

## **It is up in the air**

Academic flying of Swedish sustainability academics and a pathway to organisational change

*Isabell Burian*

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# **LUCSUS**

Lund University Centre for  
Sustainability Studies



**LUND**  
UNIVERSITY

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## **Abstract**

Drastic emission-reductions are needed to avoid the disastrous consequences of climate change. Flying is one of the highest individual carbon-impact actions. By 2050, the aviation industry's share on global greenhouse gas emissions is expected to rise by 300 to 700%. An intervention to counteract this development is to reduce flying at universities as they have a critical role in leading sustainable development. In particular, a change of flying behaviour in sustainability centres has the potential to align research with climate-targets, but not enough is known about their travel behaviour to steer such an organisational change process. Sustainability academics' role as facilitators of the sustainability transition makes the understanding of their flying behaviour relevant. In this thesis, I examine the group of sustainability academics in Sweden and use the Lund University Centre for Sustainability Studies (LUCSUS) as an exemplifying case for how they can reduce their flying. I collected empirical material by compiling the number of flights and drivers for travel choices, employing a survey in all Swedish sustainability centres. I conducted interviews and a workshop with LUCSUS-academics to explore possible interventions to reduce their flying. I analysed the quantitative data by computing statistical analyses and the qualitative data by clustering them using the 8-stage framework of organisational change. The results show that, on average, Swedish sustainability academics fly 72% more frequently for work alone than average Swedes do in total per year. Related emissions from these flights (2.61t CO<sub>2</sub>-eq) are more than twice as high as those of the flights taken by an average Swede. A lack of alternatives and time constraints are the main drivers for flying of Swedish sustainability academics even though their attitude to reduce flights is positive. This study discusses structural drivers like performance norms that hamper reductions of flights at Swedish sustainability centres. At LUCSUS, their research focus and an uncertainty about their research impact towards the sustainability transition exacerbate the difficulties to reduce their flying. These findings challenge research practices in sustainability science and at LUCSUS in particular. As a result of this work, I provide LUCSUS with next steps to reduce their flying. This analysis of the change process, as I conducted it at LUCSUS, could serve as an example for other Swedish sustainability centres to reduce their flights. For actors such as grant providers and universities, this thesis provides evidence that flying should not be actively promoted by performance norms. Collectively LUCSUS, other sustainability centres, universities and grant providers should strive to reduce academic flying as one way to pursue drastic emission mitigation.

**Keywords: Flying Behaviour, Sustainability Academics, Sweden, Air Travel, Emissions,**

**Deinstitutionalisation**

**Word count: 13999**

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## 1. Introduction

Climate change is the biggest challenge humanity is facing today. Indications of the severity of climate change effects are already present and include rising temperatures and significant extreme weather events around the globe (NOAA, 2018). These effects are predominantly caused by greenhouse gas (GHG) emissions from human behaviour (IPCC, 2013). Drastic mitigation of GHG emissions is required within the next few decades to keep temperatures peaks below a 2°C-increase compared to pre-industrial levels, which aims to avoid the disastrous outcomes of climate change (Raftery, Zimmer, Frierson, Startz, & Liu, 2017).

Flying is one of the behaviours with the greatest carbon-impact an individual can have (Alcock et al., 2017; Anderson, 2013; Balmford, Cole, Sandbrook, & Fisher, 2017; Wynes & Nicholas, 2017). In 2017, the aviation industry accounted for 3% of global GHG emissions (Alcock et al., 2017). The industry is expected to grow and its contribution to global GHG emissions is predicted to range between 15 and 40% by 2050 (Alcock et al., 2017; EEA, 2018). The normalisation of flying (Gössling & Upham, 2009), contributes to these trends and supports globalising processes in tourism, business (McDonald, Oates, Thyne, Timmis, & Carlile, 2015) and academia (Glover, Strengers, & Lewis, 2017).

Flying receives increasing attention in the grey literature of academic sustainability circles (Anderson, 2013; Hallman, 2018; Jamail, 2018; Nicholas, 2017; Pedelty, 2008). Academics criticised a situation of hypocrisy as sustainability academics' own flying behaviour contradicts their recommended lifestyle changes to support GHG mitigation (Anderson, 2013). Assessing flying of sustainability academics is particularly relevant as it raises the issue of credibility and hence hampers behavioural change of others (Attari, Krantz, & Weber, 2016). This credibility issue is problematic since sustainability academics educate future (Cortese, 2003) and inform present (van der Hel & Biermann, 2017) decision makers. Additionally, (3) flying is institutionalised within academia (Glover et al., 2017), which requires a systemic change rather than only a behavioural change of the individual academic. However, this debate cannot be resolved until more data on academic flying sheds more light on their travel behaviour.

An isolated change of individual flying behaviour is insufficient due to the way contemporary sustainability research is practised. Performance standards in academia (Glover et al., 2017), new governance models (van der Hel & Biermann, 2017) and the geographical dispersion of different stakeholders (Glover et al., 2017) impose expectations on sustainability academics to fly. Thus, it needs an institutional change within academic institutions to reduce academic flying (Glover et al., 2017). Therefore, I am using organisational change theory to assess possible interventions for an academic institution to reduce its air travel.

The Swedish context makes the analysis of academic flying from a Swedish perspective both timely and relevant. In Sweden flying became a widely discussed issue (Kihlberg, 2018; Sveriges Radio, 2017). The government introduced an aviation tax in April 2018 (Andersson & Falck, 2017) which aims to mitigate Swedish flying-related emissions to meet global climate-targets. Universities ought to take a leadership role in providing students with the knowledge to achieve sustainable development that is required by law in Sweden (The Swedish Higher Education Act). Consequently, flying in academia was put on the agenda at Swedish sustainability institutions (Anderson, Armiero, & Ekblom, 2017; Gaffney, 2018; GMV, 2016).

Despite the known adverse effects on climate, flying has been normalised in academia (Glover et al., 2017). Academics in the field of sustainability, therefore, face a credibility challenge that has an impact beyond their research (Attari et al., 2016). We need to understand how flying behaviour of sustainability academics can be changed. This thesis aims (1) to gain a better understanding of academic flying of sustainability academics in Sweden and (2) to develop a strategy for a Swedish sustainability centre to reduce flying in their organisation. The following questions will guide this study:

RQ1 - How much do Swedish sustainability academics fly?

RQ2 - What are the drivers of Swedish sustainability academics' travel choices and how do these drivers characterise their flying behaviour?

RQ3 - What are possible interventions and next steps for a sustainability centre in Sweden? - Lund University Centre for Sustainability Studies (LUCSUS) as a case

## 2. Background

### 2.1. Flying as one of the greatest contributors to carbon emissions

The aviation industry is expected to become one of the greatest GHG emitters in the next decades (EEA, 2018). Due to a 300 to 700% rise (European Commission, n.d.), the aviation industry is expected to contribute between 15% and 40% of global GHG emissions by 2050 (Alcock et al., 2017). However, these forecasts of flying-related GHG emissions likely understate their impact on the environment as researchers estimate that emissions have an enhanced impact by a factor of three at high altitudes (Lee et al., 2009). The aviation industry is the only branch in the transport sector that did not reduce their emissions between 2000 and 2015 and is expected to be responsible for a substantial share of the calculated overshoot of the EU's climate-targets (EEA, 2018).

To mitigate potential future increases in emissions, the European Environmental Agency advocates for "systemic change" (EEA, 2018, p. 53) in the aviation industry. Technological improvements to reduce emissions sufficiently are not developed yet and have a long adaptation period (Bows & Anderson, 2007). Thus, cultural and behavioural shifts are needed to moderate travel demands and meet climate-targets (EEA, 2018).

Even though the total contribution to global GHG is still small, flying is one of the actions with the greatest carbon-impact an individual can have (Alcock et al., 2017; Wynes & Nicholas, 2017).

Deciding to not take one roundtrip of a transatlantic flight alone could save 1.6t of CO<sub>2</sub>-equivalent (CO<sub>2</sub>-eq) per person (Wynes & Nicholas, 2017). Emissions of 1.6t CO<sub>2</sub>-eq equal about 75% of per-capita-GHG-emissions one can emit if the 2°C-target should be met (2.1t CO<sub>2</sub>-eq; Wynes & Nicholas, 2017).

Sweden, which presents itself as a "role model in climate politics" (Hannerz at Hannerz, Westblom, & Hildingsson, 2018), introduced a tax on flights departing from Sweden (Andersson & Falck, 2017).

With that tax, the government aims to counteract an increase of Swedish emission-levels from flying which are already seven times higher per capita than the global average (Kamb, Larsson, Nässén, & Åkerman, 2016). This is one of many governmental interventions to reach the national target and become carbon neutral by 2045 (UNFCCC, 2017). Another is the amendment of the Swedish Higher Education Act in 2006, Sweden assigned universities a critical role as leaders towards sustainability.

The Swedish Higher Education Act is in line with research showing that higher education has a critical role in leading the sustainability transition<sup>1</sup>. Swedish universities have the responsibility to educate future decisions makers (Cortese, 2003) to “promote sustainable development [aiming] to assure for present and future generations a sound and healthy environment, economic and social welfare, and justice” (The Swedish Higher Education Act). Educating sustainable development requires an integration of research, education, campus operations and community outreach (Yarime et al., 2012). These suggestions reflect the principle of sustainability science that “scientific exploration and practical application must occur simultaneously” (Kates et al., 2001, p. 641). Hence, universities have a unique opportunity to empower people to facilitate the sustainability transition.

## 2.2. Flying of sustainability academics

In the academic world, travelling is one of these operational practices that will need more attention when thinking about the sustainability transition. However, only limited data on academic air travel exist (Stohl, 2008). Two case studies suggest that academics exceed the per capita limit of 2.1t CO<sub>2</sub>-eq by far with their flying behaviour. A small-scale self-assessment by Fox et al. (2009) showed that conservationists emit more than 9t CO<sub>2</sub>-eq per researcher annually from flying. At a Norwegian institute, each employee annually emits up to 2.4t CO<sub>2</sub> on average due to air travel (Stohl, 2008). In comparison, individual flying emissions from an average Swede are 1.2t CO<sub>2</sub>-eq (Kamb et al., 2016). However, these are the only two studies, to my knowledge, that assess the flying-related emissions from academics and none of these analyses the emissions from Swedish academics.

An increasing number of debates addresses the responsibility of sustainability academics as leaders of behavioural change towards less flying (Anderson et al., 2017; Balmford et al., 2017; Kalmus, 2017) and demand consistency “active steps as a movement and as a profession [to reduce flying]” (Balmford et al., 2017, p. 268). Consequently, a group of researchers initiated the *Flying Less* campaign to motivate other academics to reduce their flying (Flying Less, 2017). Yet, the comprehensive behavioural shift seems to remain absent (Glover et al., 2017). Alcock et al. (2017) suggest that individuals, who are concerned about the environment, fly more miles annually than those who are not. This “attitude-behaviour gap” (Alcock et al., 2017, p. 137) suggests a cognitive dissonance of sustainability academics.

Additionally, to this situation of cognitive dissonance, flying of sustainability academics has a broader impact on sustainability beyond the individual researcher’s flight-related GHG emissions. According

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<sup>1</sup> A sustainability transition is defined as “meeting the needs of a stabilising future world population while reducing hunger and poverty and maintaining the planet’s life-support systems” (Parris and Kates, 2003, p. 8068).

to Attari et al. (2016), the perceived credibility of climate-researchers is weakened by non-pro-environmental behaviour. They found that if a researcher flies frequently, the perceived credibility was up to 50% lower than if they avoided flying. Considering the audiences of sustainability academics, like policy-makers (van der Hel and Biermann, 2017), students (Cortese, 2003) and the vast society (Kates et al., 2001), a credibility issue has far-reaching consequences. Thus, sustainability academics are not only knowledge creators but also facilitators of transformative change. But, why do sustainability academics fly?

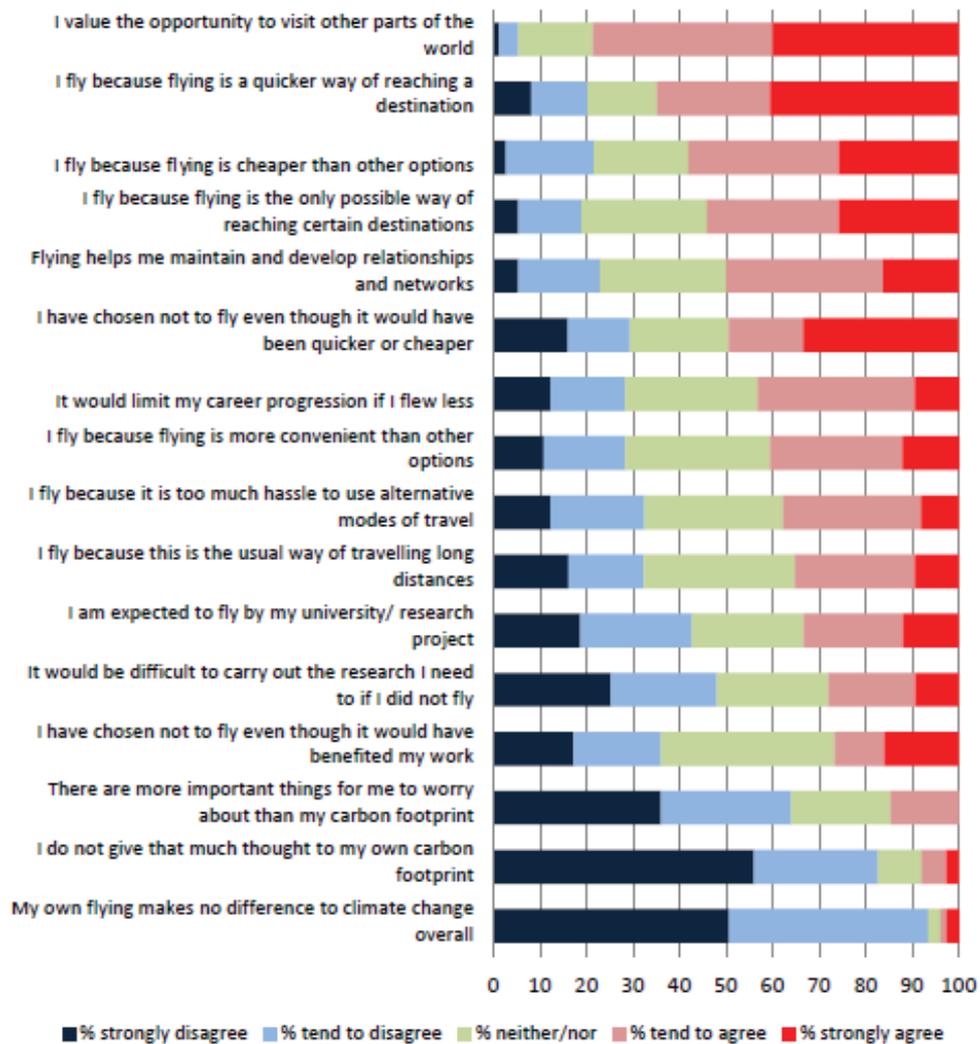
A few small-scale studies assessed the drivers of academic flying. According to Fox et al. (2009) self-assessment, the main travel purposes for academics are networking and research (ca. 66%), followed by personal (ca. 21%), management (ca. 9%), and fundraising (ca. 4%). At the Tyndall Centre<sup>2</sup>, instrumental reasons for flying are time, price, lack of alternative modes of transport to certain destinations, convenience and normalisation of flying (see Figure 1; Le Quéré et al., 2015). An opinion piece suggested that academics perceive flying as “essential” (Pedelty, 2008) to their work and that the “importance of [their]...research outweighs the environmental costs of air travel” (Pedelty, 2008). In the Tyndall study, the highest level of agreement was found with the statement “I value the opportunity to visit other parts of the world” ( Le Quéré et al., 2015, p.10; see Figure 1). Despite these accounts, scientific data on individual drivers of academics work-related travel decisions remain limited (Le Quéré et al., 2015) and does not exist for Swedish sustainability academics.

In addition to individual reasons, several institutional drivers influence academic flying. Glover et al. (2017) argue that “the normalisation of air travel [is]...central to academic professionalism” (p. 1) and flying is “integral to contemporary research” (p. 2). The study discusses how internationalisation is a prioritised objective of universities and that global collaboration is an academic performance norm (Glover et al., 2017). In university rankings, like the popular Times Higher Education Ranking, citations and internationalisation are two out of six criteria (Dyllick, Noukakis, D., & Lepori, n.d.). At Swedish universities, researchers who are mobile<sup>3</sup> have the highest relative citation rates in comparison to those who are not (STINT, 2016). Therefore, internationalisation is a structural driver that promotes flying within academia.

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<sup>2</sup> The Tyndall Centre for Climate Change Research is a research alliance of different universities developing sustainable responses to climate change located in the UK (Tyndall Centre, n.d.).

<sup>3</sup> Researchers are categorised as mobile if they have stayed for less than two years at their current affiliation before moving to another institution (STINT, 2016).



**Figure 1.** Attitudes towards flying of Tyndall researchers. Results of an internal survey of the Tyndall Centre from 2012 (Le Quéré et al., 2015, p. 10)

The direct cutback of academic flying is often not addressed in travel policies of universities. Some university policies suggest a substitution of flying by modern telecommunication technologies (Glover et al., 2017, 2017; Lund University, 2017) or offsetting schemes (Anderson, 2012) to address the environmental impact of academic flying. At Swedish sustainability centres, voluntary carbon trackers (Gaffney, 2018) and internal climate funds (GMV, 2016) have been introduced to address academic flying in their institutions. Except for the substitution with technology, none of these interventions seems to reduce the number of flights directly. A life-cycle study by Borggren, Moberg, Räsänen and Finnveden (2013), assessed the impact of such a technology-substitution and found that 90% of the GHG emissions could be saved for a travel distance like Stockholm – Gothenburg. However, digital meetings are found to be less suitable if critical matters need to be discussed, new relationships or negotiations are established or creative activities are conducted (Räsänen, Moberg, Picha, & Borggren, 2010). Arguably, all of these situations apply to many travel-occasions of sustainability academics. The main problem remains: University policies do not align sustainability objectives with performance norms in academia that favour internationalisation over sustainability.

The disastrous outcomes of the predicted emission increases stemming from the aviation industry (Alcock et al., 2017) and the critical role of sustainability academics (Attari et al., 2016; Cortese, 2003) demands change in travel behaviour of sustainability academics. The normalisation of flying in academia (Glover et al., 2017) requires an organisational change process, rather than one solely focused on the individual researcher. A better understanding of the drivers for travel choices of sustainability academics should steer future change processes to reduce flying in sustainability centres of Swedish universities. Therefore, this thesis aims to create an understanding of the flying behaviour of Swedish sustainability academics and assess possible interventions to reduce flying for one sustainability centre in Sweden, namely LUCSUS.

### **3. Theoretical Framework**

#### **3.1. Epistemological and ontological account**

This study takes a critical realism stand. It rests on the assumption that there are structures at work that shape our discourses (Bryman, 2016). These structures are constructed by ourselves and are constantly changing and, thus, can be changed by ourselves (Bryman, 2016). Evaluating these structures requires an understanding of the context (Bryman, 2016). The understanding of these structures can help us to describe mechanisms that create discourses (Bryman, 2016).

Applying this stance to my thesis, I evaluate the structures that promote flying of Swedish sustainability academics by understanding the drivers for their travel behaviour. For RQ3, I describe the phenomena of LUCSUS' context, even though the process of organisational change analysis (explained below) can be applied for flying-reduction-efforts in other sustainability centres. Understanding the structural nature of LUCSUS' travel choices helps to induce interventions.

#### **3.2. Organisational change theory**

Organisational change theory is used to inform the process of supporting low-carbon travelling at LUCSUS. This section draws on the typology of Kezar (2001). Her theory combines organisational change theory with institutional change theory to discuss change processes of universities. I combine this typology with Kotter's (2002) framework for organisational change as it explains the important characteristics of interventions for organisational change.

Since universities are tradition-bound and mission-driven, they should only engage in change processes if their key-mission or expertise is legitimately challenged (Kezar, 2001). For Swedish universities, the Swedish Higher Education Act outlines sustainable development as part of their mission. "Organisational change refers to [the] alterations within organisations at [different] levels" (Kezar, 2001, p. 12) (by individuals or groups, across the entire organisation) in different organisational dimensions or values or mental maps (Kezar, 2001). Hence, organisational change to reduce flying in academia could be implemented at different levels such as the individual researcher, university departments, entire universities and in academia as a whole.

Kezar (2001) proposes a three-step approach for change. Organisations should conduct (1) a self-assessment, and (2) an institutional self-audit, and (3) create awareness and knowledgeability of change processes among a majority of organisational members (Kezar, 2001, see (A) Figure 2). This thesis focusses on the first two steps as LUCSUS is only at the beginning of their change process.

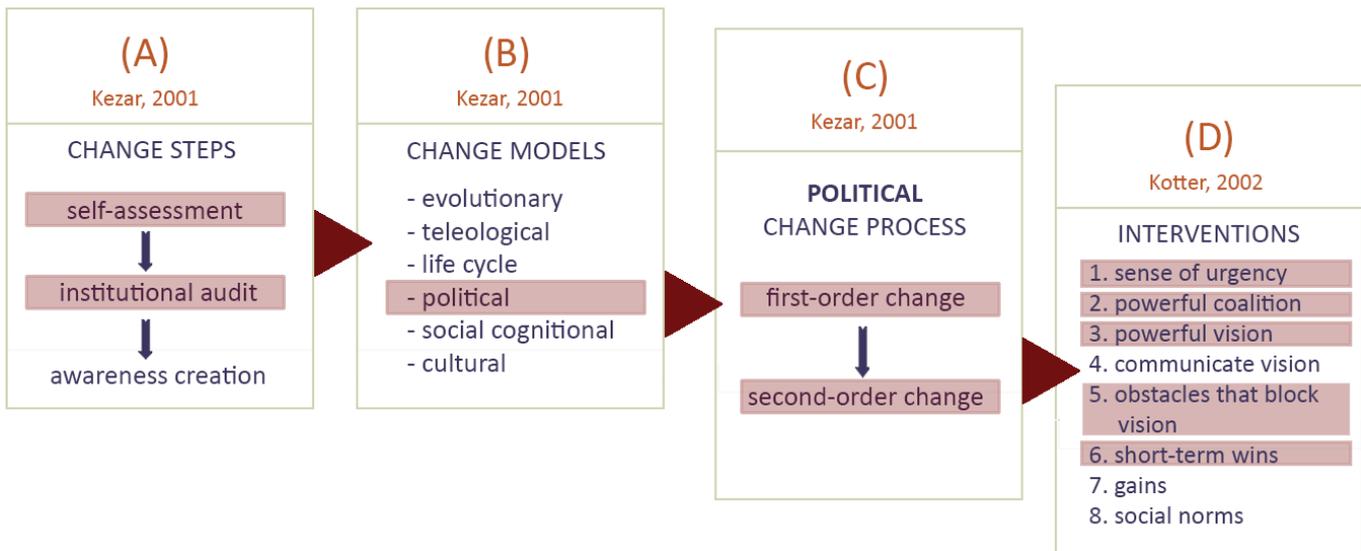
According to Kezar, (2001), six different organisational change models exist (see (B) Figure 2):

- *Evolutionary* change is a gradual, unplanned change shaped by environmental influences,
- *Teleological* change is a linear, structured change that occurs because change agents drive change intentionally,
- *Life cycle* based change is a systematic change which occurs due to natural developments of an organisation,
- *Political* change is a radical change due to the clash of world-views within an organisation,
- *Social cognitional* change is a learning-process which occurs as a reaction to perceived cognitive dissonance, and
- *Cultural* change is constant change leading to an alteration of values and beliefs.

These models enable researchers and practitioners to assess the organisational change from a macro level and shed light on why and how change can occur. Thus, they can provide insights into how a change process to reduce academic flying can be steered.

An organisation's structure, its processes and attitudes, determine the appropriate change model. Looking at these factors at universities, Kezar (2001) suggests that universities are value-driven with a shared governance approach. They are relatively independent of their environment compared to businesses for example and enjoy academic freedom (Cortese, 2003). Further, universities are loosely coupled systems (Kezar, 2001) with their different (inter-)disciplinary departments of which each has different goals. Due to these structures, organisational change at universities is "often political" (Kezar, 2001, 2001, viii).

Looking at political change processes in detail, Kezar (2001) suggests that they usually involve a first-order change followed by a second-order change (see (C) Figure 2). A first-order change is a minor adjustment that does not change the core and mostly occurs in smaller groups of the organisation (Kezar, 2001). These change processes are of linear nature and often represent tools of other change models like teleological change (Kezar, 2001). In terms of interventions to reduce academic flying, this could be travel policies. A second-order change is a transformational change process that addresses the underlying values, mission, culture and structure (Kezar, 2001). These change processes are multidimensional, seem to be irrational and lead to a paradigmatic shift (Kezar, 2001). Second-order change results in a modified organisational identity (Kezar, 2001). For changes concerning academic flying, this could be a deinstitutionalisation of flying based on altered performance norms.



**Figure 2.** Integrated concept of organisational change theory. Theoretical components for the potential organisational change process at LUCSUS. All relevant components of this thesis are highlighted in red. Own illustration based on (Kezar, 2001; Kotter, 2002)

To suggest the next steps for a political change process at LUCSUS, I explore a better understanding of the self-assessment of sustainability centres in Sweden and insights on the institutional audit at LUCSUS. The self-assessment includes the evaluation of the number of flights and the drivers of travel choices. The institutional audit identifies mechanisms that influence travel choices first and then suggest interventions for LUCSUS to alter these travel choices to a low carbon option. The interventions should include first- and second-order changes.

### 3.3. Eight-stage framework of organisational change interventions

John Kotter's (2002) eight-stage framework guides my academic inquiry as it supports organisational change processes. The framework consists of the following stages (see (D) Figure 2):

1. Create a sense of urgency,
2. Develop a powerful guiding coalition,
3. Create a powerful vision,
4. Communicate this vision,
5. Eliminate obstacles that block the vision,
6. Create short-term wins,
7. Consolidate gains and
8. Root new behaviour in social norms.

This thesis will focus on the stages: (1) sense of urgency, (2) powerful coalition, (3) powerful vision, (6) short-term wins and (5) obstacles that block the vision. The first two stages constitute the baseline work for every change initiative. Since LUCSUS is at the beginning of a change process (see

4.1.2), these are the most relevant stages of changing flying behaviour at LUCSUS. I included stage 3 and 6 to discuss practical implications as this thesis is grounded in action-oriented sustainability science principles (Kates et al., 2001). I included stage 5 to gain more insights on the drivers that cause flying in academia and counterarguments to suggested action (as a result of stage 3 and 6). In the following, I briefly present the relevant stages of this thesis.

Without a *sense of urgency*, it is very unlikely to convince the needed number of people that enable change (Kotter, 2002). About a quarter of the people in the organisation have to commit to a high level of cooperation and a need to have the willingness to make sacrifices (Kotter, 2002). A sense of urgency cannot be developed if complacency levels are too high (see Table 1). The sense of urgency motivates people to join the guiding powerful coalition of the change process. A *powerful coalition* actively guides the change process. A *powerful vision* is “a picture of the future with some...commentary on why people should strive to create that future” (Kotter, 2002, p. 68, 2002). Aiming to fulfil this vision, *short-term wins* provide evidence that the change activities move in the right direction (Kotter, 2002) while *obstacles that block the vision* need to be eliminated. The data analysis will help me to identify shortcomings of the characteristics of these five change interventions (see Table 1) at LUCSUS and guide the development of next steps for LUCSUS to reduce their flying.

**Table 1.** Characteristics of organisational changes stages. Based on Kotter (2002)

<b>Change stage</b>	<b>Characteristics</b>
(1) Sense of urgency	<ul style="list-style-type: none"> <li>- Exists if there are               <ul style="list-style-type: none"> <li>(a) a visible crisis</li> <li>(b) not too many visible successes</li> <li>(c) broad performance standards addressing vision</li> <li>(d) critical external performance feedback</li> <li>(e) capacity to deal with a crisis</li> </ul> </li> </ul>
(2) Powerful coalition	<ul style="list-style-type: none"> <li>- Involves enough key players so that the change process cannot be blocked by others in power</li> <li>- Should include a diverse set of people</li> <li>- Needs internally credible managers and leaders</li> <li>- Needs to establish a common goal grounded in trust among its members</li> </ul>
(3) Powerful vision	<ul style="list-style-type: none"> <li>- Clarifies direction for change to               <ul style="list-style-type: none"> <li>(a) Facilitate decision-making in the change process</li> <li>(b) Motivate people to take action</li> <li>(c) Coordinate action of different people</li> </ul> </li> </ul>
(6) Short-term wins	<ul style="list-style-type: none"> <li>- Visible results during the change process</li> <li>- Necessary to sustain the change efforts</li> </ul>
(5) Obstacles that block vision	<ul style="list-style-type: none"> <li>- Formal structures that make an implementation of the vision difficult</li> <li>- Lack of needed skills to act upon the vision</li> <li>- Personnel and information system that is not aligned with the vision and therefore, cause people in the organisation working different objectives</li> <li>- Discouraging supervisors</li> </ul>

## 4. Methodology

### 4.1. Research design

The research design is informed by organisational change theory. The data collection focusses on two of the three change steps: (1) self-assessment and (2) institutional audits (see Figure 2). The study applies a cross-sectional, mixed-methods research design as a one-time study with no independent variable (Bryman, 2016). An online survey and an interview examine the organisational self-assessment. A workshop and a follow-up interview examine the institutional audit. All used methods are presented in Table 2.

**Table 2.** Overview of the methods used in the study and their relation to theory (Own Table)

Change step	Method	Data type	Target group	RQ addressed
Self-assessment	Survey	Quantitative, qualitative	Swedish sustainability centres	RQ1, RQ2 and RQ3
Self-assessment	Interview	Qualitative	LUCSUS	RQ2 and RQ3
Institutional audit	Workshop	Qualitative	LUCSUS	RQ2 and RQ3
Institutional audit	Interview	Qualitative	LUCSUS	RQ3

The survey serves as a self-assessment tool to gain quantitative and qualitative insights on how much Swedish sustainability researchers fly and what drives them to do so within the population of all Swedish sustainability centres. An interview with a LUCSUS-academic complements the survey insights with a more in-depth understanding of the self-assessment of LUCSUS.

The results from the self-assessment inform the design of the workshop. In the workshop, LUCSUS-academics proposed and discussed possible interventions to reduce flying at LUCSUS. LUCSUS' director evaluated the proposed interventions in a subsequent interview. This interview represents the first part of the institutional audit at LUCSUS (see Table 2). My problem analysis and discussion of possible solutions that “guide...transition and intervention strategies” (Lang et al., 2012, p. 26) in the context of LUCSUS towards sustainability is the second part of an institutional audit. However, future analyses are needed to complete the self-assessment and the institutional audit for LUCSUS (e.g. more qualitative accounts on drivers for flying at LUCSUS and an analysis of the remaining three stages of Kotter's (2002) interventions).

#### 4.1.1. Survey

I chose the survey as a method as only limited scientific data is available to get an overview of the topic (Bryman, 2016). For the survey design, I followed a deductive approach. My objective was to

provide descriptive results and associations according to existing findings in the literature. The survey tests hypotheses that I developed based on the literature review (see a survey matrix in 9.1). Some questions of the survey (see all circled response choices in 9.2) are similar to the questions asked at the Tyndall Centre to compare the results (Le Quéré et al., 2015).

The survey design applied Bryman's (2016) good practices, which increase participation and completion (e.g. show a progress bar, minimise open-ended questions, randomise the response choice order) of the survey. In the survey, the questions 2 to 9 (see 9.2) have only been asked to respondents who answered with 'Yes' to the first question ('Did you travel for work over 180 km in the last 12 months?'). I will refer to these respondents as *travellers* hereafter. The complete survey can be found in Appendix 9.2.

For this study, sustainability centres served as the sample population. I chose research centres with the following characteristics: (1) research and education in the field of sustainability, (2) practice an interdisciplinary approach, (3) engage in action-oriented academic work (incl. community outreach). After an analysis of the websites of 14 universities<sup>4</sup> in Sweden, I identified the following five sustainability centres that met these criteria:

- (a) Centre for Environment and Development Studies (CEMUS) at the University of Uppsala and the Swedish University of Agricultural Sciences,
- (b) Gothenburg Centre for Sustainable Development (GMV) at Chalmers University of Technology and University of Gothenburg,
- (c) Lund University Centre for Sustainability Studies (LUCSUS) at Lund University,
- (d) Department of Thematic Studies of Environmental Change (TEMAM) and Technology and Social Change (TEMAT) at Linköping University and
- (e) Stockholm Resilience Centre (SRC) at Stockholm University.

The survey was designed and administered as an online web questionnaire with questionpro.com. I sent an e-mail invitation and a participation reminder if applicable to all academics at the sustainability centres and asked them to distribute the survey to relevant colleagues. See Table 3 for the exact number of contacted academics. The data was collected between 22.February and 13.March.2018.

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<sup>4</sup> The analysed 14 universities were: Karlstad University, Karolinska Institutet, Linköping University, Linnaeus University, Luleå University of Technology, Lund University, Malmö University, Mid Sweden University, Örebro University, Royal Institute of Technology, Stockholm University, Swedish University of Agricultural Sciences, Umeå University, University of Gothenburg

**Table 3.** Distribution and response rate of survey per sustainability centre (Own Table)

<b>Name of sustainability centre</b>	<b>Number of individually contacted academics</b> [#]	<b>Distribution within the organisation</b> [yes/no]	<b>Number of reminders sent</b> [#]	<b>Response rate (before/after reminder)</b> [# and %]
(a) CEMUS	34	Yes	31	15 = 44% (5/10)
(b) GMV	40	Unknown	23	12 = 30% (11/1)
(c) LUCSUS	34	Yes	22	21 = 62% (18/3)
(d) TEMAM/T	28	Yes	20	16 = 57% (13/3)
(e) SRC	159	Unknown	128	50 = 31% (29/21)
<b>SUBTOTAL</b>	<b>295</b>		<b>224</b>	<b>114 = 39% (73/41)</b>
Other	Min. 33			33
<b>TOTAL</b>	<b>328</b>		<b>224</b>	<b>147 = 45% (89/58)</b>

The participants of the survey are self-selected. Further, the study uses self-reporting of a controversial issue (academic flying) which means that social-desirability bias may have influenced the responses (Gatersleben, Steg, & Vlek, 2016). I tested the survey on a small sample of 20 academics of which 14 were sustainability academics. Based on the test results, I adjusted the survey to reduce ambiguity of questions and improve usability for participants.

#### **4.1.2. Case study - LUCSUS**

For the analysis of possible interventions, this thesis targets the travel strategy of LUCSUS. I aim to assess a change process towards a reduction of flights at a departmental level and not the individual researcher. LUCSUS serves as an exemplifying case in this action-oriented thesis. I focussed on only one sustainability centre as organisational change theory suggests that the distinctive nature of the explicit institution needs to be understood to initiate organisational change (Kezar, 2001). Further, suggestions for changes need to emerge from members of the organisation (Kezar, 2001). I chose LUCSUS as a case as the need for a change in travel behaviour at LUCSUS was voiced in a staff meeting in autumn 2017. Additionally, Lund University defined the need for a new travel policy in 2017 (Lund University, 2017) and I had access to LUCSUS as a student at the institute.

I conducted two interviews: (1) with Wim Carton who is one of the initiators of the change process at LUCSUS and (2) with Emily Boyd, LUCSUS' director and therefore the top-executive at LUCSUS. Both have been identified as key players for a potential *powerful coalition* in the change process. Additionally, I conducted a workshop with four LUCSUS-academics, which were self-selected.

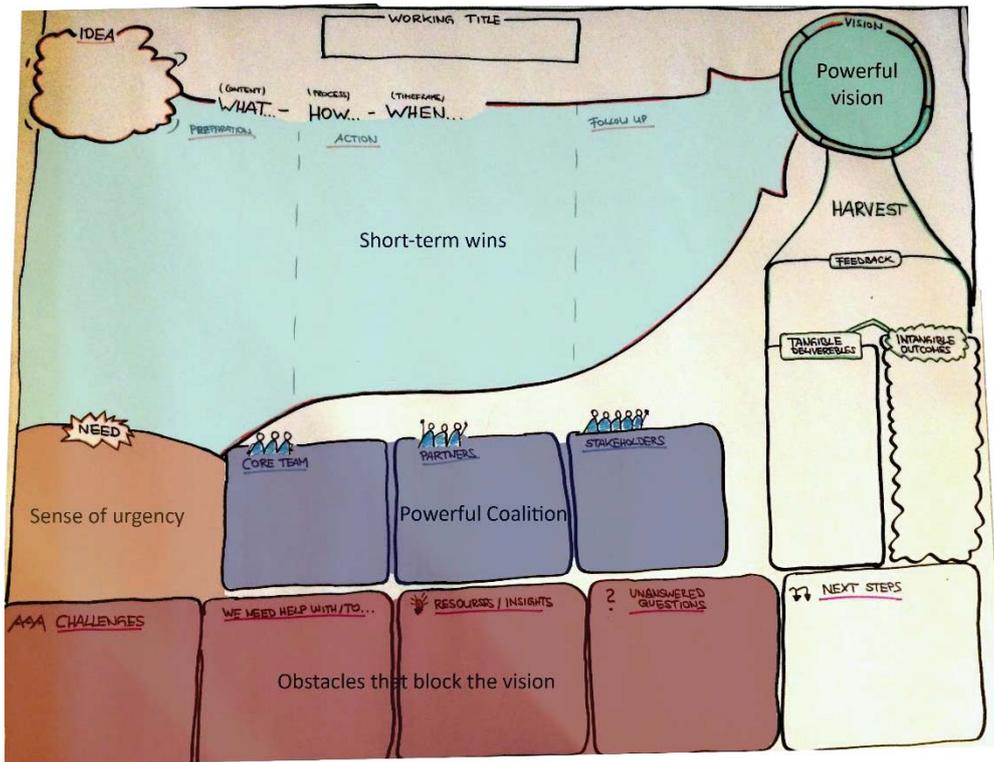
## **Interviews**

Two semi-structured interviews were conducted in two different phases of my research. I interviewed Wim before the workshop but after the survey was completed. Wim is one of the LUCSUS-academics who initiated the change process at LUCSUS in 2017. The interview provides a better understanding of his and the LUCSUS specific context as a qualitative addition to the quantitative survey results about the drivers of academic flying. Further, I aimed to gain a better understanding of the status of LUCSUS' change process. I interviewed Emily Boyd, the director of LUCSUS, after the workshop to get a director's perspective on the compiled solutions from the workshop and outline possible next steps for LUCSUS' change process. The interview guides can be found in Appendix 9.3.

## **The workshop**

The workshop is based on the fundamentals of sustainability science: "Scientific exploration and practical application must occur simultaneously [in which] participatory procedures...are critically needed [to deal with the complexities of sustainability problems]" (Kates et al., 2001, p. 641). Further, a "collaborative process [is needed to] ask...the what..., how...and why" (Kezar, 2001, p. 116) about the possible change and to "create ownership for problem and solution options" (Lang et al., 2012, p. 25).

The workshop design was based on the participatory process design *8 Breaths of Design* that is used by different sustainability practitioners (Balkfors & Ershammar, 2017). The process consists of three phases: The divergent phase, the emergent and the convergent phase. During the divergent phase stage, the participants defined the purpose and decided on the desired outcome of the workshop. They generated alternatives and are encouraged to engage in open discussions (Balkfors & Ershammar, 2017). Therefore, I prepared two ideation exercises to create a list of possible interventions to reduce flying at LUCSUS. In the emergent phase different ideas and needs from the divergent phase are coalescing into concrete ideas (Balkfors & Ershammar, 2017). During this stage, the workshop participants had to choose one of their ideas from the divergent phase and draft its implementation plan. In this phase, workshop participants had to fill out a canvas developed for collaborative decision-making processes called *Design for Wiser Action* (Balkfors & Ershammar, 2017). To address the five relevant stages of organisational change, I altered the original *Design for Wiser Action* canvas (Art of Hosting Nova Scotia, 2013; see Figure 3). The convergent phase is the goal-oriented, rather linear and structured phase of the process aiming to arrive at general conclusions (Balkfors & Ershammar, 2017).



**Figure 3.** Design for Wiser Action canvas. Workshop participants used the canvas to further explore their chosen main idea. The canvas addresses the five relevant interventions (highlighted) of Kotter’s (2002) framework of organisational change. Own illustration based on Art of Hosting Nova Scotia (2013)

## 4.2. Data analysis

I conducted the quantitative data analyses to gain insights (1) on the flight-related GHG emissions, the relations between (2) the number of flights and flying reasons, (3) the number of flights and career stages, and (4) the travel purposes and the number of flights. Qualitative data analyses have been conducted on the survey, interview and workshop data to gain more insights on the drivers for travel choices of sustainability academics in Sweden and on possible interventions to reduce flying at LUCSUS. The empirical analysis of the survey was only conducted for the respondents from the five sustainability centres (see Table 3).

### 4.2.1. Flights and related CO<sub>2</sub>-eq emission calculations

All calculated and discussed flight data are roundtrips. I calculated the total number of flights for Swedish sustainability academics ( $F_T$ ) by multiplying the sum of flights to all destinations ( $F_S$ =within Sweden,  $F_E$ =within Europe,  $F_G$ =outside Europe) from the survey responses, by the total number of academics at the Swedish sustainability centres (see Table 3), and by the percentage of survey respondents who travelled in the last 12 months.

$$F_T = (F_S + F_E + F_G) \times \text{academics at sustainability centres} \times \frac{\text{travellers}}{\text{total survey participants}}$$

Based on this total number of flights for Swedish sustainability academics ( $F_T$ ), I calculated the average number of flights per Swedish sustainability academic (avg.  $F$ ) by dividing  $F_T$  with the total number of academics at Swedish sustainability centres.

$$avg.F = \frac{F_T}{academics\ at\ sustainability\ centres}$$

Emission calculations for the flights are based on the most frequent routes for the respective destinations as asked in the survey (see Table 4; Q1 in 9.2). I used several online emission calculators<sup>5</sup> (using roundtrips, economy class and radiative forcing if available) to calculate the mean emissions for the respective routes. Within Sweden, the most frequented route is Stockholm to Gothenburg (Swedavia Airports, n.d.) with average emissions of 0.16t CO<sub>2</sub>-eq (see Table 4). Within Europe, the most frequented route is Stockholm to London (Swedavia Airports, n.d.) with average emissions of 0.48t CO<sub>2</sub>-eq (see Table 4). Outside Europe, the most frequented route is Stockholm to New York (Swedavia Airports, n.d.) with average emissions of 1.88t CO<sub>2</sub>-eq (see Table 4).

**Table 4.** Emission calculations for the most flown routes within the destination categories of the survey (Own Table)

Survey destinations	Most flown route	Distance	Mean CO <sub>2</sub> -eq
Within Sweden	Stockholm (ARN) - Gothenburg (GOT)	394 km	0.16 t
Within Europe	Stockholm (ARN) - London (LHR)	1462 km	0.48 t
Outside Europe	Stockholm (ARN) - New York (JFK)	6292 km	1.88 t

#### 4.2.2. Main reasons for flying

To analyse how the drivers of flying characterise the flying behaviour of sustainability academics, I grouped the survey respondents based on the two highest-ranked reasons for flying indicated in the survey: *Time* and *no-alternative*. I conducted t-tests to analyse if there are any statistically valid differences in the number of flights taken to the different destinations (within Sweden, within Europe, outside Europe) between the different groups.

#### 4.2.3. Career stage analysis

Several comments in the interviews and in the workshop suggested that there is a difference in the frequency of flights between career stages. Such a difference would support Glover et al.'s (2017) hypothesis that expectations within academia put pressure on academics to fly. Therefore,

<sup>5</sup> The emission calculators from the following websites have been used: [www.climatecare.org/calculator/](http://www.climatecare.org/calculator/), [www.carbonfootprint.com/calculator.aspx](http://www.carbonfootprint.com/calculator.aspx), [www.coolclimate.berkeley.edu/carboncalculator](http://www.coolclimate.berkeley.edu/carboncalculator).

participants were assigned career stages (categories: PhD, Postdoc, fixed-term contract, permanent contract, professor, administrative staff and other) based on question 18 (see 9.2). I conducted an ANOVA-analysis to assess if there are any statistical differences in the number of flights taken to the different destinations between the different career categories.

#### **4.2.4. Purpose for work-related travels**

To analyse how different travel purposes vary with travel frequency, I grouped the respondents into four groups:

- (1) respondents who did not fly – I will refer to them as *Non-Flyers* hereafter,
- (2) respondents who flew between one to five times in the last 12 months – *Flyers0+*,
- (3) respondents who flew six to ten times – *Flyers5+* and
- (4) respondents who flew more than ten times – *Flyers10+*.

I analysed how much time on average they spent on each activity when they were travelling. I employed descriptive statistics to assess if the four groups have different travel purposes. A better understanding of this relationship might surface relevant interventions based on travel purposes to reduce flying for sustainability academics.

#### **4.2.5. Used programmes and data transformations**

For the quantitative data analysis, I used Excel 2016 and IBM SPSS Statistics Version 26. All data on the number of flights taken ( $y$ ) were log-transformed to achieve a normal distribution using the natural logarithm ( $\ln[y + 1]$ ). Every  $y$  was adjusted by 1 to account for zeros that cannot be log-transformed. All statistical tests (t-test and ANOVA) for significant differences among groups were performed on the log-transformed data.

#### **4.2.6. Qualitative data analysis**

I analysed the qualitative data from the survey, the interviews and the workshop to better understand the drivers for academic flying in a LUCSUS-context and to identify possible interventions to support a reduction of flights at LUCSUS. I audio-recorded the interviews and video-recorded the workshop that I transcribed for later data analysis. With the help of NVivo 11, I coded the qualitative data according to the five relevant organisational change stages (see 3.3). Further, I analysed each change stage separately and filled out an additional *Design for Wiser Action*-canvas with the aim to write down reflections, patterns and ideas that supported the development of my discussion.

### 4.3. Limitations

Concerning the quality of the flight data, I see three potential sources of bias. First, there are only a few direct-connection-flights from Sweden to research locations of Swedish sustainability academics, like Africa. Multiple-connection-flights lead to higher overall emissions as the starting and landing of the plane is emitting the most GHG (Wynes, 2015). Second, the zone 'outside Europe' does not allow accurate emission calculations. However, the survey was designed like that to increase response rates as third, participants that were not reachable may have had difficulties tracking their past year's travel plan<sup>6</sup>. All these reasons are likely to result in an underestimation of CO<sub>2</sub>-eq emissions. I addressed some of these issues by implementing a pilot survey, testing its design and by sending reminders. Therefore, the results should be viewed as lower bounds.

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<sup>6</sup> One researcher excused himself, by e-mail, for not participating in the survey since the time effort would be too great to go back a year in travel data. That suggests that he flew a lot. I expect this to be the case for several academics who did not participate in the survey.

## 5. Results

This section presents the results of (1) the number of flights and its related emissions for Swedish sustainability academics and LUCSUS in particular; (2) the main drivers for travel choices of Swedish sustainability academics; and (3) possible interventions at LUCSUS in regards to organisational change aiming to reduce flying at LUCSUS.

### 5.1. Number of flights and related emissions for Swedish sustainability academics

On average sustainability academics in Sweden flew 2.53 times per year (see Figure 12). From these 2.53 flights, 10% of the destinations were located within Sweden, 48% within Europe and 42% outside Europe. The total amount of flights from all survey respondents from Swedish sustainability centres adds up to 745 annual flights. Assuming the most flown distances (see 4.2.1), this adds up to at least 771t of CO<sub>2</sub>-eq emissions per year by sustainability centres in Sweden. This amount is an equivalent of 2.61t CO<sub>2</sub>-eq emissions per year per sustainability academic in Sweden. A LUCSUS-academic flew 3.07 times per year on average, which is 20% more than the average Swedish sustainability academic. The individual CO<sub>2</sub>-eq emissions per year are even about 39% higher (3.64 t CO<sub>2</sub>-eq) since LUCSUS-academics flew 68% more than the average ‘outside Europe’.

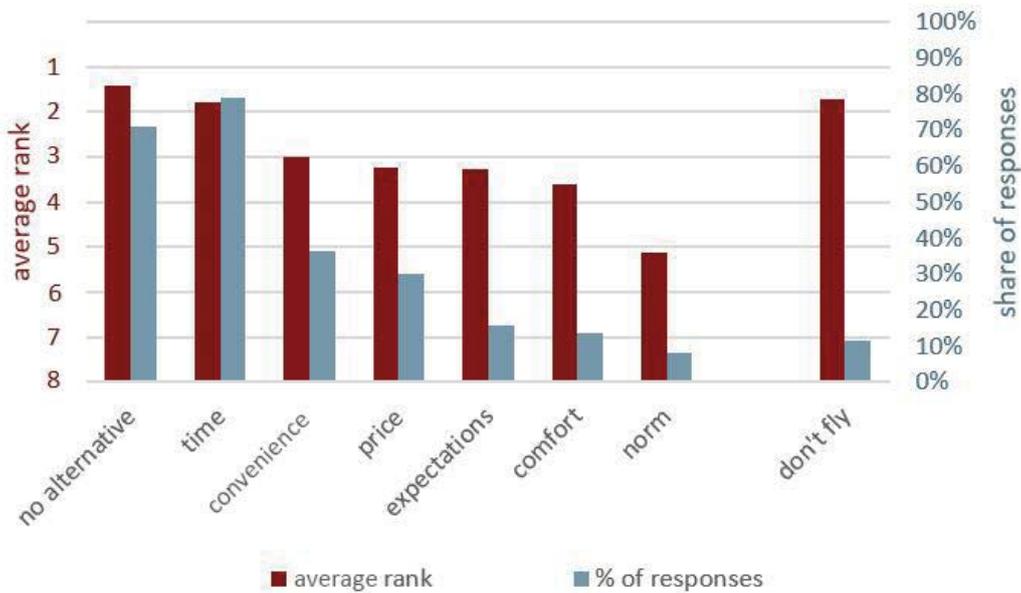
### 5.2. Drivers of Swedish sustainability academics’ travel choices and relations to their flying behaviour

To assess the drivers of sustainability academics’ travel choices I analyse (1) the reasons for flying and how they relate to the number of flights taken; (2) how an academic’s career stage relates to the flights taken; and (3) how the travel purpose differs depending on the flight frequency of Swedish sustainability.

#### 5.2.1. Reasons for flying

Of the 114 sustainability academics surveyed (see Table 3), 81% (n=96) travelled for work-related purposes in the previous year. The following results refer only to these *travellers* (see 4.1.1). The most frequently stated reasons are “time”, “distance” and “convenience” (see Figure 4; Q6 in 9.2).





**Figure 5.** Reasons for flying. Travellers' ranking of their reasons for flying according to their importance. The red bars visualise the average rank for all given options. The blue bars visualise the percentages of participants who choose a certain option. Participants were instructed to only choose the reasons that were applicable to their situation (Own illustration)

While there was no significant difference in the total number of flights between *travellers* who ranked *no-alternative* first ( $n=48$ ) and those who did not ( $n=48$ ), there was a significant difference in the frequency of flights to destinations outside Europe ( $t=2.697$ ;  $d.f.=94$ ;  $p=.008$ ) and within Europe ( $t=-1.990$ ;  $d.f.=94$ ;  $p=.050$ ). In particular, those who ranked *no-alternative* first flew 59% more frequently to destinations outside Europe, but 44% less within Europe than those who did not rank *no-alternative* first (see Table 5). This higher frequency of flights outside of Europe corresponds to 23% more CO<sub>2</sub>-eq emissions. The respondents who ranked *no-alternative* first had their work 114% more often located outside Europe than those who did not rank *no-alternative* first (see Q19 in 9.2). Interestingly, those who ranked *no-alternative* first, travelled 61% less ( $t=-2.076$ ;  $d.f.=94$ ;  $p=.041$ ) by alternative modes of transport within Europe, which suggests that these participants, in general, travelled less within Europe.

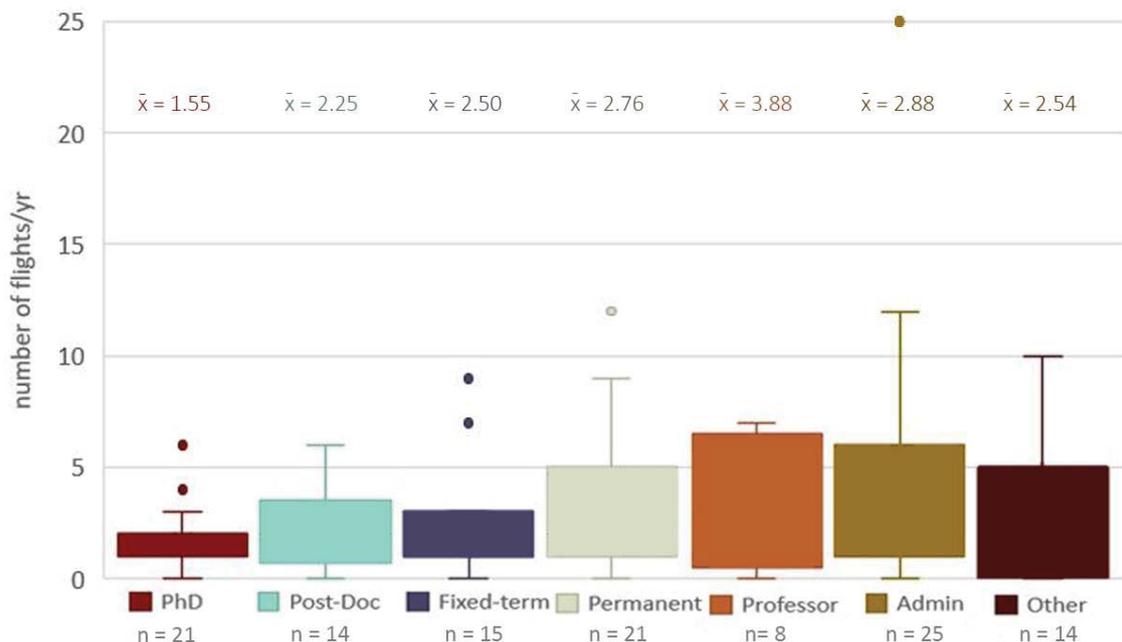
*Travellers* who ranked *time* first ( $n=30$ ) flew more than twice as often to destinations within Europe ( $t=2.973$ ,  $d.f.=94$ ,  $p=.001$ ) than those who did not choose *time* as their most important reason for flying ( $n=66$ ; see Table 5). These additional flights within Europe result in 118% higher CO<sub>2</sub>-eq emissions for European flights for those who ranked *time* first compared to those who did not. Interestingly, only one of the respondents who ranked *time* first had its work mainly located in Europe (see Q19 in 9.2). Most of them (77%) had their work located in Sweden. All other differences concerning the number of taken work-flights between *travellers*, who ranked *time* first in comparison to those who did not, were not significant.

**Table 5.** The number of trips comparing those who ranked time/no-alternative first and those who did not as the two main drivers of flying (red values are statistically significant; Own Table)

	NO ALTERNATIVE				TIME			
	Top1	Not top1	Delta	P-value	Top1	Not top1	Delta	P-value
<b>Flights total</b>	<b>2.84</b>	<b>3.36</b>	<b>-15%</b>	<b>.729</b>	<b>3.70</b>	<b>2.83</b>	<b>31%</b>	<b>.223</b>
Flights within Sweden	0.19	0.46	-59%	.480	0.13	0,41	-67%	.289
Flights within Europe	1.06	1.91	-44%	<b>.050</b>	2.37	1.08	118%	<b>.001</b>
Flights outside Europe	1.59	1.00	59%	<b>.008</b>	1.20	1.34	-11%	.592
<b>Alternative total</b>	<b>4.56</b>	<b>6.88</b>	<b>-34%</b>	<b>.078</b>	<b>5.70</b>	<b>5.73</b>	<b>0%</b>	<b>.500</b>
Alternative w. Sweden	3.94	5.42	-27%	.389	5.00	4.53	10%	.525
Alternative w. Europe	0.56	1.44	-61%	<b>.041</b>	0.67	1.15	-42%	.290
Alternative o. Europe	0.06	0.02	200%	.454	0.03	0.05	-27%	.903

### 5.2.2. Career stage

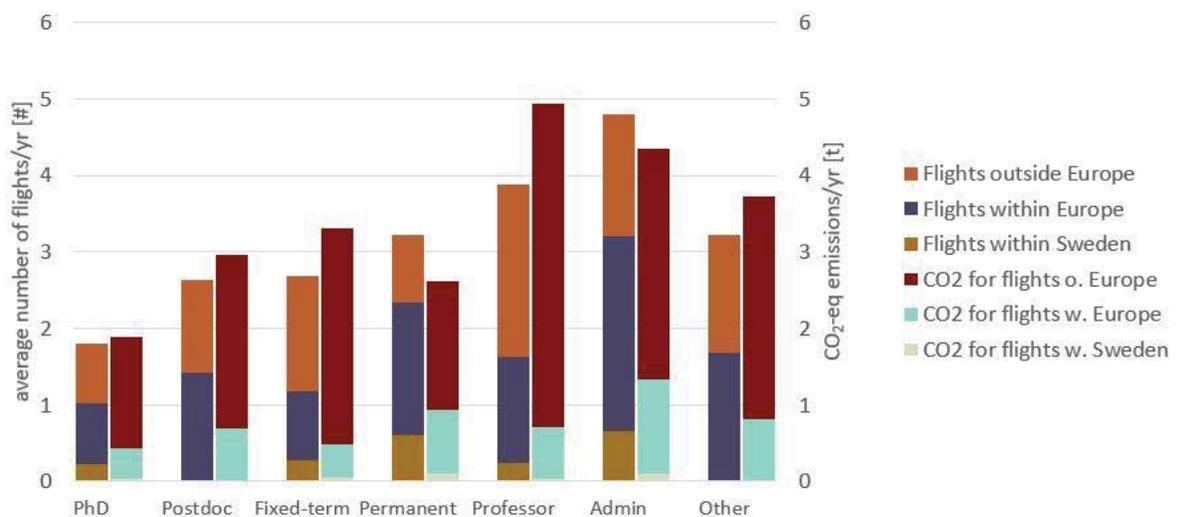
Even though the insights from LUCSUS-academics suggested that there is a difference in the number of flights taken between the different career stages (see 4.2.3), there was no statistical evidence for that. However, there was an upward trend of increasing number of flights with progressive career stages from 1.55 flights per year for PhDs to 3.88 flights per year for professors (numbers on average, see Figure 6).



**Figure 6.** Distribution of number of annual work-flights per career category. The figure shows the distribution of the number of work-flights accumulated to all destinations by career category of all survey respondents. The  $\bar{x}$  shows the average number of flights for all survey respondents in that position. With a progressive career stage from PhD to professor, the number of flights increase (Own illustration)

Interestingly, all professors ( $n=8$ ), travelled in the last year. Administrative staff had the highest share of people who did not travel (40%), which substantially lowers the average numbers of flights taken

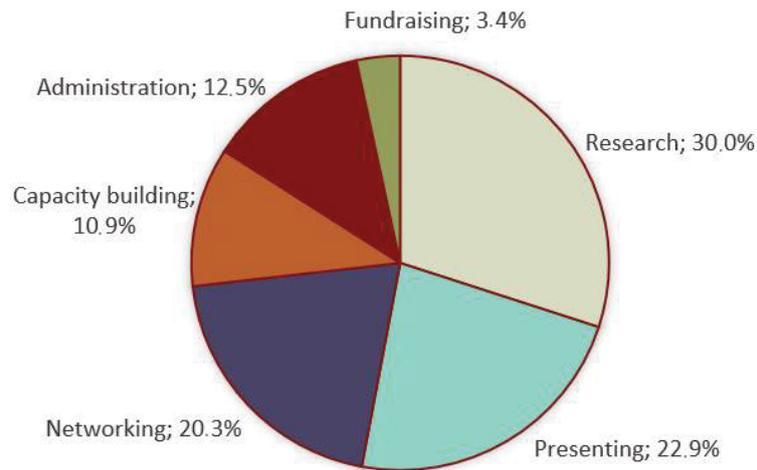
for this career category ( $\bar{x}=2.88$ , see Figure 6). However, the average of flights taken by the administrative staff who did travel was 4.80 annual flights per person and thus higher than any other category (see Figure 7). In comparison, *travelling* professors with an average of 3.88 annual flights took about one flight less per year (see Figure 7). Professors remained the highest emitters with 4.9t CO<sub>2</sub>-eq per person since they flew 40% more outside Europe compared to *travelling* administrative staff. That corresponds with the fact that professors had their work 50% more often located outside Europe than the average Swedish sustainability academic. That raises the question what are the travel purposes of academics.



**Figure 7.** Average number of annual flights and related emissions per career category for *travellers*. The figure shows the accumulated average number of flights and its related CO<sub>2</sub>-eq emissions in tons per year for travellers per career category. Even though Admin-*travellers* have the most number of annual flights, professors have the highest emissions (Own illustration)

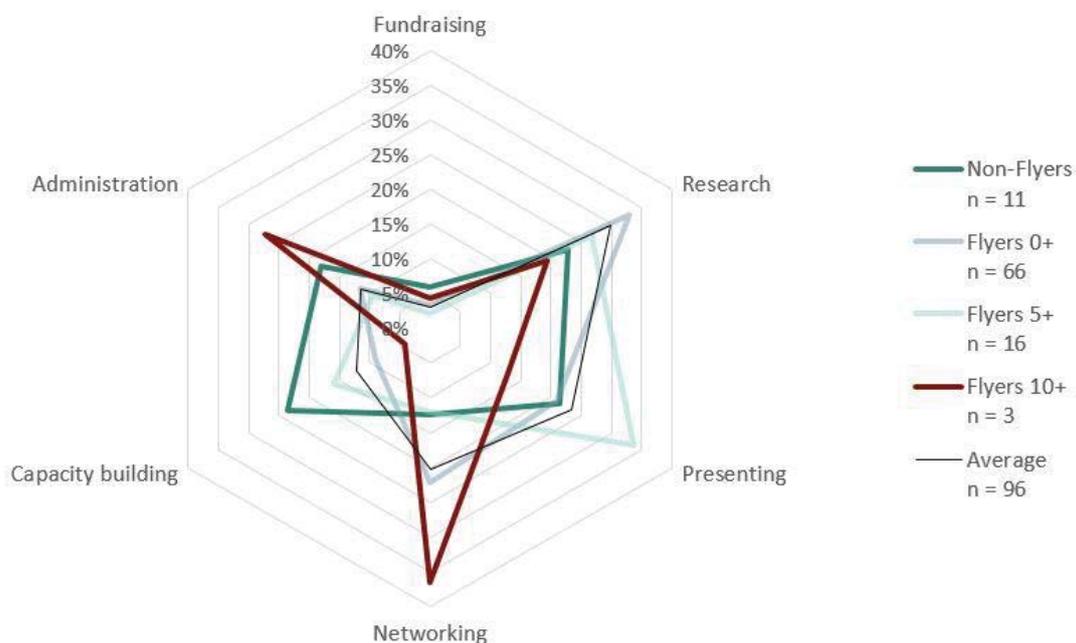
### 5.2.3. Purpose of travel

On average, *travellers* spent 30% of their time for research (see Figure 8), followed by 22.3% for presenting, 20.3% for networking, 12.5% for administrative work, 10.9% for capacity building and 3.4% for funding related purposes (see Q8 in 9.2).



**Figure 8.** Purpose of travels. Relative time allocation of Swedish sustainability academics for work-related trips. Almost three-quarters of their time is spent on research, presenting and networking (Own illustration)

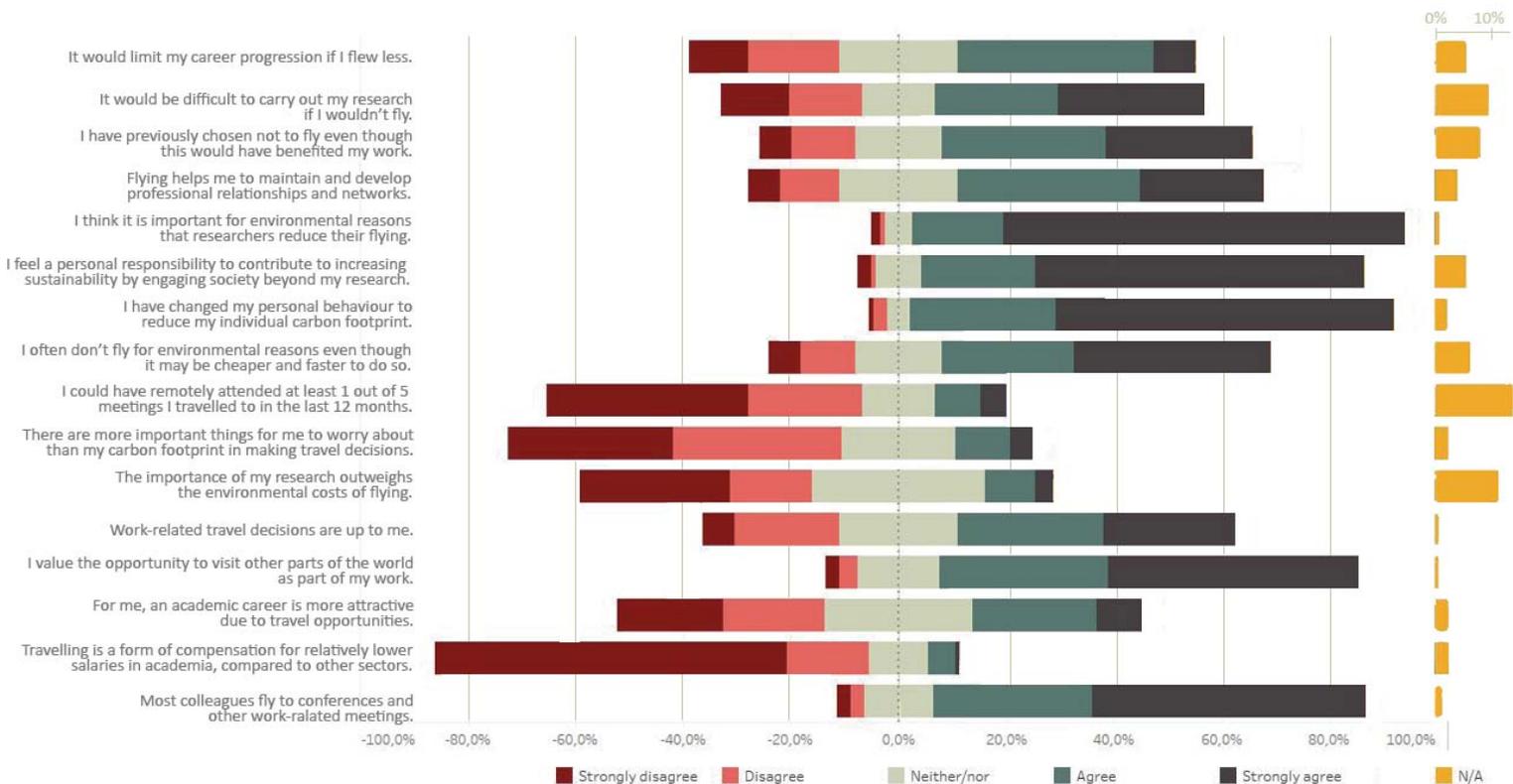
Analysis of the purpose of travel across the four groups of flying frequency (see 4.2.4) revealed that those who flew more frequently do so for different reasons than those who flew less. Individuals in the group *Flyers10+* (on average 25.7 annual flights per capita) spent considerably more time on networking (37%) and administrative work (27%) than the other groups (see Figure 9). Whereas *Non-Flyers* spent more than double the average time (24%, see Figure 9) on capacity building. Statistical analyses of these differences were not computed because of highly unequal variances that violated parametric test assumptions.



**Figure 9.** Travel purposes of different flyer groups. The figure visualises the relative time spent on different travel purposes for different groups of flying frequency. *Flyers10+* (red line) spent 64% of their time on administrative work and networking, whereas *Non-Flyers* (petrol line) spent three times as much time on capacity building than *Flyers10+* (Own illustration)

### 5.2.4. Attitudinal drivers for travel choices

Most of the sustainability academics shared the opinion that reducing flying would harm their career. About half of the respondents agreed that it would ‘limit their career progression if they flew less’ (44%) and that ‘it would be difficult to carry out their research if they would not fly’ (50%; see Figure 10; Q10m and Q10a in 9.2;). However, 58% ‘have previously chosen not to fly even if it would have benefited their work’ (see Q10o in 9.2). This is a relatively low value considering that 92% of the respondents think that ‘it is important that researchers reduce their flying’ (see Q10e in 9.2) and 82% agreed that they have ‘a personal responsibility to contribute to increasing sustainability by engaging society beyond [their] research’ (see Figure 10; Q10b in 9.2). This suggests cognitive dissonance or more structural drivers for flying like performance norms influencing their travel behaviour.



**Figure 10.** Attitudes to flying of sustainability academics in Sweden. Illustrates of results for question 10 (see 9.2; Own illustration)

Both kinds of drivers are supported by other findings of the survey. The vast majority (90%) has ‘changed [their] personal behaviour to reduce [their] individual footprint’ (see Figure 10; Q10l in 9.2). Only 14% of the respondents thought that they ‘could have remotely attended at least 1 out of 5 meetings [they] travelled to’ (see Q10j in 9.2). This suggests that respondents have changed other behaviours than flying. However, flying-related emissions tend to be a topic of interest for almost two thirds of the respondents (62%) who care about their carbon footprint when they make their

travel decisions (see Q10i in 9.2) and almost everyone (95%) talked to a colleague about the environmental impact of their work-travel (see Q11 in 9.2). Over three quarters (78%) of the survey respondents agreed to the statement: “I value the opportunity to visit other parts of the world as part of my work” (see Q10c in 9.2). Further, the majority agreed that their ‘work-related travel decisions are up to’ them (52% and only 25% think they are not, the rest was undecided; see Figure 10). Additionally, only 13% of the respondents agreed that ‘the importance of their research outweighs the environmental costs of flying’ (see Q10h in 9.2). However, I acknowledge that 44% of the respondents neither agreed nor disagreed, or chose not to answer this statement (see Figure 10). The attitudes of Swedish sustainability academics give inconclusive insights on the drivers of academic flying and need to be complemented with qualitative data.

### **5.3. Interventions to reduce flying at LUCSUS**

This section portrays qualitative results from the survey, the interviews and the workshop on the change process towards low carbon research at LUCSUS. The relevant intervention stages of organisational change (see 3.3) serve as categories for the data presentation.

#### **5.3.1. Create a sense of urgency**

At LUCSUS, two opposing views dominate the sense of urgency. Some participants perceived academic flying as an urgent matter, which needs to be tackled immediately. Those voiced the need for the debate about flying at LUCSUS: “It is not credible for us to say:...We need to reduce...emissions while we pump out carbon like crazy...We need to get our acts together and really decide on a couple of things that we...want to pull off (LUCSUS-II, workshop, 13.March.2018). Others were sceptical if changes can be implemented at LUCSUS. This group expressed that changes may not have an impact because “people will always fly” (LUCSUS-IV, workshop, 13.March.2018). Consequently, LUCSUS’ director asked: “Is LUCSUS ready to buy-into some...short-term changes?” (Boyd, personal conversation, 15.March.2018). Almost symbolically for this divide, the ‘*need*’-field on the *Design for Wiser Action*-canvas in the workshop (see Figure 3) remained blank.

The participants questioned to what extent changing academic flying (at LUCSUS in particular) has an impact on GHG-reductions from flying or if other measures might be more effective. LUCSUS’ director said, that it is up to the aviation industry to “change the incentives and the ways that flying...works” (personal conversation, 15.March.2018). She asked, “What has more impact? Shifting [the aviation industry] versus shifting five LUCSUS-academics?” Boyd contemplated, “our focus...is on...individualisation in society...which maybe hampers a bigger impact” (personal conversation, 15.March.2018). Further, another participant argued “There is a...discrepancy [between solutions]

we discuss at LUCSUS and targeting the government or the aviation industry...Maybe we should just go lobbying...[Changing academic flying is an] individual short-term solution...[that] might not be the most efficient (LUCSUS-III, workshop, 13.March.2018). However, Boyd acknowledged, “we do not see people here...targeting [an] industry” (personal conversation, 15.March.2018). In the continued discussions of the workshop, lobbying was not further pursued as a possible action even though some saw it as a more efficient intervention than reducing academic flying.

Flying was questioned as one of the most impactful actions for emission mitigation: “Is our focus travelling because it is a quick win?...Or would a quick win actually be to reduce our daily energy consumption?...Is it a quick win once we...unpack the travel aspect?” said LUCSUS’ director (personal conversation, 15.March.2018). She pointed out that, “the big questions...[concern] sociological changes.” A workshop participant thought that achieving LUCSUS’ research impact requires flying, which is why she argued, “it is not to say that we should not fly because...it is one of the most important things...that we are so much involved in other countries” (LUCSUS-IV, workshop, 13.March.2018). This attitude is also reflected in the survey results as 79% more LUCSUS-academics (23%) believed that their ‘research outweighs the environmental costs of flying’ than the average Swedish sustainability academic (13%). LUCSUS-academics expressed an uncertainty that other activities might mitigate emissions more efficiently.

Some of the LUCSUS-academics conveyed the impression that attempting to reduce flying at LUCSUS would not have much of an effect since they already reduced all the flights they can. “Do we fly too much?” (LUCSUS-III, workshop, 13.March.2018) bluntly asked one workshop participant, without concretising what “too much” exactly meant to her. One of the workshop participants also expressed, “better planning might not help that much at LUCSUS because...[the effect] would be...marginal” (LUCSUS-III, workshop, 13.March.2018). None of the LUCSUS survey respondents agreed that they could have substituted a minimum of 20% of their travels with remote participation. Therefore, Carton suggested, “to mobilise people...in LUCSUS, I think it is very necessary that we have all numbers [concerning flights at LUCSUS]” (personal conversation, 09.March.2018). As “scientists want to know...[if reducing flying] make[s] a difference” (Boyd, personal conversation, 15.March.2018). LUCSUS’ director concluded: “Even within LUCSUS, we have a disagreement between stakeholders....we can all be sensitised much more” (personal conversation, 15.March.2018).

Summing up, the qualitative data did not suggest a collective sense of urgency to tackle academic flying at LUCSUS. Some perceived it as an issue of credibility if LUCSUS does not take action. They also saw the potential at LUCSUS to reduce emissions from flying. Others remarked the limited

impact LUCSUS can have on reducing emissions from flying and motivated that LUCSUS-academics are already trying to reduce their emissions from flying.

### **5.3.2. Create a powerful coalition**

LUCSUS-academics recognised that a change could only occur as a joint effort with partners and stakeholders. They thought that a collaboration with partners is indispensable if flights should be reduced and high levels of connectedness with research partners from other institutions should be kept. If, for example, more meetings should be conducted with the help of video-conferencing: (1) “the infrastructure needs to be in place” (LUCSUS-II, workshop, 13.March.2018); (2) such an “option needs to be offered” (LUCSUS-V, workshop, 13.March.2018); and (3) accepted (LUCSUS-V, workshop, 13.March.2018). “Cultural differences” make it difficult to substitute travelling with technology as one researcher shared his experience that partners “do not...engage to the same extent” (Carton, personal conversation, 09.March.2018). Further, Boyd raised the question of competitiveness: “If we reduce...our impact [from flying]...and other sustainability academics go ahead...We will just fall out of the discourse” (personal conversation, 15.March.2018). Consequently, they said that LUCSUS’ partners would need to agree to reduce flying themselves.

Within Lund University, a number of strategical partners have been identified. Boyd mentioned the “vice-chancellor” and “research councils” who would need to prioritise academic flying in a “wider level dialogue” (personal conversation, 15.March.2018). Instead of single centres, she saw them as the ones to advocate for financial support from grant providers to reduce academic flying. More financial support would be needed: (1) for more extensive capacity building in the Global South that might simultaneously enable research in and limit flights of European researchers to these countries (Carton, personal conversation, 09.March.2018) and (2) to cover additional costs of train-travels (LUCSUS-X, see Q15 in 9.2). Additionally, the vice-chancellor would be responsible for a prioritisation of environmental concerns like flying at Lund University to get additional “resources [and]...initiatives [going]” (Boyd, personal conversation, 15.March.2018). Further, Boyd mentioned partners within the university such as the “Sustainability Forum” or the “environmental officer” (personal conversation, 15.March.2018). Both should help to advance Lund University-wide travel policies. I could not find any evidence that LUCSUS-academics are aware of any already existing initiative at Lund University to reduce flying.

LUCSUS academics identified several stakeholders within their institution:(1) Researchers, who decide who they want to invite to LUCSUS (LUCSUS-III, workshop, 13.March.2018) and where they want to travel to (Boyd, personal conversation, 15.March.2018); (2) the support staff who book travel tickets for guests (LUCSUS-V, workshop, 13.March.2018). Additionally, groups like the (3)

management board (LUCSUS-III, workshop, 13.March.2018) or the (4) *Gender, Diversity and Inclusion* committee (Boyd, personal conversation, 15.March.2018) would be strategic partners in LUCSUS' change process. In addition to these academic partners, Emily Boyd suggested to collaborate with "various partners" beyond the university boundaries such as "NGOs", "consultants" and "people [who work]...on transport, transport policy and climate change" (personal conversation, 15.March.2018). Further, participants highlighted the importance of ownership: "It needs someone who drive[s] the...change process]" (LUCSUS-II, workshop, 13.March.2018). A core group, like an "environmental committee...[would need to be] leading on that" (Boyd, personal conversation, 15.March.2018). Such an environmental committee within LUCSUS is not established yet.

### **5.3.3. Create a powerful vision**

To discuss specific change actions in the workshop, the participants formulated this guiding question: "How can we at LUCSUS create an academic culture that does not actively promote flying" (LUCSUS-X, workshop, 13.March.2018). Their consolidated vision was "more research impact with...[fewer] emissions" (LUCSUS-X, workshop, 13.March.2018). Boyd's idea of a vision for LUCSUS requires aligning LUCSUS' (travel) decisions with the Sustainable Development Goals (SDG) (personal conversation, 15.March.2018).

### **5.3.4. Eliminate obstacles that block vision**

The LUCSUS-academics identified obstacles to reduce academic flying outside and inside academia.

#### ***Dynamics outside academia***

For certain destinations, only limited alternative modes of transport exist. For example "there is no ferry to Egypt [from Europe]" (Carton, personal conversation, 09.March.2018). More than one-third of all survey respondents from LUCSUS said that better train options within Europe would encourage them to use an alternative mode of transport to flying. Additionally, a LUCSUS-academic suggested a "heavy flight tax" to tackle the environmental impact of flying (Q15 in 9.2). These obstacles might be the reasons why LUCSUS-academics perceived the government to be the most important actor for reducing emissions from academic travelling (see Q17 in 9.2).

#### ***Constraints inside academia***

Looking at constraints within the academic system, performance norms were the most discussed structural drivers for flying. In brief, the key question was "Will we be able to have a career...if we do not play by its rules? And these rules are flying" (LUCSUS-II, workshop, 13.March.2018). From an individual perspective, the LUCSUS-academics linked that to the "expectation in academia to be very

international“(Carton, personal conversation, 09.March.2018), where funders “want a lot of interaction...[and] lots of mobility of the individual” (Boyd, personal conversation, 15.March.2018). All of these criteria are promotion criteria in academia, and at LUCSUS (Boyd, personal conversation, 15.March.2018). From an institutional perspective, it means that individual academics have to meet the expectations of their institution. Academics “need to...show visibility and leadership within the community. [As a director of an institution,] I might be criticised for...not being out there all the time” (Boyd, personal conversation, 15.March.2018). LUCSUS-academics expressed the difficulties to make trade-offs between not travelling and fulfilling expectations.

Substituting travel with technology is not always an option. For big international research collaborations, travelling is a prerequisite as the LUCSUS director explained: “[We,] who will...[work on] the IPCC...Sixth assessment report,...will be travelling a lot....we have to be present at those meetings...You are making a choice by committing to it, and the importance of IPCC is huge...for LUCSUS and Lund University” (Boyd, personal conversation, 15.March.2018). Participating via Skype in smaller research meetings is accepted and for Boyd, “six out of ten times [Skype] works” as an alternative (personal conversation, 15.March.2018).

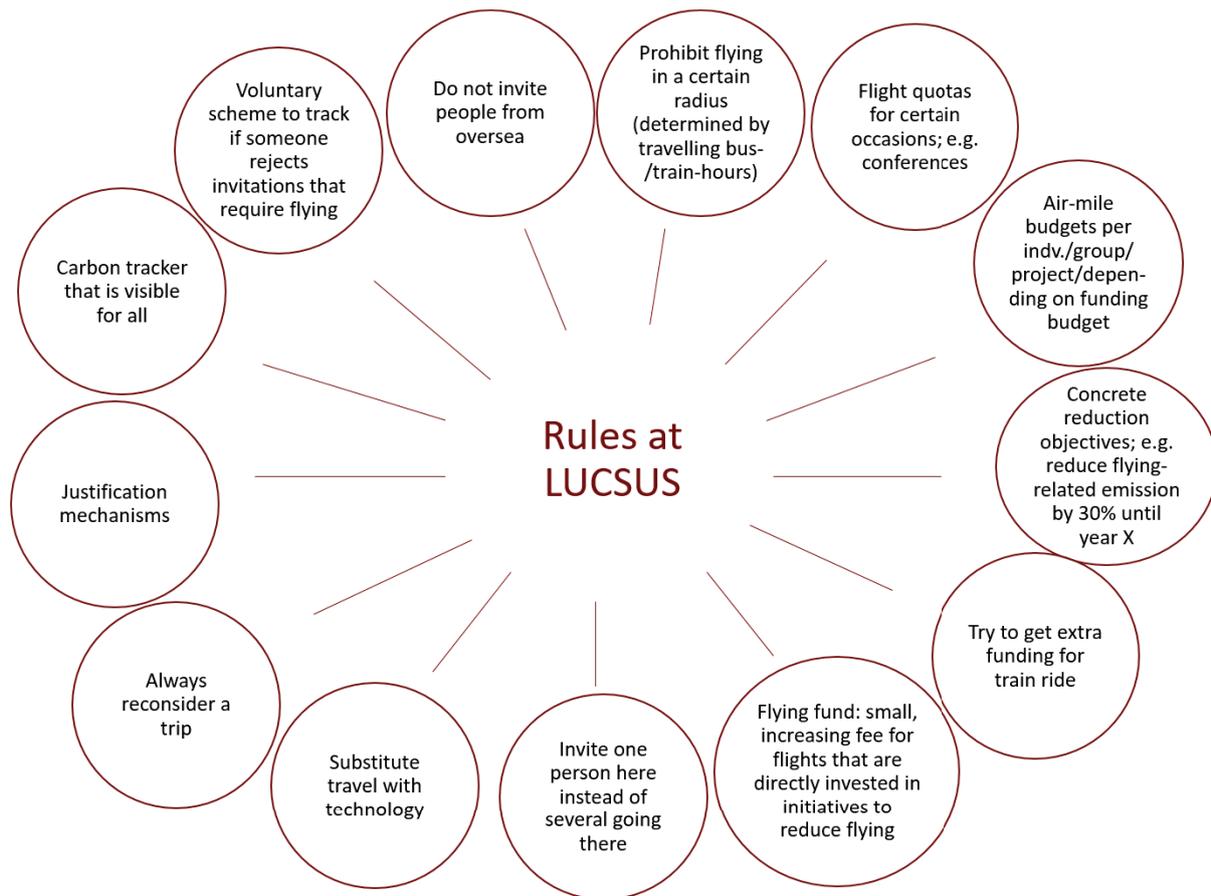
At Lund University, the current environmental policy does “not take [travel] seriously enough” (Carton, personal conversation, 09.March.2018). Some departments have a “cheapest flight policy” (LUCSUS-III, workshop, 13.March.2018) that requires them to fly even if an alternative option is available. The university’s travel agency suggests flights as the first option if available. LUCSUS-academics think that these operational issues should be addressed in a university-wide travel policy.

LUCSUS saw their institution facing a dilemma since their work “is focus[ed] on development in the Global South,” (LUCSUS-III, workshop, 13.March.2018) mainly in Africa. As a result, the number of flights and its related emissions outside Europe are higher compared to other sustainability centres. Therefore, “changing the research direction” (LUCSUS-X, workshop, 13.March.2018) might have the biggest emission-reduction-impact, LUCSUS-academics concluded. For Carton quitting flying “would put [him]...out of a job” (personal conversation, 09.March.2018). “I want to start applying for research projects that do not require to fly....[But] I guess for [others]...it is more difficult,” he continued (personal conversation, 09.March.2018). Boyd pointed out the consequences if LUCSUS’ management would pursue a change of research direction “we will lose half the people that work here [and]...the focus of our master's programme” (personal conversation, 15.March.2018). “It is very much connected to who we are,” concluded a workshop participant (LUCSUS-III, workshop, 13.March.2018). “It is a question of academic freedom....and if you want to limit that freedom” (LUCSUS-II, workshop, 13.March.2018). LUCSUS-academics framed a change of their research direction is an identity question for LUCSUS.

In addition to that, “there is...a deep political dimension...in doing development research” (Boyd, personal conversation, 15.March.2018). The Swedish government has an attempt to build research capacity in, for example, Uganda (Carton, personal conversation, 09.March.2018). At the same time, the government invests in projects in these countries that “turn out to be problematic....As Swedish researchers, we have...a responsibility to hold the Swedish government accountable for [that],” explained Carton (personal conversation, 09.March.2018). Hence, deciding on a research direction is not only an environmental but also an ethical and political trade-off LUCSUS-academics have to make.

### **5.3.5. Create short-term wins**

Despite a number of ideas on short-term wins from the ideation phase (see 4.1.2), the discussions were mainly gravitating around the impact of flight-reductions and its implications for LUCSUS (as presented above). In the ideation phase, the most discussed interventions entailed better planning of travels. Some workshop participants were not convinced that better planning is an impactful intervention as “it may not have a big potential [at LUCSUS]” (LUCSUS-II, workshop, 13.March.2018). Still, some thought that if the planning of travels would be prioritised it could reduce the number of flights. For example, one LUCSUS-academic shared that a “teacher...[needed] to divide...its [fieldwork] into two periods because there is teaching in between” (LUCSUS-V, workshop, 13.March.2018). Further, multi-purpose trips were discussed for LUCSUS-academics themselves but also for the people, they invite to LUCSUS. They perceived this as a way to increase the impact of a made trip. Besides that, a number of possible rules were proposed in the workshop, the interviews and the survey (see Figure 11). Proposed rules range from voluntary schemes (LUCSUS-X, workshop, 13.March.2018), to flight-bans in a certain travel-time radius (Carton, interview, 9.March.2018), to a form of offsetting for necessary travel (e.g. the IPCC meetings; Boyd, interview, 18.March.2018). However, these ideas (see Figure 11) were not discussed in detail as the structural challenges of academic flying dominated the discussions.



**Figure 11.** Proposed rules for LUCSUS to reduce emissions from flying (Own illustration)

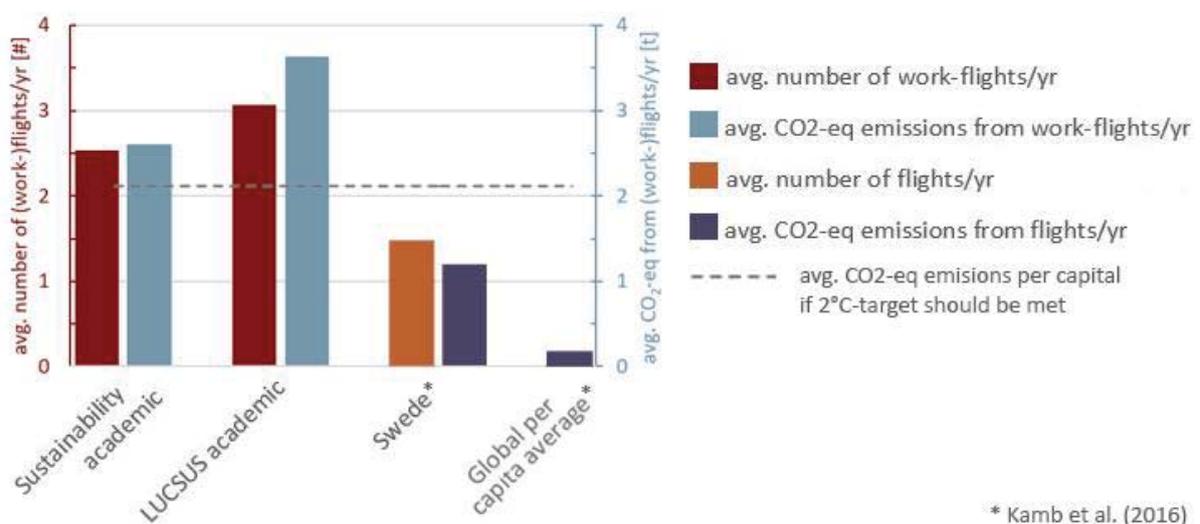
LUCSUS-academics suggested supporting measures to facilitate the enforcement of rules or travel policies. The current LUCSUS' guidelines (no flights within a 700km-radius) are not enforced (LUCSUS-V, workshop, 13.March.2018). Consequently, the LUCSUS-academics suggested making alternatives to flying more pleasurable, for example by offering "own cabins" (LUCSUS-V, workshop, 13.March.2018) for train rides or setting up a better infrastructure for video-conferences (LUCSUS-III, workshop, 13.March.2018). Using technology as a substitute would also mean that people would need to "learn,...change...[their] habits" (LUCSUS-V, workshop, 13.March.2018) and attitudes towards digital conferencing and networking if that should reduce LUCSUS' flights. One LUCSUS-academic suggested that LUCSUS should organise a digital conference to "inspire others to travel less" (LUCSUS-X workshop, 13.March.2018). To inspire others, they also suggested that they need to emphasise the opportunities that come with such new policies and behaviours (Carton, interview, 09.March.2018). Putting the focus on the benefits and opportunities might help to implement new policies.

## 6. Discussion

To meet climate goals a drastic reduction of emissions from flying is needed in the next decades. Sustainability academics have a critical role in facilitating this mitigation with their work. In Sweden, they see their responsibility to support the necessary sustainability transition. Consequently, 90% of Swedish sustainability academics engage in pro-environmental behaviour. The vast majority agrees that researchers should reduce emissions from flights. However, not even two-thirds of sustainability academics have previously decided not to fly for environmental reasons. Therefore, sustainability academics remain high individual emitters due to flying.

### 6.1. Flights and its emissions of sustainability academics in Sweden

Compared to the average Swede, sustainability academics in Sweden fly a lot. The results of this thesis indicate that these academics fly, on average, 72% more frequently for work alone than the average Swede does in total in a year (see Figure 12). The difference is even greater between LUCSUS-academics and the average Swede. LUCSUS-academics fly more than twice as much for work-related purposes than the average Swede in total. On average, Swedes emitted 1.2t CO<sub>2</sub>-eq per capita from all flights combined (Kamb et al., 2016). My results show that sustainability academics emit more than twice as much by their work-flights (+118%) as the average Swede emits from all their flights combined (work and leisure), and LUCSUS-academics even emit three times (+203%) as much (see Figure 12). This is especially worrying considering the fact that the average flying emissions of Swedes are already seven times higher than those of the global average (Kamb et al., 2016). Achieving emissions of 2.1t CO<sub>2</sub>-eq per capita requires drastic reductions, especially from Swedish sustainability academics.



**Figure 12 Average number of flights and CO<sub>2</sub>-eq emissions comparing Swedish sustainability academics, the Swedish national and global average.** The academic flights (red bars) and its related emissions (blue bars) only refer to their work-related flights. Whereas the number of flights per Swede (purple bar) and the emissions from flights of Swedes and the global per capita average (orange bars) relate to all their flights. The grey dashed line indicates the average per capita emissions if climate-targets should be met (Own illustration)

## 6.2. Trade-offs in making travel choices for Swedish sustainability academics

For emission reductions, it is necessary to understand the drivers of academic flying. My findings suggest that Swedish sustainability academics mainly fly because of two reasons: (1) There is no alternative to get to their destinations and (2) because it is faster. In comparison to the findings from the Tyndall Centre, in which time is the most important reason for flying followed by price (Le Quéré et al., 2015), the financial effort to use an alternative mode of transport is less important at Swedish sustainability centres (compare Figure 1 and Figure 5). However, Swedish sustainability academics fly more often (+12%) on average than Tyndall academics (Le Quéré et al., 2015). This is the case albeit twice as many Swedish sustainability academics (58%) than the academics at the Tyndall Centre (25%; (Le Quéré et al., 2015)) state that they 'have previously chosen not to fly even though it would have benefited their work'. Even if the comparison to the Tyndall Centre is not of central interest to this thesis, it suggests that (1) sustainability academics fly a lot in general since also the slightly lower Tyndall Centre value of flights is still transgressing sustainable limits. It further suggests that (2) it is important to look at the different contexts to understand the drivers as, for example, financial interventions might have a stronger impact at the Tyndall Centre than at LUCSUS. Additionally, it indicates that (3) fewer flights are possible and one can still be successful in sustainability science. Better targeting of flying reduction interventions can be reached when our understanding of main flying reasons is completed with its purposes.

The varying travel purposes give an indication about the efficiencies of different interventions to reduce flying. About 84% is spent on research and networking related activities, like fieldwork, presenting, capacity building and developing international partnerships in research, supporting the results of Fox et al. (2009). My results have shown that if jobs are created that require double the amount of administrative work and networking, Swedish sustainability academics fly ten times as often as the average sustainability academic in Sweden. Additionally, if an academics' work is located outside Europe, the (perceived) lack of alternatives makes academics fly to these destinations and makes them be the highest emitters. With a more detailed understanding of the travel purposes, interventions could target the main purposes more effectively. For example, if flights to African countries with the main purpose of research should be reduced then one needs to address the way research is done. One intervention could be to support the decolonisation of research. Whereas, if travels with networking as their main purpose should be reduced, establishing digital conferencing in academia could be a form of intervention. Additionally, to the knowledge about main reasons and purposes, it is important to shed light on the intentions of Swedish sustainability academics to reduce their flying.

My findings support attitudinal assumptions from the grey literature and suggest that structural drivers influence travel decisions of Swedish sustainability academics. Some answers of Swedish sustainability academics allow conclusions about the intention to reduce their flying. The beliefs that (1) researchers should reduce flying, (2) emissions are an important factor in work-related travel-decisions, (3) researchers should personally feel responsible to engage others in pro-environmental behaviour and (4) researchers did so themselves (see Figure 10), indicate that the attitude of Swedish sustainability academics towards reducing their flights is positive. Further, the intentions of behavioural change are supported by the low percentage of researchers (13%) who believe that their research would outweigh the environmental costs of flying. These findings support the call that sustainability academics should lead by example and reduce their flying (Anderson, 2013; Flying Less, 2017). However, only 58% to 61% of Swedish sustainability academics have reduced their flying. The ambiguity of their actions confirms Alcock et al.'s (2017) findings that pro-environmental attitude is not related to air travel. However, their belief about the normalisation of flying in academia (Q10k in 9.2) and their perceived low control to alter their behaviour might have led to these poor results (Q10n in 9.2). These findings support Glover et al.'s (2017) suggestions of structural drivers (that academic flying is institutionalised) from an individual perspective.

For Swedish sustainability academics, the implications of that institutionalisation mainly concern their career progression. Every second Swedish sustainability academic believed that carrying out research would not be possible and thus limit his or her career progression if he or she would not fly (see Figure 10). Glover et al. (2017) characterise expectations towards internationalisation as the main pressure to fly for academics. Surprisingly, only 16% ranked 'expectations' as a reason to fly (see Figure 5). In connection to that, the career-concerns of Swedish sustainability academics in accordance with current performance norms are justified. The STINT (2016) report showed mobile researchers are the most cited researchers in Sweden. These dynamics seem to dominate travel decisions so that the positive attitude to reduce flying are seriously hampered. This absence of behavioural shift becomes even more serious considering that climate-targets will most likely not be met without a reduction of flights.

This contradiction in individual beliefs and behaviours as well as confirmed institutionalisation of flights from an individual perspective requires (1) a more in-depth understanding of the dynamics that lead to this institutionalisation and (2) a way to change academic flying from an institutional perspective.

### **6.3. Institutionalisation of flying in the context of LUCSUS as a case**

Looking at the dynamics of the institutionalisation of academic flying in a LUCSUS-context provides a better understanding of possible interventions. At LUCSUS, the academic culture is considered as one of the main institutional drivers for academic flying. Performance standards encourage flying in academia (Glover et al., 2017) and likewise at LUCSUS. If academic flying should be reduced drastically, performance standards need to be aligned with the overall goal of sustainability science. One way to achieve that might be to align performance standards with the SDGs, as LUCSUS' director suggested. What Glover et al. (2017) concluded for university strategies applies to LUCSUS' practices: As long as mitigation ambitions from academic flying are not aligned with strategic directions and internationalisation requirements within the field of sustainability science, and at LUCSUS in particular, this conflict cannot be resolved.

The structures at Lund University complicate change efforts at LUCSUS. Environmental efforts at Lund University are mainly of voluntary nature, which does not provide a budget if an environmental committee at LUCSUS should be established. Additionally, if travels should be substituted with modern telecommunication, LUCSUS-academics would need access to such telecommunication technology and training to learn the technical and attitudinal skill towards digital networking. As another component, LUCSUS' research partners would need to have similar access and training to enable collaborative research.

Whereas such technological infrastructure is feasible in Sweden it is challenging in places where the power supply is not ensured. Some of these places are research locations of LUCSUS-academics. With 57% of LUCSUS-academics having their (field)work located outside Europe, often in Africa, they fly and emit the most compared to other sustainability centres in Sweden. So, what requires them to fly there that often? First, it is the way they do research. LUCSUS' work is focussed on a social science contribution in sustainability science with face-to-face processes (Boyd, 2018). The action-orientation of sustainability science (Kates et al., 2001) and its methodological approaches (Glassman & Erdem, 2014) encourage the interaction on-site for LUCSUS-academics. Second, grant providers have an interest in an in-person engagement of Swedish researchers. The funders do not want the researcher to stay at a certain location long-term, as the LUCSUS-director explained. Instead, a high mobility is required from researchers. Hence, quitting flying for LUCSUS would mean to give up a majority of their research funding and change their research direction.

A change in research direction at LUCSUS would cause an identity challenge. Therefore, the reduction of flights at LUCSUS cannot only be resolved with a new travel policy but requires a political organisational change.

#### **6.4. LUCSUS' reduction of flying as a political change process**

The process of flight reductions at LUCSUS has the characteristics of a political organisational change. The qualitative findings demonstrated that two opposing world-views are present at LUCSUS. The proponents of changing academic flying believe that the individual action is part of a wider, collective change and hence everyone has to contribute by mitigating its individual GHG. Therefore, LUCSUS-academics should reduce their flights as much as possible. Otherwise, they have a reduced impact on the behavioural change of their audiences (Attari et al., 2016). The opponents of changing academic flying believe that there is a dichotomy between collective and individual change. This collective change is supported by theory to bring about transitions and thus all efforts should be channelled towards this kind of change. Whereas the proponents seem to agree with these change efforts, they believe environmental costs that occur directly, should be factored higher in decision-making. For the proponents, this is important since immediate emission reductions are required to meet the 2°C-target. The reason for conflict is that none of the groups can provide evidence for the long-term impact of their actions. This tension of beliefs and the identity crisis are characteristics of the political change model.

Political change requires first- and second order change that uses a mix of tools from different change models (Kezar, 2001). At the LUCSUS change process, first-order change processes would entail travel policies. Second-order change processes need to be rooted in the beliefs of LUCSUS-academics. Examples are (1) creating of a sense of urgency at LUCSUS to reduce flying, (2) finding partners inside and outside academia to enable a wider dialogue about a reduction of flying and (3) eliminating obstacles that block the change vision. The interventions to reduce flying at LUCSUS are revealed from the analysis of the self-assessment and the institutional audit.

#### **6.5. Interventions and next steps towards a low carbon research at LUCSUS**

First-order changes at LUCSUS mainly concern the *short-term wins* and the establishment of an environmental committee at LUCSUS. Better planning to reduce the number of trips, introducing rules and schemes to ban or track flying emissions flying and setting up an internal offsetting-scheme were some of the discussed *short-term wins*. So far, these suggestions lack concrete objectives. Further, the establishment of an environmental committee, measurements to make the usage of alternative modes of transport more pleasurable and a presentation of the opportunities that come with such new policies are suggested interventions by the LUCSUS-academics. These interventions are first-order changes as they will not change the core of the organisation (Kezar, 2001) but provide evidence for the transformational – second-order – change (Kotter, 2002). Only a combination of

first- and second-order changes can help LUCSUS to overcome the structural challenges of academic flying and align LUCSUS-academics' flying behaviour with their vision.

The vision for LUCSUS' future travel behaviour lacks clarity and motivation. Although the proposed vision - "more research impact with fewer emissions" (LUCSUS-X, workshop, 13.March.2018) - was met with general approval, the motivation why people should strive for that vision remained unclear during the workshop discussions. Further, a definition of such a research impact was not developed, let alone a potential impact-assessment (further discussed below). Boyd's suggestion to align the impact-assessment with the SGDs helps to visualise the vision's direction but still does not contribute to more clarity and motivation. The vision needs some rework to improve its desirability, feasibility and imaginability (Kotter, 2002).

Second-order changes at LUCSUS mainly address the underlying values concerning academic flying and the obstacles that block the vision. The sense of urgency is insufficient at LUCSUS. From all interviewees and workshop participants, half consider an immediate change in academic travel behaviour at LUCSUS as important and half consider the change within LUCSUS as not impactful enough to sacrifice their travel. To achieve major change the majority of employees and all top executives need to believe that change is critical (Kotter, 2002). According to organisational change theory, the sense of urgency is insufficient if complacency levels are too high (Kotter, 2002). At LUCSUS, this high level of complacency is mainly triggered by one-sided performance standards. Academics at LUCSUS are not evaluated based on the net-impact of their work on a sustainability transition but on criteria such as citations and internationalisation. To assess such a net-impact is difficult as its calculation combines interconnected environmental, social and political dimensions. Nevertheless, LUCSUS-academics believe that they are already contributing to a sustainability transition with their research. That makes them questioning the net-impact of reducing flying by LUCSUS-academics and hinders their engagement in a change process. Due to a lack of impact-assessment, LUCSUS' net-impact on a sustainability transition remains uncertain. Hence, it is difficult to make an informed travel decision or suggest concrete reduction objectives.

Organisational change theory suggests that external feedback can reduce the level of complacency (Kotter, 2002). Holistic impact-assessments are not yet available for sustainable development (Dunning, 2016). Consequently, performance-feedback from external stakeholders is complicated and a certain degree of specialised knowledge is needed. However, an increased feedback from LUCSUS' research partners and its audiences might help to gain a better understanding of the perceived impact of LUCSUS' work. Additionally, it would reveal the credibility issue Attari et al. (2016) suggested for LUCSUS that is central to the argument to reduce academic flying. Additionally, external stakeholders like *Flying Less*-supporters or colleagues from the GMV and the SRC who

already implemented measurements to reduce flying at their institutes could be valuable exchange partners.

Kotter (2002) identifies a lack of responsibility as another source of complacency. Organisational change theory would then require holding more people accountable for broader performance measurements (Kotter, 2002). Collective emission targets (from air travel) with a visible tracking is one approach as suggested by a workshop participant. These goals could be guided by Swedish or European climate-targets. As a result, LUCSUS-academics would need to alter their behaviour compared to business-as-usual, which increases the sense of urgency for change and further triggers the change process.

To create a sense of urgency a powerful coalition is needed. According to Kotter, (2002) about 24% of an organisation's members need to be willing to make an extra effort to enable the change. Setting up such a coalition, LUCSUS faces the challenge of a high fluctuation of academics. More than half of the employees have a non-permanent employment with LUCSUS and the expectation of high mobility in academia makes it less likely that especially those in early career stages will participate in the entire organisational change process. Change processes usually start with two or three people and then expand throughout the organisation (Kotter, 2002). These initiators could be the suggested environmental committee at LUCSUS. Ideally, someone from the management is part of this future environmental committee and drives the next steps in the change process together with the early contributors. Key players for a coalition are people who have a high credibility within the organisation and combine leadership and management skills (Kotter, 2002). Thus, it is important to start the dialogue with key players and especially with those who have a high reluctance to change (Kotter, 2002) their flying behaviour. Some of them might be found among the group of 22% LUCSUS survey respondents who think that their 'research outweighs the environmental costs of flying'. This group is almost twice as big compared to other sustainability centres in Sweden. That suggests that changing LUCSUS' flying behaviour might be particularly difficult which highlights the importance to initiate conversations to form a powerful coalition from the beginning.

All these interventions will not bring political change as long as opposing world-views cannot be resolved. Therefore, LUCSUS' central question to answer for the next step should be: What does research impact mean at LUCSUS and how do we assess it? Specifying the definition and evaluation of research impact makes the suggested vision more feasible. New performance norms and collective mitigation targets could be set with the help of such an impact-assessment. That, in turn, would increase the responsibility of LUCSUS-academics by striving to meet the objective of the research impact and, therefore, create a sense of urgency for change. Other institutions, like other Swedish sustainability centres, universities and grant providers, would need to go through such a change

process and trigger a deinstitutionalisation of flying in academia. The difficulties of the impact assessment remain but at least for LUCSUS, there is a better understanding of where to apply future interventions.

## **6.6. Contribution to sustainability science**

The findings of this thesis provide a better understanding of academic flying at Swedish sustainability centres. Academic flying is an example of a problem with social and environmental interaction coupled. It represents a sustainability problem. This thesis discussed the underlying uncertainty of the academic flying debate: Does sustainability research as it is practised now have a net-positive impact on the sustainability transition? This uncertainty leads to a dilemma in making informed travel decisions.

Action is urgently required and this thesis sheds light on how to initiate action

- (1) by providing a better understanding of individual and structural drivers of academic flying in Swedish sustainability centres,
- (2) by applying organisational change theory to address the institutional dimension of the problem that could be helpful in change processes at other institutions and
- (3) by identifying next steps for LUCSUS to pursue the change process.

This thesis, therefore, provides evidence and a basis for LUCSUS, other sustainability centres, universities and grant providers to strive to reduce academic flying collectively as one way to pursue drastic emission mitigation.

## 7. Conclusion and future research

The findings of this thesis show that Swedish sustainability academics fly substantially more than the average Swede, more than other sustainability academics and more than individual sustainable GHG-targets would allow. However, it remains unclear whether Swedish sustainability academics are aware that their flying behaviour probably places them among the top-ranked individual emitters globally. This relation would need to be assessed by future research as these findings might increase the sense of urgency to reduce academic flying.

The main reasons for flying are time and a lack of alternatives. When Swedish sustainability academics fly, they do so for two main purposes: (1) conducting and presenting research and (2) networking. The different purposes suggest different interventions for the common goal to reduce related travelling. My findings revealed that the individual academic can eliminate some unnecessary travelling by planning better or a substitution of travels with technology. However, a sensitisation towards these flight reductions and improved infrastructure and skills are required. Future research would need to assess how some academics already manage to reduce their flying. In general, Swedish sustainability academics have a positive attitude towards the reduction of academic flying, but structural pressures, like performance norms, hinder individual efforts to reduce flying.

These structural drivers also determine travel decisions at LUCSUS. Their research focus and practices exacerbate the difficulties in making sustainable travel decisions. As a next step, LUCSUS should focus on defining and assessing their impact on the sustainability transition. Like that, clarity of the change process vision, new performance norms and concrete objectives can be developed which help to create a sense of urgency for flying reductions. Impact-assessment is also one option to resolve the tensions of world-views at LUCSUS. However, impact assessment of this kind of complex problems poses challenges. Therefore, further investigations are required to develop a methodology for such impact-assessments to allow informed decisions when committing to travels as sustainability academics.

Further, the findings have shown the need to deinstitutionalise academic flying. Institutions beyond LUCSUS have to aim at reducing their flying-related emissions. Undergoing a similar process of organisational change might help to identify fruitful avenues of interventions. If LUCSUS follows its change process successfully, LUCSUS could serve as an example for a value-based change process for other academic centres. Future research would need to assess how such processes can be spread and scaled up.

Final remarks: To discuss how and where to do sustainability research is fair. It is difficult to conclude what is the best approach to achieve a sustainability transition. Therefore, it is arguably an unsolved

problem that needs more attention. However, that competitiveness and success criteria in academia place Swedish sustainability academics among the highest emitters only with their flying behaviour is irresponsible and should be avoided by all means. Additionally, every single academic (and everyone else as well) should, despite all structural pressures, take the matter seriously and reduce as much flying as possible. It is only a few more decades (if at all) in which we can avoid disastrous outcomes of climate change and “sacrifices have to be made” as one LUCSUS-workshop participant put it.

## 8. References

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## 9. Appendices

### 9.1. Appendix A – Survey matrix

Question theme	Q-no.	Question text	Tested association	Survey design	Reference			
	1	Travel Y/N		To enable that people who didn't travel can skip the questions 2-9				
Number of trips and the related mode of transport	1-4	# trips to different destinations by plane and alternative modes of transport	To test if surveyed academics fly more than (1) average Swedes, (2) the 2°C-target requires.		(1) Kamb et al., 2016; Anderson et al., 2017 (2) Wynnes & Nicholas, 2017			
	6	Open answer: reasons	The Tyndall survey suggests the following order 1 2 3 4 5 6	to check if open question is consistent with suggested options	Le Quéré et al., 2015 Le Quéré et al., 2015			
Reasons for flying	7c	It is faster						
	7f	It is cheaper						
	7a	There is no alternative way						
	7h	It is too much hassle to use alternatives						
	7e	It is the norm for academic travelling						
	7b	It is expected from my university/project						
	7d	It is more comfortable						
	7g	I don't fly for work		Since it was a required question, I needed to give those who didn't fly an answer possibility as well				
Travel purpose	8c	Funding related	The Fox et al. self-assessment suggests 5%		Fox et al., 2009			
	8f	Administration	11%		Fox et al., 2009			
	8a	Research			Fox et al., 2009			
	8b	Networking	84%	These categories are separated since the interventions might be differing for the different purposes.	Fox et al., 2009			
	8d	Presenting						
	8e	Capacity building	Not included but maybe understood to be part of research and networking					
	9	Other purposes		Possibilities to name other purposes to capture all travel purposes of academics.				
Attitude			The Tyndall survey suggests the following attitudes for sustainability academics.		Le Quéré et al., 2015			
			Strongly disagree or disagree	Tend to disagree	Neither/n agree	Tend to agree	Strongly agree	N/A
	10a	It would be difficult to carry out my research if I would not fly.	24%	22%	23%	18%	9%	5%
	10c	I value the opportunity to visit other parts of the world as part of my work.	1%	4%	15%	37%	38%	5%

Question theme	Q-no.	Question text	Tested association				Survey design	Reference	
			Strongly disagree	Tend to disagree	Neither/n or agree	Tend to agree	Strongly agree	N/A	
	10d	Flying helps me to maintain and develop relationships/networks.	5%	16%	25%	32%	15%	6%	Le Quéré et al., 2015
	10g	I don't fly for environmental reasons even though it may be cheaper and faster.	15%	13%	20%	15%	32%	5%	Le Quéré et al., 2015
	10i	There are more important things for me to worry about than my carbon footprint in making travel decisions.	34%	27%	20%	14%	0%	5%	Le Quéré et al., 2015
	10m	It would limit my career progression if I flew less.	11%	15%	27%	32%	9%	6%	Le Quéré et al., 2015
	10o	I have previously chosen not to fly for environmental reasons even though this would have benefited my work.	16%	18%	35%	10%	15%	5%	Le Quéré et al., 2015
	10h	The importance of my research outweighs the environmental costs of flying.	To test statement from comment by Pedelty.						Pedelty, 2008
Attitude	10b	I feel a personal responsibility to contribute to increasing sustainability by engaging society beyond my research.	To test: (1) if Attari et al.'s findings are relevant to the surveyed academics; (2) if surveyed academics perceive this responsibility as several accounts on the hypocrisy of academics concerning academic flying state.						(1) Attari et al., 2016 (2) Anderson, 2013; Balmford et al., 2017; Fox et al., 2009
	10l	I have changed my personal behaviour to reduce my individual carbon footprint.	To test if surveyed academics engage in pro-environmental behaviour on the ground but still fly.						Alcock et al., 2017
	10f	Travelling is a form of compensation for relatively lower salaries in academia, compared to other sectors.	To test affective motives.						Le Quéré et al., 2015; Pedelty, 2008
	10p	For me, an academic career is more attractive due to travel opportunities.	To test if the normalisation of flying in academia influenced career decisions.						
	10j	I could have remotely attended at least 1 out of 5 meetings I travelled to in the past 12 months without a negative effect on my career.	To test the level of complacency concerning a reduction of flights.						Kotter, 2002

Question theme	Q-no.	Question text	Tested association	Survey design	Reference
			To test if flying decisions are conscious decisions (planned behaviours) by testing the following beliefs and behaviours:		
	10e	I think it is important for environmental reasons that researchers reduce their flying.			Ajzen, 2002
	10h	The importance of my research outweighs the environmental costs of flying.	Beliefs about consequences of behaviour (attitude)		Ajzen, 2002
	10i	There are more important things for me to worry about than my carbon footprint in making travel decisions.			Ajzen, 2002
	11	Talked to a colleague Y/N			
	10k	Most colleagues fly to conferences and other work-related meetings.	Belief about normative expectations of behaviours (subjective norm)		Ajzen, 2002
	10n	Work-related travel decisions are up to me.	Belief about factors that facilitate/impepe behaviour (preceived control)		Ajzen, 2002
Decision making	10b	I feel a personal responsibility to contribute to increasing sustainability by engaging society beyond my research.	Intention		Ajzen, 2002
	10g	I often don't fly for environmental reasons even though it may be cheaper and faster.			Ajzen, 2002
	10o	I've chosen not to fly for environmental reasons even though this would have benefited my work.	Past-behaviour		Ajzen, 2002
	10l	I have changed my personal behaviour to reduce my individual carbon footprint.			Ajzen, 2002
Know-ledge	12	% of CO2-eq emissions for described lifestyle	To test if surveyed academics are aware of the impact of flying on the individual carbon footprint and if it impacts their flying behaviour.		Alcock et al., 2017
Research location	13	Country where research/work has been located	To test how the location of their work impacts flying behaviour.		

Question theme	Q-no.	Question text	Tested association	Survey design	Reference
			The Tyndall survey suggests that the following percentage of people see these interventions as encouraging to reduce their work-related flights:		
	16a	Reduced travel time	51%		Le Quéré et al., 2015
	16b	Financial support from your institution/grant providers	76%		Le Quéré et al., 2015
	16c	More information	24%		Le Quéré et al., 2015
	16d	A reward scheme which gives benefits for using non-aviation modes of transport	52%		Le Quéré et al., 2015
	16e	Reduced costs of non-aviation alternatives	71%		Le Quéré et al., 2015
	16g	Other colleagues reducing their air miles	19%		Le Quéré et al., 2015
	16i	Support from your institution/grant provider in terms of time flexibility	72%		Le Quéré et al., 2015
	16j	Recognition by research funders to cover additional costs	71%		Le Quéré et al., 2015
	16h	Guidance on how to differentiate necessary from unnecessary travel	To test how efficient a decision tree would be at LUCSUS.		Le Quéré et al., 2015
	16k	Better support from travel agencies for alternatives to flying (incl. easier booking)	To test if an improved train/bus booking system of ViaEgencia would encourage LUCSUS academics to reduce their flights.		This has been stated as an issue by several LUCSUS-academics before the survey.
	10j	I could have remotely attended meetings I travelled to	To test how efficient a substitution by technology would be to reduce flying.		Borggren et al., 2013
	16l	Improved teleconferencing facilities/equipment/software at my institution	To test how efficient a substitution by technology would be to reduce flying.		Kotter, 2002
	16f	Recognition for virtual lectures by institution/grant providers	To test if such a substitution is currently rewarded		
	5	Number of accompanied colleagues for flights	To test if it has an effect to reduce the number of people from the same institution to go to the same occasion.		Fox et al., 2009
<b>Intervention to reduce flying</b>					

Question theme	Q-no.	Question text	Tested association	Survey design	Reference
Responsible actor	10a	I feel a personal responsibility to contribute to increasing sustainability by engaging society beyond my research.	To test: (1) if Attari et al.'s findings are relevant to the surveyed academics; (2) if surveyed academics perceive this responsibility as several accounts on the hypocrisy of academics concerning academic flying state.		(1) Attari et al., 2016 (2) Anderson, 2013; Balmford et al., 2017; Fox et al., 2009
	17	Ranking of the actors (government, grant providers, aviation industry, academic culture, researcher, university)	To test which actor LUCSUS-academics perceive as the most important to reduce academic flying		
Institution	14	Institution	To test how LUCSUS' results differ from the other		
Career stage	18	Position	To test if the career stage is influencing the flying behaviour.		
Home country	19	Home country	To test how affective motives influence the flying behaviour.		
Demographics	20	Age			
	21	Gender	To test how demographics influence the flying behaviour.		Alcock et al., 2017; Balmford et al., 2017
	22	Care-taker			

## 9.2. Appendix B – Full survey

### Travel Choices of Swedish Academics

3%

[Exit Survey](#) ↗

#### Study on work-related travelling at Swedish sustainability centres

This study aims to assess travel choices by researchers at Swedish sustainability centres. The findings will be used to understand current choices and inform future sustainable travel strategies, as part of my master's thesis at Lund University.

All teachers, researchers (incl. PhD students, postdocs, lecturers, and professors) and administrative staff (incl. coordinators, communications, HR, finances, head of office etc.) at Swedish sustainability centres are invited to participate in this survey.

The survey will take **roughly 15 minutes** to complete. I highly appreciate your participation.

##### *Survey and survey results*

- Please note that due to methodological reasons this survey contains repeated questions. Thank you for answering all questions.
- Even though all questions are voluntary, please try and answer the full survey. A good estimation is more useful than an incomplete survey.
- The results of this thesis will be published via Lund University online and in print. They may subsequently be published in scientific journals or presented during presentations.
- If you would like to receive a copy of the final thesis, please submit your email at the end of the survey.

##### *When?*

- The survey will be open from 22 February 2018 to 05 March 2018.

##### *Your data*

- Your participation in this survey is voluntary.
- Your answers will remain anonymous.
- You have the right to terminate the survey at any time.

##### *Contact*

- If you have any questions regarding the research, please do not hesitate to contact me [isabell.burian@gmail.com](mailto:isabell.burian@gmail.com). Your contact details will not be shared.

By completing the survey, you agree to these conditions.

Thank you for your participation.  
Isabell Burian

Please start with the survey now by clicking the 'Next' button below.



LUND UNIVERSITY

Next

Q1) \* Did you travel for work over 180 km one way in the last 12 months?

- a.  Yes.
- b.  No.

Q2) \* How many work-related flights did you take in the last 12 months? Please fill in the number of flights according to listed destinations. One round-trip counts as one flight. *If applicable, it is okay to write 0. Please see the question tip if you're unsure how to answer. Please count the number of domestic flights only for the first category "Within Sweden" and not for the "Within Europe"-category.*

a. Within Sweden

b. \* Within Europe

c. \* Outside Europe

Q3) \* On how many work-related trips over 180 km one way in the last 12 months did you use an alternative to flying (e.g. train, bus, ferry, car etc.)? Please fill in the number of trips according to the destinations listed below. One round-trip counts as one trip. *If applicable, it is okay to write 0. Please count the number of domestic trips only for the first category "Within Sweden" and not for the "Within Europe" category. Please see the question tip if you're unsure how to answer.*

a. Within Sweden

b. \* Within Europe

c. \* Outside Europe

Q4) How many personal (non-work) flights did you take in the last 12 months? Please fill in the number of flights according to the destination below. One round-trip counts as one flight. *If applicable, it is okay to write 0. Please count the number of domestic trips only for the first category "Within Sweden" and not for the "Within Europe" category. Please see the question tip if you're unsure how to answer.*

a. Within Sweden



b. \* Within Europe

c. \* Outside Europe

Q5) How many people from your institute/university (on average) accompanied you on your work-related flights in the last 12 months?

- a.  Nobody      b.  1-2      c.  3-4      d.  5-6      e.  Other, please specify

Q6) When you choose to fly for work, what is the main reason for you to fly instead of using another mode of transport?

Q7)\* When you choose to fly for work, why do you fly? Please order the following statements according to their importance. Please only use the statements which are applicable to you.

Drag your choices here to rank them

a.	I fly because there is no alternative way to get to certain destinations
b.	I fly because it is expected from my university/research project
c.	I fly because it is faster than alternative modes of transport
d.	I fly because it is more comfortable than alternative modes of transport
e.	I fly because it is the norm for academic travelling
f.	I fly because it is cheaper than alternative modes of transport
g.	I don't fly for work
h.	I fly because it is too much hassle to use alternative modes of transport

Choose at least 1 choice to rank them

**Q8) \* For all work-related travels in the last 12 months, how did you spend your total time across all trips?**

Please allocate the relative time you spent on the given categories. Please allocate a total of 100 percent to the applicable categories. If any of the categories are not applicable to you, it is okay to allocate 0. Please consider the final purpose of the trip, i.e. for a conference, it could be 50% networking and 50% presenting your research. (?)

a. <b>Research:</b> e.g. conduct field work, collaborate with colleagues on a specific research project	<input type="range"/>	%
b. <b>Networking:</b> e.g. meet new people, catch up with colleagues and friends	<input type="range"/>	%
c. <b>Funding related:</b> e.g. report to project funders, grant proposal writing, review or evaluate grant proposals, fundraising	<input type="range"/>	%
d. <b>Presenting:</b> e.g. present your research, give a keynote, be part of a panel discussion	<input type="range"/>	%
e. <b>Capacity building:</b> e.g. training, summer schools, teaching	<input type="range"/>	%
f. <b>Administration:</b> e.g. project management, develop partnerships with other organisations, representational meetings	<input type="range"/>	%

0

Values must add up to 100

**Q9) Were there any other purposes for work-related trips you flew for in the last 12 months, which are not provided in the set answers of the previous question?**

- a.  No.
- b.  Yes, please specify

**Q10) Please indicate how much you agree with the following statements (related to your work):**

	strongly disagree	neither agree or disagree	strongly agree	N/A
a. It would be difficult to carry out my research if I would not fly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. I feel a personal responsibility to contribute to increasing sustainability by engaging society beyond my research.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. I value the opportunity to visit other parts of the world as part of my work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Flying helps me to maintain and develop professional relationships and networks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. I think it is important for environmental reasons that researchers reduce their flying.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

		strongly disagree		neither agree or disagree		strongly agree	N/A
f.	Travelling is a form of compensation for relatively lower salaries in academia, compared to other sectors.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g.	I often <u>don't</u> fly for environmental reasons even though it may be cheaper and faster to do so.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
h.	The importance of my research outweighs the environmental costs of flying.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
i.	There are more important things for me to worry about than my carbon footprint in making travel decisions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
j.	I could have remotely attended (e.g. via Skype) at least 1 out of 5 (20% of the) meetings I travelled to in the past 12 months without a negative effect on my career.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
		strongly disagree		neither agree or disagree		strongly agree	N/A
k.	Most colleagues fly to conferences and other work-related meetings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
l.	I have changed my personal behaviour to reduce my individual carbon footprint (e.g. eating less meat, driving less, using a green energy provider).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
m.	It would limit my career progression if I flew less.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
n.	Work-related travel decisions are up to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
o.	I have previously chosen not to fly for environmental reasons even though this would have benefited my work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
p.	For me, an academic career is more attractive due to travel opportunities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q11) **In the last 12 months, have you ever talked to a colleague about the environmental impact of your work travel behaviour?**

a.  Yes.

b.  No.

Q12) \* **Please estimate the annual breakdown of emissions (CO<sub>2</sub>-equivalents) for a Swede, assuming that this person:** has an omnivorous diet, lives in a medium-size apartment (60-90m<sup>2</sup>), uses national standard energy supply and uses energy-saving appliances, commutes 20min daily by car to work, takes two flights Stockholm-Amsterdam and one flight Stockholm-New York City per year and consumes goods and services at an average level. *Please allocate a total of 100 percent to the applicable categories. One round-trip counts as one flight.*

a. Food	<input type="range"/>	<input type="text"/>	%
b. Home & energy	<input type="range"/>	<input type="text"/>	%
c. Daily commute	<input type="range"/>	<input type="text"/>	%
d. Flights	<input type="range"/>	<input type="text"/>	%
e. Goods & Services	<input type="range"/>	<input type="text"/>	%
f. I don't know	<input type="range"/>	<input type="text"/>	%

0

Values must add up to 100

Q13) **In the last 12 months, where has your research been located?** *If you didn't conduct research please indicate where you predominantly worked. Press 'Shift/Cmd/Open' to select multiple countries.*

Afghanistan

Albania

Algeria

Andorra

Q14) \* **Please choose your institution:** *If you are from a different department than those listed below please choose 'other' and specify.*

-- Select --

-- Select --

CEMUS/CSD, Centre for Environment and Development Studies, Uppsala University or SLU

LUCSUS, Lund University Center for Sustainability Studies

GMV, Centre For Environment And Sustainability, Gothenburg University

SRC, Stockholm Resilience Centre, Stockholm University

TEMAM/TEMAT, Linköping University

Other, please specify

Q15) **What would encourage you to use alternatives modes of transport, instead of air travel, for work purposes?**

**Q16) Which of the following interventions (if any) would encourage you to use alternative modes of transport, instead of air travel, for work purposes?** *Multiple answers acceptable*

- a.  Reduced travel time with non-aviation modes of transport
- b.  Financial support from your institution/grant providers to subsidise additional costs of non-aviation modes of transport
- c.  More information about benefits of non-aviation modes of transport
- d.  A reward scheme in your institution/from grant providers which gives benefits for using non-aviation modes of transport
- e.  Reduced costs of non-aviation alternatives
- f.  Recognition for virtual lectures by institution/grant providers
- g.  Other colleagues in similar circumstances taking steps to reduce their air miles
- h.  Guidance on how to differentiate necessary from unnecessary travel
- i.  Support from your institution/grant provider in terms of being flexible about potential increased journey time
- j.  Recognition by research funders of the potential extra costs and demands from avoiding flying
- k.  Better support from travel agencies for alternatives to flying (incl. easier booking)
- l.  Improved teleconferencing facilities/equipment/software at my institution

**Q17) Please rank these actors based on their responsibility for reducing emissions from academic travelling.**

*Please only use the actors which you think are applicable.*

Drag your choices here to rank them

a.	government	
b.	grant provider	
c.	aviation industry	
d.	academic culture	
e.	researcher (or the person who is travelling)	
f.	university/supervisor/department head	

**18) \* What best describes your current position?**

- a.  PhD Student
- b.  Postdoc
- c.  fixed-term (non-permanent) contract (e.g. biträdande lektor)
- d.  permanent contract (e.g. lecturer and senior lecturers)
- e.  Professor (full professor)
- f.  Administrative Staff (e.g. coordinators, HR, finances, communication)
- g.  Other, please specify

Q19) Which place do you consider home?

-- Select --  
-- Select --  
Afghanistan  
Albania  
Algeria  
Andorra  
Angola

Q20) \* What is your year of birth?

Year

--  
--  
1918  
1919

Q21) Which of the following best describes how you think of yourself?

- a.  Woman
- b.  Man
- c.  In another way
- d.  Prefer not to say

Q22) Do you have children or pets at home or do you take care of a sick relative or friend? *Please answer 'Yes' if any of these options apply.*

- a.  Yes.
- b.  No.
- c.  Other, please specify

Q23) Please leave your email address if you are willing to be interviewed further or want to receive a copy of the final thesis. *Please check the applicable boxes and insert your email address. Your email address will only be used to contact you. Your data still remain anonymous.*

- a.  I am willing to be interviewed further
- b.  I would like to have a copy of the final thesis
- c.  Please insert your email address:

**Q24) Do you have any comments about the survey? Is there any question which should have been asked?**

*This is an open comment box. You are invited to leave anything which comes up to your mind about the study.*

**Please submit your answers by clicking the 'Done' button below.**

Done

***Thank you very much for participating.***

**Please help by forwarding this survey to colleagues.**

This will greatly help to increase the significance of this study and, therefore, inform possible future solutions for sustainable travel policies at Swedish sustainability centres as part of my master's thesis. Your colleague will not get any information about the responses you gave.

Please copy this text and send it to your colleagues working at Swedish sustainability centres:

Hej,

I participated in a survey from a master's student at Lund University concerning 'travel choices in academia'. Please help to give a complete picture. The survey only takes 15 minutes and it would increase the significance of the analysis.

Please follow this link:

<https://www.questionpro.com/t/AN9aPZbc8q>

Thanks a lot for your support.

Thank you so much. I appreciate your support.

Isabell Burian

[Thank you for completing this survey.](#)

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All question numbers have been added to facilitate referencing in the thesis text. They have not been displayed in the online format of the survey.

All response choices circled with a purple circle are based on a survey at the Tyndall Centre (Le Quéré et al., 2016) to be able to compare results. The responses choices have been slightly changed.

**Q7** All questions with an orange question number had randomised responses choices.

### **9.3. Appendix C – Interview guides**

#### **9.3.1. Interview guide Wim Carton**

##### Research project

- What are your current research projects? Where are they located and how does that influence your flying behaviour?
- How many research partners do you have at the research location?
- How long are your stays if you travel to the research locations?
- What do you do at the research location?

##### Other travel purposes

- Tell me about your postdoc exchange programme you are currently doing
- Do you have any obligations by your grant providers that require travels?
- How many conferences do you attend?

##### Survey responses

- What do you mean if you say that you only travel 'if there is no alternative'?
- Why could you not have attend a meeting remotely?
- Why do you not think that your travel decisions are up to you?
- Why did you rank 'academic culture' first and why did you not rank 'grant provider' and 'aviation industry' as responsible actor for reducing emissions from academic flying?

##### Interventions

- How could you reduce your travelling?
- Which options for flight-reduction do you see in academia in general?
- What is LUCSUS' current travel policy?
- What is Lund University's current travel policy?
- How did the conversation about reducing flying started at LUCSUS?
- How would you book a train for a work-related trip?
- Do you think LUCSUS should offset?

### **9.3.2. Interview guide Emily Boyd**

#### Workshop experiences

- Most responsible actors to reduce flying in academia
- Time-impact discussions about the chosen ideas
- Design for Wiser Action canvas:
  - o What do you think is the need to change academic flying at LUCSUS?
  - o Who are the partners and stakeholders in such a change process?
  - o How would such a change process work in corporation with Lund University?
  - o Do you see a potential in arranging multi-purpose trips?
  - o The workshop participants suggested another workshop on a LUCSUS-travel policy. What do you think about that?

#### Interventions

- How much can LUCSUS influence Lund University's travel policy?
- Is lobbying at grant providers something LUCSUS can do?
- How much is capacity building in countries of the Global South financed?
- Is one objective of such capacity buildings to make travel obsolete in the long run?
- It seems to be important what LUCSUS emits in comparison to other centres. Why?