of aviation having socio-economic responsibilities (ICAO, 2020d).

It is arguable that these discrepancies were partly overcome when the EU decided to include all aircraft entering the EU into their Emission Trading Scheme (ETS) by 2024 (Larsson et al., 2019). Doing so, the EU directly challenged the leadership and the governmentality set out by ICAO (Staniland, 2012). ICAO could not condemn the EU for their action, as it was not violating any objectives of ICAO, but was in fact promoting a measure recommended by ICAO itself (ICAO, 2007, art. A36-22). ICAO had stated that MBMs were the most appropriate measures to be used for addressing GHG emissions not able to be mitigated by technological development (ICAO, 2007, art. A36-22). Furthermore ICAO is obliged to “[...] support the work and activities of any existing or future regional civil aviation bodies [...]” as long as the regional body serves the interests of ICAO (ICAO, 2019a, art. A27-17).

I argue that the internal disagreements in ICAO became easier to resolve when the EU included aviation emissions in their Emission Trading Scheme. Disagreements over relative emission responsibilities (the CBDR discussion) became irrelevant with the EU ETS, as ICAO had to either out-aside disagreements and take measure or accept the measure taken by the EU. This enabled ICAO to agree on CORSIA and keeping the power to exercise governmentality within ICAO (Bartels, 2012; Staniland, 2012).

The difference between ICAO’S governmentality and that of the EU is that CORSIA reinforces the notion of sustainable growth, aiming for carbon-neutral growth and thus in practice not aiming for an actual reduction of emissions, whereas the EU ETS aims for emission reduction by decreasing the amount of emission allowances over the coming years (European Commission, 2019).

CORSIA, I argue, is a measure developed by ICAO to maintain leadership in the field of international aviation by balancing the discrepancies between external pressures and internal principles. It does so by on the one hand creating a measure to address aviation CO₂ emissions by offsetting GHG emissions elsewhere; and on the other hand being designed not to prevent aviation growth by distorting the market, or negatively affecting opportunities in developing countries to develop their aviation sector.

CORSIA is made economically efficient in various ways, including: 1. Only addressing CO2 emissions and not non-CO2 emissions; 2. Only addressing emissions that exceed 2020 emissions levels; 3. Being a voluntary scheme until 2027, giving extra time for making necessary adjustments, to countries with airline companies that need time for preparation; 4. In the long run being replaced by technological innovation and bio fuels; and 5. By being a global scheme, which means it can make use of the benefits of buying carbon credits in a global market, enabling them to buy offsets where cheapest, typically in the global South.

Significance for governmentality of aviation and future alternative mitigation possibilities for aviation

Rose and Miller argue that governmentality changes when entering into periods of crisis and criticism (Miller & Rose, 2008). In the case of ICAO, the pressures produced by climate change and growing international awareness of the adverse impact of GHG emissions on the climate, has created a period of crisis and criticism for aviation in general. The governmentality impact on ICAO, which is reflected in CORSIA can be understood in two ways, either optimistically and uncritically or more sceptically.

On an optimistic note, CORSIA can be seen as different from previous attempts at including climate considerations into the governmentality of ICAO because previous attempts aimed to be aligned with the company's objective of seeking profit. For example, the objective of annual increased fuel efficiency by 2% includes climate considerations, but it can also be argued that it is a desirable objective for companies wanting to increase profits. Meanwhile, CORSIA will affect the sector down to the individual airline company, introducing a cost with no profit. Although these costs are relatively small, it could be argued that CORSIA is introducing a change of governmentality, reflecting an instrumentalisation of the new rationale behind the aviation sector's accountability for their emissions.

Central to governmentality studies is how actions (technological measures) are intimately linked to the way we represent reality (Lövbrand & Stripple, 2011)

The new reality for ICAO involves a change in ICAO's governmentality, resulting in them, recognising the aviation sector's responsibility for environmental considerations, despite resulting economic costs that will affect the whole sector.

On the other hand, a more sceptical perspective would point out a number of cracks in this argumentation. It can rightfully be questioned whether, CORSIA does in fact reflect a shift in ICAO's governmentality or if the shift is rather a symbolic shift. The economic significance is relatively small, and will not decrease flight travel⁷. ICAO still proclaims the same organisational objectives, from the Chicago Convention (1944), governing thought about aviation, and there are still the same power relations within the aviation sector, with ICAO as the main governing body, seeking consensus amongst member states and industry. The combination of the objectives of the Chicago Convention and a consensus culture results, results in an agreement on the lowest common denominator where profit is prioritised over emissions.

The sceptical perspective would thus argue that the starting point for ICAO's governance has not shifted to an *environmental point of view*, where environmental considerations are at the forefront. The *new rationale* has rather been juxtaposed through CORSIA to the existing rationale of socio-economic development.

Whilst making offsetting governmental ICAO is defining what 'conduct' is thinkable, subsequently ruling out any other possibilities for reducing aviation emissions, for example the possibility of reducing demand for aviation. Overall there are very few suggestions for actually reducing aviation demand. Whilst this would seem like a straightforward objective when discussing emission reductions, such suggestions are ruled out by the current governmentality.

Meanwhile with a different governmentality, ICAO could itself take an active role in informing the public of the adverse impact of flying or indeed encourage flying less. In the health sector there exist various successful stories of behavioural change regarding reduction of people's smoking and drinking habits by informing people of the adverse health effects (ADVICE, 2013; Taylor et al., 2006) and by banning advertisement (Saffer & Dave, 2002). Based on my findings within the aviation sector, it is doubtful that ICAO will pursue such measures, unless they undergo major organisational reforms.

⁷ It is in fact a requirement of CORSIA that it must not distort the market (ICAO, 2019a, art. A40-18)

Although ICAO has responded to the climate crisis, the crisis still prevails. It is very doubtful that CORSIA will sufficiently address aviation's emissions, but will the scheme convince the critiques? Will it be enough to harness the governmentality of aviation emissions?

There has over recent years been a rise in social movement groups promoting not flying (FlightFree2020, 2020; Kalmus, 2020). Among these are 'NoFlyClimateSci' that is an international organisation intended to raise awareness of flight reduction (Kalmus, 2020); and The Swedish based organisation 'We Stay On Ground' that has started the campaign Flight Free 2020 that has spread to 12 different countries (Kalmus, 2020). If Rose and Millers argument that governmentality changes when entering into periods of crisis and criticism these social movements that are currently small, may in fact pose a chance of shifting the current governmentality.

If the Paris agreement's goal of limiting global warming to 1,5-2-degrees, is to be reached, deep-cut emissions are required, calling for a need to reorganise societies completely, including reconsidering notions of progress, development, time and speed and considering the role of transport therein (IPCC, 2018; Schwanen et al., 2011).

7. Conclusion

To conclude this thesis I would like to return to the research question of this study: *Why is ICAO promoting CORSIA rather than other measures?*

If we do not dramatically cut GHG emission-levels as soon as possible, lurking prospects of climate change await us, threatening a grim fate for life on earth. Time for change is undeniably now. There exists a broad recognition for this throughout global society, which is consequently calling for the aviation sector to take responsibility for reducing its emissions, aviation being at the moment, one of the fastest growing sources of greenhouse gas emissions. Lack of action from ICAO has resulted in the EU taking matters into their own hands and in effect, challenging ICAO's leadership within the aviation sector by including aviation in its ETS.

ICAOs promotion of CORSIA can partly be understood as a reaction to the EU and other external pressures. ICAO wants to remain the leader of aviation, also on climate related issues. The organisational structure of ICAO, however, harnesses the governmentality of ICAO requiring the organisation to promote development (understood as growth) of aviation.

The organisation is thus unable to envisage promoting policies that aim for actual emission reductions, as this would require measures to reduce demand for air travel and consequently undermine the further development of aviation.

Therefore, CORSIA is the ideal measure for ICAO.

It is wide-ranging, addressing aviation emissions with the prospect of covering the whole sector. Simultaneously it is designed to avoid distorting the market, so aviation can continue developing. The price is kept low by only addressing CO₂ emissions and not non-CO₂ emissions; by only addressing emissions that exceeds the 2020 cap and by producing the offsets internationally, meaning that they are made where cheapest, typically being in the global South.

The current governmentality of ICAO prevents the organisation from pursuing measures that would lead to deep emission cuts. A shift of aviation governmentality will likely not come from ICAO unless the organisation undergoes a reform, renewing the objectives of the organisations conventions.

The scope of this thesis has been to explore ICAOs reasons and rationale for promoting carbon offsetting rather than other measures to reduce emissions. No doubt more study will have to be made into the actual effects of CORSIA, deepening the understanding of both the subjective as well as the material effects of the policy. It will also be interesting to follow over the coming years, to what extent environmental social movements will affect aviation development and most interestingly, if air travel actually decreases, what social and cultural effects that may have.

8. Contribution to sustainability science

This thesis has its starting point in sustainability science in that it is raising a question in the cross field of natural science and social science (Jerneck et al., 2011). Studying how and why ICAO attempts to overcome societal demand for free and fast mobility whilst limiting GHG emissions is complex. Deconstructing and describing these complexities requires a transdisciplinary approach, which is at the heart of sustainability science (Spangenberg, 2011)

As Robert W. Kates et al. said “science must be connected to the political agenda for sustainable development” (Kates et al., 2001) and the very aim of a governmentality study, i.e. this thesis, is to make visible the politics behind the governance (Bacchi, 2012). Ultimately my research boils down to questioning the premises, on which the fundamental value of freedom to move, builds upon (I refer here to a value of privileged people of the global north). The premises are here the social-environmental costs of us being able to exercise this freedom. Raising such a question, unpleasant as it may be, evokes reflection and opens up the possibility for change.

9. References

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